# Appendix E-5: Alternative Development
## Lower Passaic River and Hackensack River Package

## Hudson Raritan Estuary Ecosystem Restoration

## Draft Integrated Feasibility Report & Environmental Assessment
February 2017

**Prepared by the New York District, North Atlantic Division,
U.S. Army Corps of Engineers**

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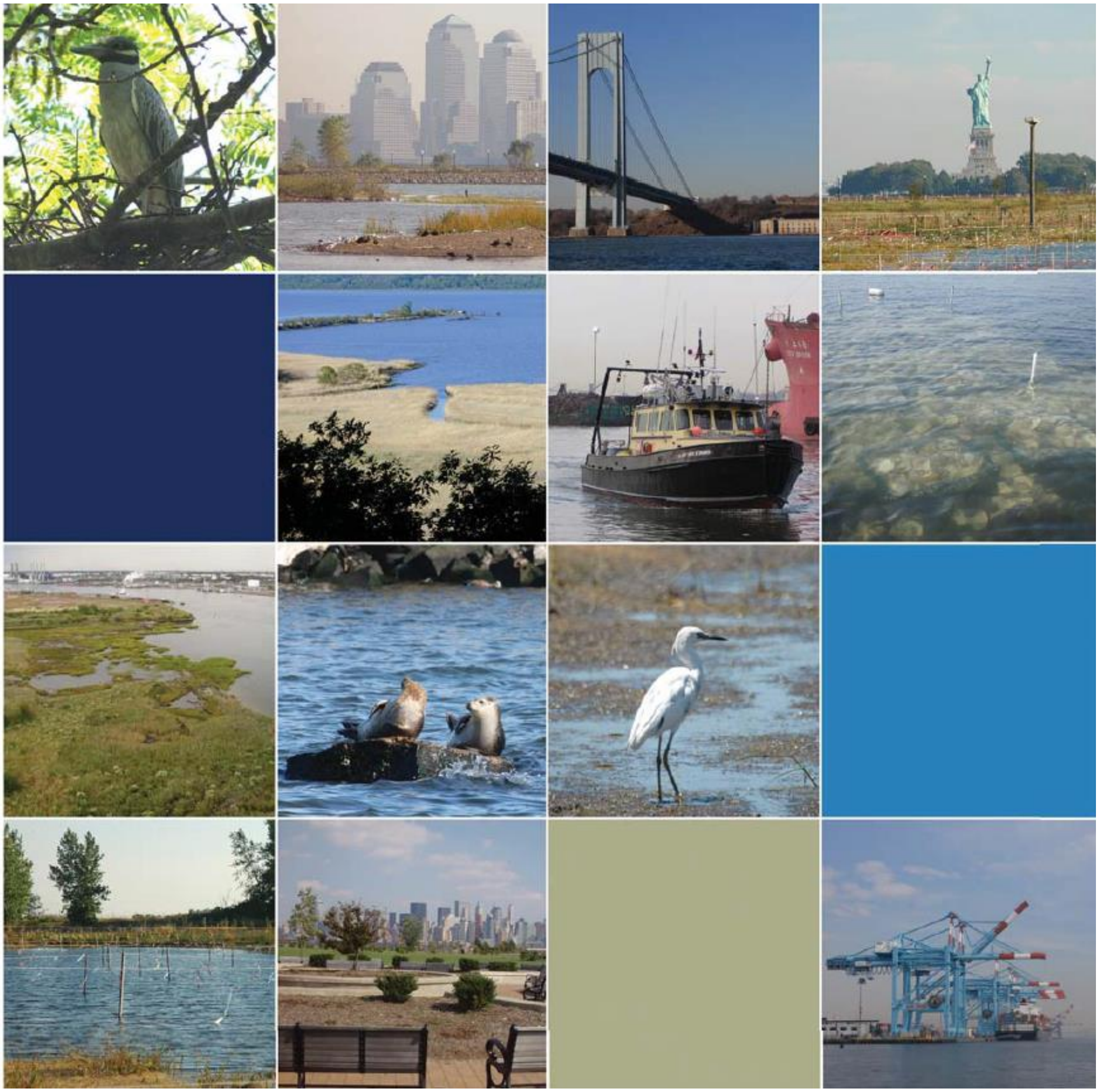

## Executive Summary

The U.S. Army Corps of Engineers (USACE) is conducting a feasibility study of ecosystem restoration opportunities within the Hudson-Raritan Estuary (HRE). The Lower Passaic and Hackensack Rivers are located within the Newark Bay, Hackensack River, and Passaic River Planning Region. The area has been heavily developed and industrialized since the mid-nineteenth century. This industrial activity has resulted in the degradation of wetlands, discharges of effluents into the streams and rivers, and dumping of industrial waste, thereby contaminating river sediments and adversely impacting fish and wildlife habitat. Shorelines, tidal shallows, natural river channels and riparian forests have been greatly modified by construction of bulkheads, other shoreline alterations, and channel dredging. Dams and tide gates reduce stream connectivity and freshwater flow to Newark Bay, and block upstream and downstream passage of migratory fish.

The restoration opportunities within this planning region had been identified pursuant the HRE-Lower Passaic River and HRE-Hackensack Meadowlands "source" feasibility studies. The Lower Passaic River "source" study was initiated in 2003 with New Jersey Department of Transportation (NJDOT) as non-federal sponsor as part of a Governmental Partnership with U.S. Environmental Protection Agency (USEPA) and Natural Resource Trustees (National Oceanic Atmospheric Administration [NOAA], U.S. Fish and Wildlife Service [USFWS], New Jersey Department of Environmental Protection [NJDEP]). The "source" study was a joint Remedial Investigation/Feasibility Study (RI/FS) with USEPA combining both the USACE Water Resource Development Act (WRDA) and USEPA Superfund Program (Comprehensive Environmental Response, Compensation, and Liability Act, 1980 [CERCLA]) to comprehensively remediate and restore the Lower Passaic River basin.

As part of the HRE-Hackensack Meadowlands Ecosystem Restoration "source" feasibility study, the USACE and the New Jersey Meadowlands Commission, prepared the Meadowlands Environmental Site Information Compilation (MESIC) Report (USACE, 2004) and the Meadowlands Comprehensive Restoration Implementation Plan (MCRIP) (USACE, 2005). A total of 52 restoration opportunities were identified along the mainstem of the Passaic River (23) and its tributaries (29). Significant data collection during the coordinated RI/FS was utilized to inform the restoration planning effort. Sites were screened in coordination with NJDEP, partner agencies, the Community Advisory Group (CAG), and a design charrette with NJDEP and the NOAA (June 2015). Through the site screening process a total of seven (7) project sites were identified for focused investigations and design development.

The existing conditions of the seven (7) project sites, plus the additional reference sites, were assessed during field investigations in the summer of 2015. In addition to data gathered during the field studies, information on site geology, historic river geomorphology, and soils was also compiled and reviewed. Finally, desktop studies of potential uniqueness and heritage elements, as well as water quality classifications, were gathered. The baseline conditions will be used as the basis for determining the appropriate restoration actions to be recommended for each site.

The baseline ecosystem function at the sites were assessed with the Evaluation of Planned Wetlands (EPW) technique supplemented with the Natural Resources Conservation Service's (NRCS) Stream Visual Assessment Protocol (SVAP), a stream-specific functional assessment.

The EPW technique was used to determine baseline ecosystem function at the sites. The EPW evaluates a site on six (6) major wetland functions or Functional Capacity Indicators (FCIs): Shoreline Bank Erosion Control (SB); Sediment Stabilization (SS); Water Quality (WQ); Wildlife (WL); Fish [Tidal fish (FT), Non-tidal Stream/River (FS), Non-tidal Pond/Lake (FP)] and Uniqueness/Heritage (UH). The

FCIs are then multiplied by the Wetland Assessment Area (WAA), the approximate acreage of studied wetlands at a site, to derive the Functional Capacity Units (FCUs). The FCIs represents the “quality” of functional capacity per unit area, whereas the FCUs represent the “quantity” of functional capacity. The results of the EPW baseline scores for the seven (7) project sites Section 6 of this report.

It should be noted that the EPW metrics are scored independently with separate FCIs calculated using equations that vary in their weighting of the metrics. This methodology led to the Passaic River reference site scoring lower-than some of the CRP project sites for some of the FCIs. There are several reasons for this outcome. First, EPW does not consider typical anthropogenic infrastructure as a negative for those FCIs relating to stability. Second, EPW does not consider sewage or other non-hazardous human inputs in the WQ calculation. Third, indicators of quality fish habitat are not factored into the WQ FCI; they are only factored into the Fish FCI. Lastly, the EPW methodology focuses on wetland functional indicators as opposed to specific indicators of stream functionality. Therefore, it may not be appropriate to compare the EPW baseline scores for the project sites to one another, and in some instances to the reference site. However, following the completion of the conceptual alternative designs for the project sites, the baseline FCIs and FCUs should be compared to the scores for the planned wetland conditions to quantity the ecological uplift on a site-specific basis.

To supplement the EPW, NRCS’s SVAP, a stream-specific functional assessment, was used to assess hydrologic, habitat, and morphologic stream conditions that were not addressed within the scope of the EPW. Any overall SVAP assessment score under 6 is determined to be poor and any score over 9 is excellent. Sites with fewer impacts to their natural stream geomorphology, as well as sites with less development/disturbance in their riparian buffers and adjacent uplands, scored higher. The results of the SVAP scores are provided in Section 7.

A request letter was sent to the New Jersey Natural Heritage Program (NJNHP) for known occurrences of threatened and endangered species within or near the project sites. Based on the correspondence with NJNHP (included in Attachment E), there are recent records of rare species at or within the vicinity of four CRP sites: Kearny Point, Meadowlark Marsh, Metromedia, and Oak Island Yards, as well as at both reference sites. Documented species at the projects sites include: short-eared owl (*Asio flammeus*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), and yellow-crowned night-heron (*Nyctanassa violacea*). Several New Jersey state listed threatened and endangered avian species were observed during site investigations, including: black-crowned night heron (*Nycticorax nycticorax)* at Semel Avenue & River Road Parcel, Dundee Canal Green Acres and Island Preserve, Harrison Marsh, and Third River Clifton Pond; osprey (*Pandion haliaetus*) at Metromediaedia ; and bald eagle (*Haliaeetus leucocephalus*) at Kearny Point.

# Hudson-Raritan Estuary Ecosystem Restoration Feasibility Study
# Appendix E-5: Lower Passaic River and Hackensack River Alternative Development Appendix

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# 1 Introduction

The work documented in this Alternative Development package focuses on the assessment and alternatives development of potential restoration opportunities in the Newark Bay/Lower Passaic River/Hackensack River Planning Region as part of the Hudson Raritan Estuary Feasibility Study. The restoration opportunities within this planning region had been identified pursuant the HRE-Lower Passaic River and HRE- Hackensack Meadowlands “source” feasibility studies.

The Lower Passaic River “source” Study was initiated in 2003 with New Jersey Department of Transportation (NJDOT) as non-federal sponsor as part of a Governmental Partnership with U.S. Environmental Protection Agency (USEPA) and Natural Resource Trustees (National Oceanic Atmospheric Administration [NOAA], U.S. Fish and Wildlife Service [USFWS], New Jersey Department of Environmental Protection [NJDEP]). The “source” study has been unique in that the study had been a joint Remedial Investigation/Feasibility Study (RI/FS) with USEPA combining both the Corps’ Water Resource Development Act (WRDA) and USEPA’s Superfund Program (Comprehensive Environmental Response, Compensation, and Liability Act, 1980 [CERCLA]) to comprehensively remediate and restore the Lower Passaic River basin.

The study area included the lower 17 miles of the Lower Passaic River from Newark Bay to the Dundee Dam including tributaries Saddle River, Second River and Third River. The restoration planning within the area was conducted in coordination with the Superfund Program including shared data collection efforts informing site selection. Remedial Action decisions (i.e., Focused Feasibility Study for the remediation of the lower 8.2 miles and non-time critical removal action at river mile [RM] 10.9) have influenced the sequence and type of recommendation for restoration (e.g., construction near-term, construction following remedial actions [“deferred”] or future feasibility study).

The HRE-Hackensack Meadowlands “source” study was also initiated in 2003 with the New Jersey Meadowlands Commission (now known as the New Jersey Sports and Exposition Authority [NJSEA]) as the non-federal sponsor. Restoration opportunities in the Hackensack River were identified, screened, and evaluated as part of the “source” study with the final array of restoration projects recommended in this HRE Feasibility Report/Environmental Assessment (FR/EA).

A total of seven (7) restoration sites along the Passaic and Hackensack River, in Passaic, Essex, Hudson and Bergen Counties, are recommended for construction (Table 1).

As part of the Lower Passaic River “source” study, restoration opportunities were initially identified during reconnaissance field efforts in 2003 and 2004 and numerous meetings with stakeholders; non-governmental Organizations (NGOs) including the Passaic River Coalition, NY/NJ Baykeeper, and Ironbound Community Corporation; the City of Newark; local municipalities ; and governmental partnership agencies (USEPA, NOAA, USFWS, NJDOT and NJDEP). Municipal master plans were also reviewed to identify additional restoration opportunities, as well as determine compatibility of restoration with local planning efforts.

**Table 1: Lower Passaic River and Hackensack River Ecosystem Feasibility Studies Project Sites.**

| River | Site | County |
|---|---|---|
| Passaic River | Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | Passaic |
| | Dundee Island Park Pulaski Park | Passaic |

| River | Site | County |
|---|---|---|
| | Essex County Branch Brook Park | Essex |
| | Kearny Point | Hudson |
| | Oak Island Yards | Essex |
| | Reference Site - Harrison Marsh | Hudson |
| Hackensack River | Meadowlark Marsh | Bergen |
| | Metromedia | Bergen |
| | Reference Site – Marsh Resources Phase 2 | Bergen |

A total of 52 restoration opportunities were identified along the mainstem of the Passaic (23) and its tributaries (29). These sites were divided into two site groupings (Tier 1 and Tier 2 [Deferred]) based on the timing and location of USEPA remedial actions. Significant data collection during the coordinated RI/FS was utilized to inform the restoration planning effort. Sites were screened in coordination with NJDEP, other partner agencies, Community Advisory Group (CAG) and a design charette with NJDEP and NOAA (June 2015).

As part of the HRE-Hackensack Meadowlands Ecosystem Restoration “source” study, the USACE and the New Jersey Meadowlands Commission, prepared the Meadowlands Environmental Site Information Compilation (MESIC) Report (USACE, 2004) and the Meadowlands Comprehensive Restoration Implementation Plan (MCRIP) (USACE, 2005). The MCRIP provided a menu of comprehensive, ecosystem-based actions that address the problems affecting the aquatic environs and associated habitats of the Hackensack Meadowlands. The MESIC Report identifies 50 sites that were evaluated and screened using available data (Cultural Investigations [Appendix I], Hazardous Toxic Radioactive Waste [HTRW; Appendix H], geophysical investigations, topographic and geotechnical surveys [Appendix D], bio-benchmarking and benthic community investigations) with input from NJMC and USFWS.

Following site selection, current conditions were assessed at the seven (7) sites, as well as two (2) reference sites in Hudson and Bergen County, to establish baseline function and document existing conditions at each site. The baseline conditions were then used as the basis for determining the appropriate restoration measures to be recommended for each site in a future phase.

Field investigations were conducted in May of 2015 by biologists and geologists on the Lower Passaic Field Team (LPFT). These investigations included data collection for the functional assessments, such as community structure, bank stability, vegetative diversity, sediment types, and wildlife species utilization, as well as habitat and feature mapping for each site. These investigations included functional assessments, utilizing the Evaluation of Planned Wetlands (EPW) technique and the Natural Resources Conservation Service’s (NRCS) Stream Visual Assessment Protocol (SVAP).

This appendix documents the identification of restoration opportunities, screening of sites and evaluation of the focused array of sites. The evaluation includes EPW methodology results, Average Annual Functional Capacity Units Scores (AAFCU) calculated from the EPW scores, and SVAP methodology results, as well as the findings of the field investigations and desktop studies. Attachment A contains the EPW summary results, Attachment B contains the AAFCU Scores, Attachment C contains the SVAP Data Sheets, Attachment D contains the Upland Buffer Data Sheets, Attachment E contains the Baseline Assessment Maps, Attachment F contains the Uniqueness/Heritage Site Information, Attachment G contains the Photo Log, and Attachment H contains the Alternative Maps.

## 2 Regional Context

The Hackensack and Passaic Rivers drain portions of the densely populated Bergen, Passaic, Hudson, Essex, and Union counties of New Jersey. Approximately eighty percent (80%) of the land use within the planning region is urban development comprised mainly of residential, commercial, and industrial development. Approximately seven percent (7%) of the region is forested, six and one-half percent (6.5%) is open water, and four and one-half percent (4.5%) is wetland. Less than two percent (2%) is barren land and less than one percent (1%) of land is used for agriculture. This watershed is directly connected to Upper New York Bay and Lower New York Bay through Kill Van Kull and Arthur Kill, respectively.

The Hackensack Meadowlands District is a dominant feature within this region, measuring approximately 19,730 acres. The District contains residential, commercial, industrial, and landfill areas, as well as tidal wetlands and large areas of open space, including the largest remaining brackish wetland complex in the study area, measuring approximately 8,400 acres. As part of the HRE-Hackensack Meadowlands Study effort, USACE and the NJMC identified data gaps and recommended data collection needs to address the Meadowlands region. The MESIC report served to advance the restoration planning and eliminate duplication of data previously collected and recorded.

The Lower Passaic River is identified as the 17-mile, tidally influenced portion of the Passaic River from the Dundee Dam downstream to Newark Bay. The watershed of this reach of the river also includes its tributaries: Saddle River, Second River, and Third River. The lower 1.7 miles of the Lower Passaic River is characterized by commercial industry, some of which is dependent on river access, such as the petroleum industry. The Lower Passaic River study area has been heavily industrialized since the mid-nineteenth century. This industrial activity has resulted in the degradation of the wetlands, discharges of effluents into the river, and dumping of industrial waste resulting in contaminated sediments in the river that has adversely impacted fish and wildlife habitat. The project goal of the HRE-Lower Passaic River Ecosystem Restoration Feasibility Study was to coordinate with the USEPA—in addition to the USFWS, NOAA, and the State of New Jersey—to remediate and restore 17 miles of the Lower Passaic River and its tributaries. Data collected for this program are publically available on www.ourpassaic.org.

Lower reaches of the Passaic and Hackensack Rivers provide habitat for marine and estuarine fish and invertebrates, while further upstream, the rivers support a mix of estuarine and freshwater species. The Lower Passaic River is comprised of three river sections – brackish, transitional, and freshwater. The brackish section of the river was defined as the portion that falls between RM 0 and RM 6.0 where the water salinity is defined as almost always mesohaline (5-18 parts per thousand [ppt]) to polyhaline (18-30 ppt). The transitional section was defined as the portion that falls between RM 6 and RM 10 where salinity values fluctuate under typical tidal conditions and saltwater intrusion and mixing. Therefore, water conditions vary continuously from oligohaline (0.5-5 ppt) to mesohaline. The freshwater section upstream of RM 10 to the Dundee Dam.

In all of these sections, the banks of the Passaic River primarily consist of bulkheads, riprap slopes or unvegetated rock and mud flats that quickly slope upwards to developed land or upland parks. The Hackensack River is primarily brackish and supports wide swaths of tidal marsh with some native vegetation and a significant portion of invasive plants. Newark Bay's open water is used by many fish and invertebrate species as nursery habitat, although its shorelines and river channels have been greatly modified by dredging, filling, and shoreline stabilization. The hydrology of the rivers has also been altered by numerous water control structures which impede passage for migratory fish.

Anadromous fish make annual spawning runs up the 17-mile tidal stretch of the Lower Passaic River to the Dundee Dam, but are blocked from going further.

Extensive development in the region has directly contributed to extensive habitat losses. Historic wetland losses have transformed the Hackensack Meadowlands from a rich combination of fresh and saltwater marshland into a less diverse, brackish tidal marsh with a 60% loss in wetland area. Even at this reduced size, the Meadowlands still represents, after Jamaica Bay, the largest remaining tracts of habitat in the HRE study area. Many Hackensack and Passaic river tributaries have been converted to storm sewer drainages. Surrounding wetlands were either filled, or mosquito ditches were dug, in order to control mosquito populations. The destruction of shallow water habitats has contributed to poor water quality and has altered the floral and faunal species assemblages. Within the Passaic River watershed, 78 miles of historic rivers, creeks, and tributaries have been lost to filling, draining, or conversion to storm pipes and studies have estimated wetland losses at over 80% (Crawford et al. 1993, Iannuzzi et al. 2002, NJDEP Division of Watershed Management 2002). Considering the rivers history and current land use patterns it becomes clear that the study area will never be returned to its historic natural state. However, it is realistic to set goals of restoring a functioning and sustainable urban river system that supports rather than drains community resources.

The lower Hackensack River and Passaic River basins and Newark Bay have been a center of industry since the Industrial Revolution. As a result, hundreds of chemical, herbicide, paint and pigment manufacturing plants, petroleum refineries, and other large industrial facilities have been located along their banks. Effluent from these facilities has caused severe contamination of sediments in the rivers. Primary contaminants of concern in the study area include dioxins (2,3,7,8-tetrachlorodidenzo-p-dioxin [TCDD]), mercury, lead, polychlorinated dibenzofurans (PCDF), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and dichlorodiphenyltrichloroethane (DDT). Many of these contaminants pose risks to human and ecological health. Several USEPA Superfund sites exist within this planning region, including the entire 17-mile Lower Passaic River, (USEPA, 2016) Newark Bay and portions of the Hackensack River. Pathogenic microbial contamination, floatable debris, excessive levels of waterborne nutrients, and non-point source discharges further impair water quality. There are strict human consumption advisories for fish and crabs caught from this region. Habitat restoration plans have carefully considered the presence of contamination, the potential for the transport of contaminants, and attractive nuisance issues due to recontamination. In this planning region, the sequencing of restoration opportunities relative to remedial actions are coordinated through integration and partnership with the USEPA Superfund program.

The Tentatively Selected Plan (TSP) compliments and has been coordinated with ongoing activities within the planning region.

- Ongoing USEPA remedial actions within the Lower Passaic River: In addition to the past remedial actions including the Tierra Removal Action adjacent the Diamond Alkali Facility (www.passaicremovalaction.com) and the non-time critical removal action at RM 10.9 in Lyndhurst, the USEPA had released the Record of Decision (ROD) for the cleanup of the lower 8.2 miles of the River (April 2016). In September 2016, USEPA and Occidental Chemical entered into an agreement to prepare the remedial design for cleanup of the lower 8.2 miles of the Passaic to be conducted over four years. Following design, construction is expected to take approximately six (6) years to complete and is estimated at $1.38 billion. Kearny Point and Oak Island Yards Tier 2 sites would be implemented following completion of the remedial action.
- Urban Waters Federal Partnership (UWFP): The Lower Passaic River is one of 19 designated community locations. The UWFP attempts to reconnect urban communities, particular those that are overburdened or economically distressed by improving coordination among federal agencies and collaborating with community–led revitalization efforts to improve our Nation's water systems

and promote their economic, environmental and social benefits. The advancement of restoration within the Lower Passaic is a key component of the UWFP program (https://www.epa.gov/urbanwaterspartners/passaic-rivernewark-new-jersey).

- USACE Passaic River Tidal Protection Area Coastal Storm Risk Management (CSRM) Project: Restoration at Kearny Point and Oak Island Yards must be coordinated with the general re-evaluation of CSRM measures within Newark, Kearny and Harrison (USACE, 2016).
- USACE Passaic River Basin Flood Risk Management Study: The USACE and NJDEP are partnering to carry out the Passaic River Basin General Re-evaluation Study to determine the best flood risk management alternatives (e.g., flood wall levee, non-structural and the tunnel) to help communities throughout the basin. Restoration projects including Dundee Island Park and Clifton Dundee Canal sites must be coordinated with this flood risk management study (USACE, 2016).
- NY and NJ Harbor and Tributaries: Many of the restoration opportunities identified during the “source” study could serve as Natural and Nature-Based Features (NNBFs) providing coastal storm risk management benefits and improved resiliency.
- The Natural Resource Damages (NRD) Assessment and Restoration Program was created to conform with CERCLA. This allows federal and state agencies to implement ecosystem restoration projects provided from the Natural Resource Damages funds. Currently, there is an ongoing assessment of the NRD on the Lower Passaic for the 73 potentially responsible parties in the Cooperating Parties Group (CPG) to evaluate the natural resources of the system with regard to contaminated sediments, industrial activities, and limited habitat resources. The CPG signed an agreement with the trustees to pay for the completion of the RI/FS for the 17 mile stretch of the Lower Passaic River. The Diamond Alkali site in Newark was designated as a target site for early action cleanup in the Focused Feasibility Study. The trustees included in this NRD assessment are the USFWS, NOAA, and NJDEP, and with coordination from government agencies and the potentially responsible parties, a path forward and additional potential restoration plans will be developed to remediate damages of the Lower Passaic River. The restoration planning outlined for the “source” study, was coordinated with the resource agencies and the NRD sites were included within the array of sites (http://www.darrp.noaa.gov/northeast/passaic/).
- NJDEP Natural Resource Damage Assessment Grants for restoration at Dundee island park and Clifton Dundee Canal
- Green Acres Program: NJDEP developed the Green Acres Program to protect open space and develop parks in New Jersey. Flood plains on the Passaic River are also acquired by Green Acres. Once private land is acquired, it becomes part of a statewide system of parks and natural areas. The Local and Non-profit Assistance Program provides funding and technical assistance to municipal and county governments and non-profit land trusts to acquire land. These efforts result in increased public access to the Passaic River and its tributaries, recreational opportunities, and improved environmental quality of the entire watershed (http://www.nj.gov/dep/greenacres).
- The Passaic Valley Sewerage Commissioners (PVSC) created the Passaic River/Newark Bay Restoration Program in 1998 to promote the recreational and economic uses of Newark Bay, the Passaic River and its tributaries. The Program consists of shoreline clean-ups, floatables removal, and "in-house" clean-ups to keep our waterways clean of debris and litter. Education and community outreach is also an important component of the Restoration Program. PVSC also teaches the local children through community outreach about the effects of pollution on the Passaic River (http://www.pvsc.com/rr/index.htm).
- Community groups such as the Ironbound Community Corporation (ICC), Passaic River Coalition, NY/NJ Baykeeper, the Lower Passaic and Saddle River Watershed Alliance and others are working to reincorporate and reconnect the river into the lives of the people living in the adjacent communities. ICC has been working for years to advocate creating safe public access and view points for residents and the community to recreate on the riverbank that has been very influential in the development of their community in Newark. Passaic River Coalition has been working diligently

to create new public access points in the form of parks. They led a campaign to encourage businesses and public parkland to “Face the River, Fix the River.” This has been the slogan of the Passaic River Coalition in their effort to establish deed restricted parkland and public access as well as raise awareness of the environmental issues in the area. The Lower Passaic and Saddle River Watershed Alliance (sponsored in part by NJDEP’s watershed management program) has also encouraged stewardship and advocacy of the watershed by holding educational seminars and an annual canoe event. The Alliance also completed a plan in partnership with the National Park Service Recreational Trails Program to design a water trail to encourage public use of the river for non-motorized recreational boating. The Lower Passaic River Canoe & Kayak Trail Plan cites existing public access points and includes plans for future development of new access points and improvements to existing points. The Passaic River Boat Club, Passaic River Rowing Association, and Neried Boat Club all work toward bringing recreational boating back to the Passaic River and actively advocate public access for the Passaic River and conduct cleanups.

- Essex County Branch Brook Park, the nation’s first county park, has the largest collection of cherry blossom trees in the United States and is listed on both the New Jersey (1980) and National (1981) Registers of Historic Places. The restoration efforts are coordinated with the Branch Brook Park Alliance and the Essex County Department of Parks, Recreation and Cultural Affairs to help Essex County restore and revitalize the park.
- Hackensack Mitigation Banks: Restoration complements the Richard P. Kane Wetland Mitigation Bank (restoration of 240 acres of tidal emergent marsh, streams, mudflats, freshwater forested wetlands and open water) and the MRI-3 Mitigation Bank (51 acres) parcel.
- Lincoln Park Wetlands Restoration Project involved the restoration of over 42 acres of tidal habitats from high marsh to open water and mud flats, provided beneficial reuse of dredge sands as the planting base of the marsh, provided for excavation of more than 250,000 cubic yards of illegally dumped materials to restore the correct marsh elevations, added more than 4,000 feet of new inter-tidal channels, reconnected a pond to the Hackensack River, restoring tidal flushing to the pond, and provided walking trails and interpretive signs along the perimeter of the marsh.
- Hackensack Riverkeeper efforts: Restoration supports the Riverkeeper’s efforts for environmental education (e.g., ecotours, eco-cruises, canoeing/kayaking, etc), river cleanups and environmental restoration to protect, preserve and restore the various habitats in the region.
- Hackensack Meadowlands Initiative: Restoration supports municipalities efforts to improve environmental stewardship and promote ecotourism.

## 3 Site Screening

### 3.1 Lower Passaic River

Significant amounts of data collected for the USEPA’s Remedial Investigation and USACE restoration planning efforts that were used to inform the site selection and alternatives development. Much of the data has been summarized in the Final Remedial Investigation and Focused Feasibility Study Reports (USEPA, 2014a and 2014b). Specifically, baseline conditions (habitat, sediment quality, biological communities, side scan sonar, geophysical surveys, hydrodynamic surveys, avian community surveys, surface water, bathymetry etc.) within the Lower Passaic River were established through field efforts outlined in Appendix B.

Although significant amounts of data have been collected to characterize baseline conditions in the 17-mile stretch of the Passaic River mainstem, limited data was available for the specific restoration opportunities. Since 2004, restoration opportunities were identified through public outreach, baseline surveys conducted as part of the coordinated USEPA and USACE Remedial Investigation/Feasibility Study [RI/FS], field reconnaissance activities (USACE, 2004a, b, c), restoration opportunities report

(USACE, 2006) and visioning efforts with municipalities (Figure 1) within the tributaries and the 17-mile river proper.

In 2007-2008, the USACE conducted baseline vegetation sampling activities in the riparian zone of the brackish, transitional and freshwater sections of the Lower Passaic River. Wetland delineations and bio-benchmark studies were also conducted at subset of the array of sites outlined in the Restoration Opportunities Report (USACE, 2006) and site accessibility. Sampling methodology, complete data sets and sample location maps for these activities can be found in the Vegetation Sampling, Wetland Delineation and Bio-benchmark Report (USACE 2008a).

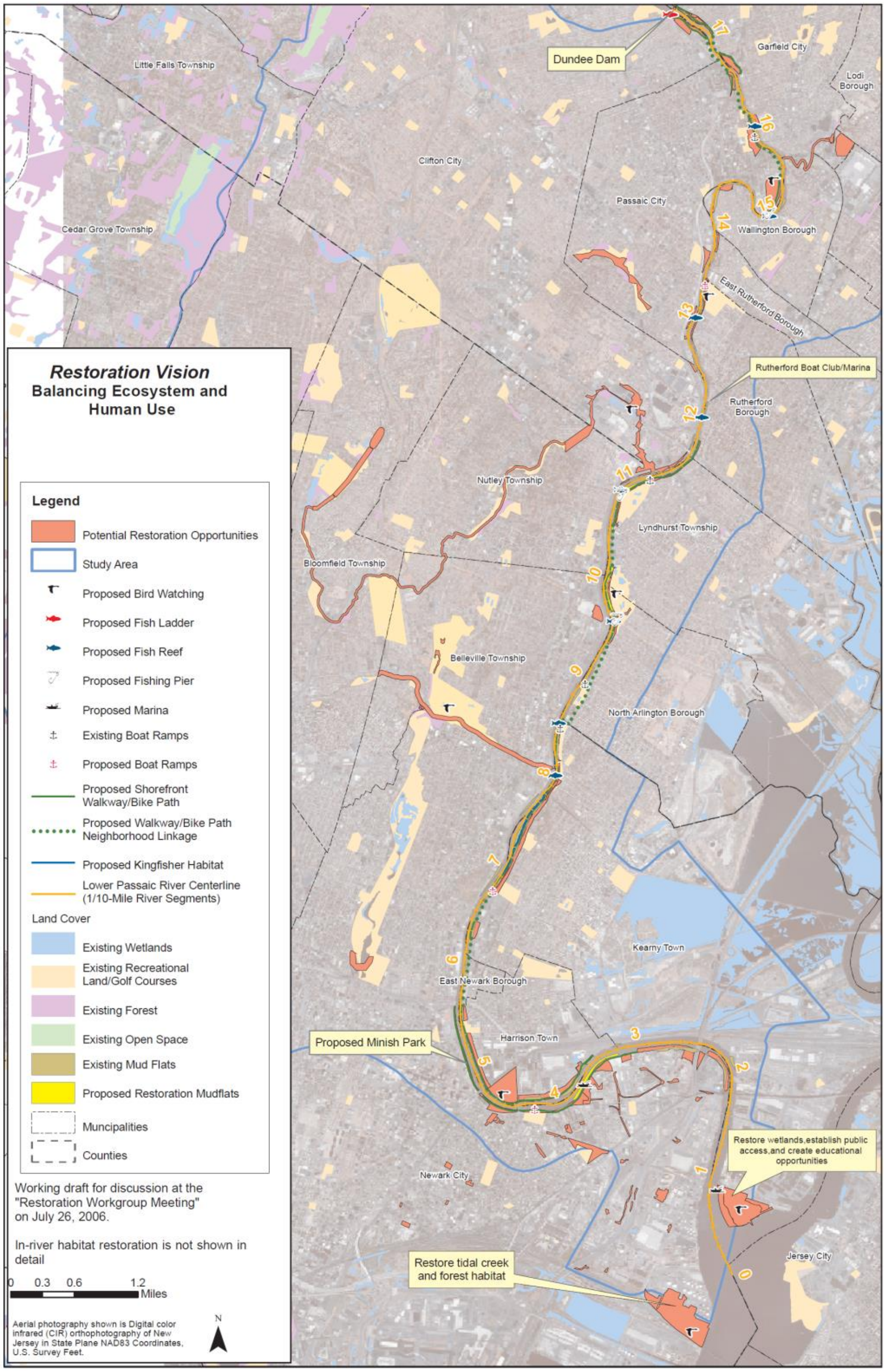

**Figure 1: Restoration Opportunities on the Lower Passaic River during Municipality/Stakeholder Visioning.**

Minimal restoration opportunities are present in the brackish river section due to the highly industrialized nature of both river banks, therefore; only two locations were sampled within the brackish river section (5 vegetation plots). Within the transitional section of the river, a total of six sites were sampled (20 vegetation plots) (Table 2).

**Table 2: Vegetation Sampling Data Summary.**

| | **Brackish (RM 0 to RM 6.0)** | **Transitional (RM 6.0 to RM 10)** |
|---|---|---|
| **Tree basal area average** | 479 in$^2$ (82% native) | 2,278 in$^2$ (86% native) |
| **Shrub cover** | 24% (80% native species) | 25% (63% native species) |
| **Herbaceous cover** | 81% (20% native species) | 78% (29% native species) |
| **Dominant Tree** | American elm & Tree of heaven | White mulberry, Box elder & Tree of heaven |
| **Dominant Shrub** | Marsh elder | Multiflora rose & red-osier dogwood |
| **Dominant Herbaceous** | Japanese knotweed, common reed & Swamp dock | Japanese knotweed & White snakeroot |

During the 2007 and 2008 sampling, 143 distinct plant species were observed along the Lower Passaic River. Of these, 45 species were non-native to New Jersey. The results of these sampling activities were used for restoration planning and the Lower Passaic River Plant Restoration Resource Document (USACE 2008b) was developed, using this data, to provide recommended planting lists for the suite of habitats to be restored in each of the three salinity sections.

Vision maps were developed for the future navigational use of the river (NJDOT, 2007) which identified potential options and local plans for the Passaic River shoreline. The results of visioning was also illustrated in a 3-D flyover of future conditions (http://lprrp.videos.e4mapp.com).

Proposed CERCLA remedial action decisions and the timing of those actions heavily influenced the sequence and types of restoration actions that could be recommended in the Lower Passaic River study area. A total of 52 sites were identified based on the above study activities and were grouped into the following two categories:

- Tier 1 sites: Opportunities that can advance without remediation, comprising 29 sites.
- Tier 2 sites: Opportunities that require remediation, comprising 23 sites within the mainstem of the river.

Based on the direction at a re-scoping charrette, the focus was on Tier 1 sites that could be recommended in the near term without requiring remediation from the Superfund Program. To advance sites designed at a feasibility study level, a subset of the restoration sites was evaluated further to determine which sites would be advanced in the feasibility study. The following factors were employed in the screening to select up to 16 sites, as outlined in the scope for field investigation:

- Restoration potential, based on Target Ecosystem Characteristic (TEC) type and habitat acreage;
- Land ownership; and
- Known upland on-site contamination.

Of the 16 selected sites, five (5) were dropped during scope negotiations, based on site access, land ownership, and contamination issues raised. The USACE and the NJDEP, the non-federal sponsor, investigated 11 sites in the field, including the collection of EPW data. Included among the 11 sites were two (2) Tier 2 sites for construction following USEPA remedial action, at Kearny Point and Oak Island Yards.

The USACE held design charrettes with the NJDEP to discuss the sites and the baseline EPW results, and determine which sites NJDEP would support as the local sponsor for construction. NJDEP evaluated the data and conducted two site visits, and selected three (3) sites, based on the department's assessment of ecological lift and the state's intent to compensate for natural resource damages on the Lower Passaic River.

Three (3) sites were selected by NJDEP to further investigate and potentially recommend for near-term construction. The Tier 1 near-term construction sites including Essex County Branch Brook Park, Dundee Island Park, and Clifton Dundee Canal Green Acres Site, were then evaluated similar to other shoreline sites. Kearny Point and Oak Island Yards, Tier 2 sites, were also evaluated further as a result of the original goal and intent of the coordinated CERCLA/Water Resource Development Act feasibility study illustrating the intended coordination with the CERCLA Superfund Program, as well as to meet the goals of the project and the restoration of Lower Passaic River. Kearny Point and Oak Island Yards are two mainstem sites providing the most potential for restoration and meeting the project objectives. This aspect of the recommendation is representative of the USEPA/USACE Urban Waters Federal Partnership.

### 3.2 Hackensack River

In 2004, the USACE, USFWS, and New Jersey Meadowlands Commission (now the NJSEA)—conducted the Meadowlands Environmental Site Investigation Compilation (MESIC) to identify and catalog existing data, assist in creating a strategy for future data collection, and eliminate the potential for duplicating data (USACE, 2004b). The information compiled in the MESIC report focused on 50 sites within the Meadowlands and also included data relevant to the Meadowlands as a whole. The MCRIP (USACE, 2005) provided a menu of comprehensive, ecosystem-based actions that address the problems affecting the aquatic environs and associated habitats of the Hackensack Meadowlands. The plan is a precursor to the design and construction phases of restoration implementation.

Of the 50 sites identified in the MESIC Report, 18 of the sites were identified as “critical restoration opportunities.” These 18 sites were selected by using measures such as:

- Restoring hydrology or wetlands;
- Land ownership, with priority placed on sites owned only by the New Jersey Meadowlands Commission; and
- Presence of contamination.

The 18 critical restoration sites were screened further, with input from USFWS coordination that grouped the potential restoration sites into the following three categories (based on presence of contamination):

- Preferred sites;
- Potential sites; and
- Currently unsuitable sites.

Of these critical restoration sites, the USACE and NJ Meadowlands Commission selected two restoration sites including Metromedia and Meadowlark Marsh to evaluate further to recommend for near-term construction and are included in the TSP.

# 4 Field Data Collection and Assessment Approach

To accomplish the project goals, the team employed a specific field approach at each site, focusing on accomplishing three (3) broad goals:

- Collect data as required for the EPW, SVAP, and upland buffer baseline assessments and accurately characterize existing conditions;
- Review the existing HRE CRP restoration alternative and confirm the sufficiency of the approach; and
- Identify additional restoration measures (to support additional alternatives), focusing on highest ecological benefit/uplift, long-term success, and economic feasibility.

The field data collection and assessment effort was executed as follows:

A. On 15 April 2015, the LPFT conducted a one (1)-day field reconnaissance of the project sites to establish site access points and any potential field work constraints.

B. Field data collection was initiated on 5 May 2015. Site investigations included observations of wetlands, stream channels, and surrounding uplands. Specific field data collection included GPS survey of specific features, photographic documentation, an inventory of observed vegetation and wildlife, and vegetative community mapping of existing terrestrial and aquatic habitats within the study area boundary. Vegetative communities/habitat cover types were classified using the description of cover types in the EPW guidebook, USFWS National Wetland Inventory (NWI) data, and *Plant Communities of New Jersey: A Study in Landscape Diversity*[1]*.* Study area boundaries, Assessment Area boundaries, and vegetative communities/habitat cover types within each Assessment Area are depicted on the Baseline Assessment Area Maps (Section 5).

C. To support the EPW, SVAP, and upland buffer baseline assessments, during the field investigations, the LPFT identified various conditions and features including:
   - stream channel/bank and riparian buffer/upland conditions;
   - dominant vegetation in each habitat/vegetative community;
   - anticipated fauna usage within each habitat;
   - outfalls and other conveyances of hydrology;
   - human-induced and natural/wildlife impacts; and
   - evidence of flooding and water level fluctuations.

D. Concurrent with the field investigations, desktop studies of potential uniqueness and heritage elements, as well as water quality classifications, were gathered for each site.

E. Following the completion of field investigations and desktop studies, the LPFT completed the EPW, SVAP, and upland buffer data sheets for each site. The data sheets were carefully reviewed to ensure that the various elements were scored consistently across the sites. It should be noted that the SVAP was used to inform the formulation of restoration alternatives only and did not factor into the scoring for the EPW assessments.

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[1] Collins BR and KH Anderson. 1994. Plant Communities of New Jersey: A Study in Landscape Diversity. Rutgers University Press, New Brunswick , NJ

# 5 Field Investigation

## 5.1 General Field Observations

During field investigations at sites in the Lower Passaic River and its tributaries, functionally healthy habitats such as wetlands, wetland transition zones, riparian areas and forests were rarely observed, and when present, typically were small in extent. Vegetated wetlands were often limited to narrow strips located along steep stream banks on fill material. Disturbed conditions have led to the colonization of many stream and river banks and riparian buffer areas by invasive plant species such as *Polygonum cuspidatum* (Japanese knotweed) and *Phragmites australis* (common reed). Larger wetland habitats are present in the Hackensack River and at the Newark Bay sites, but many of these areas are hydrologically impaired and dominated by common reed.

Sites in the Lower Passaic River and its tributaries are located in a region that has primarily been encroached upon and fragmented by residential and/or commercial development and transportation corridors. Those sites are generally surrounded by roads, utilities, and residential and commercial development. The landscape becomes significantly more industrial nearer to and within Newark Bay, where most waterfront properties are developed right up to the water. Numerous bridges, mostly active but a few abandoned, allow passage for roads and highways, mass transit and freight rails across the Passaic River. Direct human disturbance of sites was observed in the forms of dumping, river and tide-borne debris, off-road vehicle usage, and occupancy by vagrants.

The placement of bulkheads, dams, bridges, and spillways along portions of the Passaic River and its tributaries has impeded fish passage to significant lengths of habitat. Sewage, fertilizers, sediment-laden stormwater runoff, litter, legacy pollution, and other factors have also degraded water quality and wetland habitats throughout the watershed.

The Marsh Resources Phase 2 reference site suffers less industrial encroachment than other sites observed. It contains little to no common reed in the low and high marsh areas, but wetland transition and upland areas contain considerable invasive plant cover. The Harrison Marsh reference site, although exposed to the impaired waters of the Lower Passaic River and directly adjacent to industrial development, contains a diversity of native brackish tidal marsh vegetation; however, riparian and upland areas are dominated by invasive vegetation.

Several New Jersey state listed threatened and endangered avian species were observed during the field investigations, including: black-crowned night heron at Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve, Oak Island Yards, and Harrison Marsh; American bittern at Harrison Marsh; osprey at Metromedia; and bald eagle at Kearny Point. It should be noted that only the breeding population of black-crowned night heron is listed, and neither nests nor individuals exhibiting breeding activity were not observed at any of the sites.

Various native and invasive plant species were identified within the upland and wetlands at each site. Table 3 identifies the observed plant species at each site.

Table 3: Plant Species Observed At Each Site.

| Stratum | Scientific Name | Common Name | Dundee Canal Green Acres Purchase and Dundee Island Preserve | Dundee Island Park/ Pulaski Park | Essex County Branch Brook Park | Kearny Point | Oak Island Yards | Passaic River Reference Site Harrison Marsh | Meadowlark Marsh | Metromedia | Hackensack River Reference Site Marsh Resources Phase 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T | *Acer negundo* | boxelder | X | X | X |  | X | X |  |  |  |
| T | *Acer palmatum** | Japanese maple |  |  | X |  |  |  |  |  |  |
| T | *Acer pensylvanicum* | striped maple |  |  | X |  |  |  |  |  |  |
| T | *Acer platanoides** | Norway maple |  | X | X |  |  | X |  |  |  |
| T | *Acer rubrum* | red maple |  |  | X |  |  |  | X |  |  |
| T | *Acer saccharinum* | silver maple | X | X | X |  |  | X |  |  |  |
| T | *Ailanthus altissima** | tree of heaven |  | X | X |  | X | X | X |  |  |
| T | Aralia spinosa | devil's walking stick |  |  | X |  |  |  |  |  |  |
| T | *Betula nigra* | river birch | X | X |  |  |  |  |  |  |  |
| T | *Betula populifolia* | gray birch |  |  |  |  |  |  | X |  | X |
| T | *Carpinus carolineana* | American hornbeam |  | X |  |  |  |  |  |  |  |
| T | *Catalpa speciosa* | northern catalpa |  | X | X |  |  |  |  |  |  |
| T | *Celtis occidentalis* | common hackberry |  |  |  |  |  | X |  | X |  |
| T | *Fagus grandifolia* | American beech |  |  | X |  |  |  |  |  |  |
| T | *Fraxinus pennsylvanica* | green ash | X |  | X |  | X | X |  |  |  |
| T | *Liquidambar styraciflua* | sweetgum |  |  | X |  |  |  |  |  |  |
| T | *Liriodendron tulipifera* | tuliptree | X |  |  |  |  |  |  |  |  |
| T | *Magnolia* sp. | magnolia |  |  | X |  |  |  |  |  |  |
| T | *Morus alba** | white mulberry |  |  | X |  |  | X |  | X | X |
| T | *Paulownia tomentosa** | princesstree |  |  |  | X | X | X | X |  | X |
| T | *Pinus strobus* | eastern white pine |  | X | X |  |  |  |  |  |  |
| T | *Platanus occidentalis* | American sycamore | X |  | x |  |  |  |  |  |  |
| T | *Populus deltoides* | eastern cottonwood | X |  | X | X | X |  |  |  |  |
| T | *Prunus serotina* | black cherry |  |  | X | X |  | X | X |  |  |
| T | *Pyrus calleryana** | Callery pear |  |  |  |  |  |  |  |  | X |
| T | *Quercus bicolor* | swamp white oak |  |  | X |  |  |  |  |  | X |
| T | *Quercus palustris* | pin oak |  |  | X |  |  | X | X |  | X |
| T | *Quercus phellos* | willow oak |  |  | X |  |  |  |  |  |  |
| T | *Quercus rubra* | northern red oak |  |  | X |  |  |  |  |  | X |
| T | *Quercus velutina* | black oak |  |  | X |  |  |  |  |  |  |
| T | *Robinia pseudoacacia* | black locust | X | X | X |  |  | X | X | X | X |
| T | *Salix nigra* | black willow | X | X | X |  | X |  |  |  |  |
| T | *Sassafras albidum* | sassafras |  |  | X |  |  |  |  |  | X |
| T | *Tilia americana* | American basswood | X |  | X |  |  |  |  |  |  |
| T | *Tsuga canadensis* | eastern hemlock |  |  | X |  |  |  |  |  |  |
| T | *Ulmus americana* | American elm |  |  | X |  |  |  |  |  |  |

| Stratum | Scientific Name | Common Name | Dundee Canal Green Acres Purchase and Dundee Island Preserve | Dundee Island Park/ Pulaski Park | Essex County Branch Brook Park | Kearny Point | Oak Island Yards | Passaic River Reference Site Harrison Marsh | Meadowlark Marsh | Metromedia | Hackensack River Reference Site Marsh Resources Phase 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T | *Ulmus rubra* | slippery elm | | | | | | | X | | |
| S | *Amorpha fruticosa* | false indigo bush | | | | X | | X | | | |
| S | *Baccharis halimifolia* | eastern baccharis | | | | X | X | | X | | X |
| S | *Berberis thunbergii** | Japanese barberry | | | X | | | | X | | |
| S | *Cephalanthus occidentalis* | buttonbush | X | | X | | | | | | |
| S | *Clethra alnifolia* | coastal sweet pepperbush | X | | X | | | | | | |
| S | *Cornus amomum* | silky dogwood | X | | X | | X | | | | |
| S | *Elaeagnus umbellata** | autumn olive | | | | | | | X | | |
| S | *Hibiscus syriacus** | Rose of Sharon | X | | | | | | | | |
| S | *Iva frutescens* | Jesuit's bark | | | | X | X | X | | | |
| S | *Lonicera* sp. * | shrub honeysuckle | | | X | | | | X | | |
| S | *Morella pensylvanica* | northern bayberry | | | | | | | X | | |
| S | *Rhamnus cathartica** | northern buckthorn | | | | | | X | X | X | |
| S | *Rhododendron maximum* | great laurel | X | | | | | | | | |
| S | *Rhus copallinum* | winged sumac | | | | | X | | X | | |
| S | *Rosa multiflora** | multiflora rose | | | X | | | | | | |
| S | *Rubus* sp. | raspberry | | | | | X | X | | | |
| S | *Sambucus canadensis* | American black elderberry | | | | | X | | | X | X |
| S | *Viburnum dentatum* | southern arrowwood | | | X | | | | X | X | |
| S | *Viburnum* sp. | Viburnum | | | X | | | | | | |
| V | *Ampelopsis brevipedunculata** | Amur peppervine | | | X | | X | | X | X | X |
| V | *Campsis radicans* | trumpet creeper | | | X | | | | | | |
| V | *Celastrus orbiculatus** | oriental bittersweet | X | | X | | | | X | X | X |
| V | *Cuscuta americana* | American dodder | | X | | | | | | | |
| V | *Lonicera japonica** | Japanese honeysuckle | | | X | | X | | | X | |
| V | *Parthenocissus quinquefolia* | Virginia creeper | | X | X | X | | X | X | X | |
| V | *Persicaria perfoliata** | Asiatic tearthumb | | | | | | | | | X |
| V | *Toxicodendron radicans* | eastern poison ivy | X | X | X | | | | X | X | |
| V | *Vitis* spp. | grape | X | | X | | | | | | |
| H | *Ageratina altissima* | white snakeroot | | X | X | | | X | | | |
| H | *Alliaria petiolata** | garlic mustard | | | | | | | X | | |
| H | *Amaranthus cannabinus* | tidalmarsh amaranth | | | | | | | X | | X |
| H | *Ambrosia artemisiifolia** | annual ragweed | | X | X | | | | | | |
| H | *Apocynum cannabinum* | Indianhemp | | | | | X | | X | X | X |
| H | *Artemisia vulgaris** | common wormwood | | X | X | X | X | X | | X | |
| H | *Asclepias syriaca* | common milkweed | | X | X | | | | X | | |
| H | *Aster* sp. | aster | | | | | X | X | | | |

| Stratum | Scientific Name | Common Name | Dundee Canal Green Acres Purchase and Dundee Island Preserve | Dundee Island Park/ Pulaski Park | Essex County Branch Brook Park | Kearny Point | Oak Island Yards | Passaic River Reference Site Harrison Marsh | Meadowlark Marsh | Metromedia | Hackensack River Reference Site Marsh Resources Phase 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H | *Atriplex patula* | spear saltbush | | | | | | X | | X | X |
| H | *Bambusa* sp.* | bamboo | | | X | | | | | | |
| H | *Bidens* sp. | beggarticks | | | X | | | | | | |
| H | *Camissonia sp.* | primrose | | X | X | | | | | | |
| H | *Carex flava* | yellow sedge | | X | X | | | | | | |
| H | *Carex stipata* | awlfruit sedge | | | | | | X | | | |
| H | *Chenopodium album* | lambsquarters | | | | X | | | | | |
| H | *Cichorium intybus** | chicory | | | X | | | | | | |
| H | *Cirsium arvense** | Canada thistle | | | | X | X | | | | X |
| H | *Cirsium vulgare** | bull thistle | | | X | | | | X | | X |
| H | *Coronilla varia** | crownvetch | | | | | | | X | | |
| H | *Cuscuta* sp. | dodder | | | | | X | | | | |
| H | *Dichanthelium clandestinum* | deer tongue grass | | | X | | | | | | |
| H | *Distichlis spicata* | saltgrass | | | | | | | | | X |
| H | *Eleocharis parvula* | dwarf spikerush | | | | | | X | | | X |
| H | *Equisetum laevigatum* | smooth horsetail | | | X | | | | | | |
| H | *Eutrochium maculatum* | spotted joe pye weed | | | | | | X | | | |
| H | *Hibiscus moscheutos* | crimsoneyed rose mallow | X | | X | | | | X | | X |
| H | *Impatiens capensis* | jewelweed | | | X | | | | | | |
| H | *Ipomoea* sp. | morning-glory | | | X | | | X | | X | X |
| H | *Iris pseudacorus** | paleyellow iris | X | | X | | | X | | | |
| H | *Juncus* sp. | rush | | | | | | | X | | |
| H | *Juncus effusus* | soft rush | | | X | | | | | | |
| H | *Lespedeza* sp. | lespedeza | | | | | | X | | | |
| H | *Linaria vulgaris** | butter and eggs | | | | | | X | | | |
| H | *Lycopus rubellus* | taperleaf water horehound | | | | | | | X | X | X |
| H | *Lythrum salicaria** | purple loosestrife | X | X | X | | | | | | X |
| H | *Onoclea sensibilis* | sensitive fern | | | X | | | | X | | |
| H | *Osmundastrum cinnamomeum* | cinnamon fern | | | | | | | X | | |
| H | *Panicum virgatum* | switchgrass | | | | | | | X | | X |
| H | *Phalaris arundinacea*** | reed canarygrass | | | X | | | | | | |
| H | *Phragmites australis** | common reed | | | X | X | X | X | X | X | X |
| H | *Phytolacca americana* | American pokeweed | | X | X | | X | | | X | X |
| H | *Pluchea odorata* | sweetscent | | | | | | | | X | X |
| H | *Polygonum cuspidatum** | Japanese knotweed | | X | X | X | X | X | | | |
| H | *Polygonum persicaria** | spotted ladysthumb | | X | | | | | | | X |
| H | *Polygonum virginianum* | jumpseed | | | X | | | | | | |

| Stratum | Scientific Name | Common Name | Dundee Canal Green Acres Purchase and Dundee Island Preserve | Dundee Island Park/ Pulaski Park | Essex County Branch Brook Park | Kearny Point | Oak Island Yards | Passaic River Reference Site Harrison Marsh | Meadowlark Marsh | Metromedia | Hackensack River Reference Site Marsh Resources Phase 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H | *Pteridium aquilinum* | western brackenfern | | | | | | | X | | |
| H | *Rumex crispus* | curly dock | | | | X | X | X | | | |
| H | *Rumex verticillatus* | swamp dock | | | | | | | | X | |
| H | *Sagittaria latifolia* | broadleaf arrowhead | X | | X | | | | | | |
| H | *Schoenoplectus americanus* | chairmaker's bulrush | | | | | | | X | | |
| H | *Scirpus cyperinus* | woolgrass | | | X | | | | | | |
| H | *Sinapis arvensis** | wild mustard | | | | | | | | X | |
| H | *Solidago canadensis* | Canada goldenrod | | | | X | | X | | | |
| H | *Solidago rugosa* | wrinkleleaf goldenrod | | X | X | | | | | X | X |
| H | *Solidago sempervirens* | seaside goldenrod | | | | X | X | X | X | | X |
| H | *Spartina alterniflora* | smooth cordgrass | | | | X | X | X | | | X |
| H | *Spartina patens* | saltmeadow cordgrass | | | | | | | | | X |
| H | *Thelypteris noveboracensis* | New York fern | | | | | | | X | | |
| H | *Trifolium pratense** | red clover | | | | | | X | | | |
| H | *Typha* spp. | cattail | | | X | | | | X | | |
| H | *Verbascum thapsus** | common mullein | | | | | X | X | X | | |
| H | *Zannichellia palustris* | horned pondweed | | | | | | | | X | |

T=tree S=shrub V=vine H= herbaceous

Asterisk (*) denotes introduced species, per USDA PLANTS Database

Double Asterisk (**) denotes not classified as invasive in the US by USDA, however, this species is generally considered invasive.

## 5.2 Site-Specific Observations

The following is a brief description of the field observations at each site. The sites are presented in order of their location from north to south along each river, followed by their respective reference site.

**<u>Passaic River Sites</u>**

### 5.2.1 Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve (Figure 1; Attachment E).

This site consists of approximately 1,800 linear feet of the western shoreline of the Lower Passaic River downstream of the Dundee Dam in Clifton, NJ. Rt 21 and a commercial property border the landward side of the site. The City of Clifton has established Dundee Island Park within the site which includes a trail network, benches, interpretive signage, trash and recycling bins, and fish consumption advisory signage. This site includes the Safas property, which is subject to an NJDEP environmental investigation/cleanup (NJDEP case # E20050092). Large volumes of flood-driven woody debris and floatable trash have been deposited along the shore of the central portion of the site, immediately below a low, flat peninsula projecting out into the river. An active vagrant campsite strewn with trash was observed during the site visit within the southern portion of the site near Ackerman Ave.

*Wetlands:* Forested and scrub-shrub wetlands occur along portions of the shore of this site. These wetlands are primarily vegetated with *Betula nigra* (river birch), *Salix nigra* (black willow) and *Cephalanthus occidentalis* (buttonbush). Thick wrack, dumped trash, and floatable debris has accumulated in and around some of the wetland areas.

*Cover Types:* Trees-Broad-Leaved Deciduous; Emergent-Short Persistent; Non-vegetative - Open Water; Non-vegetative - Rubble

*Uplands:* Riparian uplands within the site are primarily forested by native plant species, though some areas are dominated by Japanese knotweed. Large amounts of cement, stone, brick, asphalt and steel debris fill have been historically placed at the site and are now heavily overgrown with vegetation.

*Cover Types:* Mixed Hardwood Forest - Broad-Leaved Deciduous; Shrubland - Tall Deciduous; Non-vegetative - Cobble-Gravel; Non-vegetative - Rubble

*Stream Channel and Banks*: The river shore and bottom substrates at the site consist primarily of boulders and cobbles, although wetland areas are comprised of silt, sand and gravel. While portions of the site have been historically filled, some of the river's original floodplain remains. Stream banks are stable in filled and original floodplain areas.

*Ecological Value:* The site functions as an important riparian buffer between the Passaic River and Route 21 and the surrounding commercial and residential development of Clifton. The state-listed black crowned night heron was seen on a rock in the river between this site and the Dundee Dam. Carp were actively spawning in shallow water along the shore during the site visit. The adjacent Dundee Dam is the upstream end of migratory fish passage in the Lower Passaic River. Regular human visitation and inhabitation by vagrants, and the considerable volume of trash and storm-driven wrack and debris at the site limit its ecological value.

### 5.2.2 Dundee Island Park/ Pulaski Park (Figure 2; Attachment E)

This site consists of approximately 2,370 linear feet of the western shoreline of the Lower Passaic River approximately 1.3 miles downstream of the Dundee Dam in Passaic, NJ. An inactive set of railroad tracks and right-of-way border the site to the west and north; a church and commercial properties border the site to the south. The City of Passaic has established Dundee Island Park within the site which includes a soccer field, benches, a playground, trash and recycling bins, a boat launch and fish consumption advisory signage. Flood-driven woody debris and floatable trash has been deposited along the shore of the site. Large ash trees have been removed from the shoreline and bank is now dominated by Japanese knotweed. Within the boundary of the site the bank of the Passaic River is very steep and stabilized with rip-rap and concrete.

*Wetlands*: A very narrow band of forested wetlands occurs along the shore of this site. These wetlands are primarily vegetated with river birch, black willow and *Ailanthus altissima* (tree of heaven).

*Cover Types:* Trees-Broad-Leaved Deciduous; Non-vegetative - Open Water

*Uplands:* Riparian uplands within the site are primarily shrubland with a mix of native and non-native species, grassland, and non-vegetated uplands.

*Cover Types*: Mixed Hardwood Forest - Broad-Leaved Deciduous; Shrubland - Tall Deciduous; Grassland – Short Persistent; Non-vegetative - Bare Ground; Non-vegetative - Cobble-Gravel; Non-vegetative - Sand

*Stream Channel and Banks:* The river shore and bottom substrates at the site consist primarily of rip rap, boulders and concrete, although wetland areas are comprised of silt and mud. The stream banks are stable and very steep.

*Ecological Value:* The site functions as a riparian buffer between the Passaic River and the surrounding commercial and residential development of Passaic. Regular human visitation, the considerable volume of trash and storm-driven trash and debris, steep banks and limited wetland area at the site limit its ecological value.

### 5.2.3 Essex County Branch Brook Park (Figure 3; Attachment E)

This site contains of approximately 4,200 linear feet of Branch Brook and adjacent parkland in Newark, NJ. The surrounding environment consists primarily of commercial and residential developments and roadways. The site includes a day-lighted section of Branch Brook as well as 3 larger pond features (Branch Brook Lake, Clarks Pond, and an unnamed pond) that were created using weirs. Branch Brook Park was established by Essex County as the first county park in the nation. The park is notable as having the largest collection of cherry blossom trees in the United States. The park is four miles long and a quarter mile wide and includes open grassland with patches of forest stands that line Branch Brook. The stream and adjacent forest areas experience considerable amounts of anthropogenic trash. The ponds suffer from algal blooms and eutrophication indicative of excess nutrient inputs.

*Wetlands:* A narrow band of forested wetlands is found along the stream of this site. These wetlands are primarily vegetated with red maple, black willow and northern spicebush. Two emergent wetland areas are found in the northern section of this site. These wetland areas are dominated by common reed and *Typha latifolia* (broadleaf cattail).
*Cover Types:* Trees-Broad-Leaved Deciduous; Emergent - Tall Persistent; Non-vegetative - Open Water

*Uplands:* Uplands within the site are primarily mowed areas indicative of a park setting. Riparian habitats include mixed hardwood trees such as green ash and *Platanus occidentalis* (American sycamore). A majority of the south end of the park is forest dominated by red oak, red maple, *Liquidambar styraciflua* (sweetgum), green ash, and Norway maple. Shrubland areas are a mixed cover of mowed and unmowed grasses with smaller and newly planted trees such as red maple and red oak.

*Cover Types:* Mixed Hardwood Forest - Broad-Leaved Deciduous; Shrubland - Tall Deciduous; Grassland – Short Persistent; Non-vegetative – Pavement

*Stream Channel and Banks:* Most of the stream portions of Branch Brook are stable with limited erosion issues. Low-flow step weirs manage the water levels within the site. The pond sections have banks that have been stabilized with cement and paver stones. Portions of the stream and ponds suffer eutriphication from excess nutrient runoff.

*Ecological Value:* The forested riparian habitat within the site provides a vegetated buffer between surrounding mowed fields and the stream. Waterfowl, egrets, and songbirds were observed within the site. Recreational fishing was observed in the larger open water portions of the site. The park acts as a habitat island in highly developed and densely populated urban setting. However, the understory of the upland and wetland forested habitats of the site are dominated by non-native, invasive vegetation, limiting ecological value. The stream and ponds are isolated within the park so fish passage is not possible beyond the boundary of the site. The presence of weirs along the stream impedes fish passage.

### 5.2.4 Kearny Point (Figure 4; Attachment E)

This site consists of a 300 to 1,000 foot wide area located along approximately 3,000 linear feet of the northern shore of Newark Bay in Kearny, NJ. The surrounding land use consists entirely of commercial developments and roadways. Adjacent commercial developments include Hudson County Correctional Center and River Terminal, a massive distribution warehouse that includes the former site of Western Electric's Kearny Works manufacturing plant and the Kearny Yard of Federal Shipbuilding and Drydock Company. Within the site boundary, half of the site is an active soil sorting site and half of the site is an undeveloped forested area.

*Wetlands:* A narrow fringe of *Spartina alterniflora* (smooth cordgrass) dominated low salt marsh is located at the base of a bulkhead along the western half of the site. A combination of high salt marsh vegetated with smooth cordgrass and common reed-dominated wetlands are present along the eastern shore of the site. The eastern interior portion of the site contains some forested wetlands dominated with *Populus deltoides* (eastern cottonwood) and silver maple with an understory of common reed.

*Cover Types:* Emergent-Short Persistent; Emergent-Tall Persistent; Trees-Broad-leaved Deciduous; Non-vegetative-Open Water.

*Uplands:* Uplands found within the western half of the site include gravel access roads, massive soil piles, mounds of boulders and active soil sorting areas. Upland areas within eastern half of the site include a forested area which contains a number of non-native and invasive plant species. Trees in this area include cottonwoods, silver maples, tree of heaven and *Paulownia tomentosa* (princess tree). Herbaceous vegetation in this area is dominated by common reed and Japanese knotweed.

*Cover Types:* Mixed Hardwood Forest - Broad-Leaved Deciduous; Grassland - Short Persistent; Non-vegetative - Cobble-Gravel

*Stream Channel and Banks:* The western half of the site contains a shoreline predominantly composed of riprap and boulders below a cement bulkhead. Portions of this area contain a narrow fringe of high marsh. A combination of smooth cordgrass and common reed-dominated emergent wetlands is present at the along the shoreline of the eastern part of the site. Cement, riprap, and boulders stabilize the western half of the site, while root mats from common reed and smooth cordgrass stabilize the eastern half.

*Ecological Value:* The ecological value of the waterways, their associated wetlands and uplands located within the eastern half of the site is fairly high, despite the heavy development of the area. An active bald eagle nest is located within one of the eastern cottonwood trees located on site. Shorebirds were observed foraging within the smooth cordgrass marsh and mudflats found along the eastern shoreline. The western half of the site contains barren acres of stockpiled soil and rocks of negligible ecological value.

### 5.2.5 Oak Island Yards (Figure 5; Attachment E)

This site is located along approximately 900 feet of Newark Bay and is bordered by a shipping container yard, railroad tracks, and a HESS petroleum tank farm. A semi-tidal ditch with a tide gate is located adjacent to the site, below the railroad track embankment on the southeast border of the site. Since the date of the project mapping aerial photo, the shipping container storage yard has been extended southeast to within approximately 100 feet of the pond and runs the full width of the northwestern boundary of the site. Also, a considerable amount of rock and gravel fill has been placed onsite since the aerial photo was taken. Rock fill extends from the shipping containers all the way to the river along the southeast portion of the site and has also been placed in the river. The remainder of the site is vegetated.

*Wetlands*: A common reed-surrounded pond is present in the center of the site. A small remnant smooth cordgrass marsh and panne measuring approximately 50 feet by 100 feet is present at the northeast corner of the site. A forested wetland area is located in the northeast portion of the site beyond the shoreline. This forested area has a canopy dominated by red maple and eastern cottonwood and a near monoculture of common reed in the understory. As small are of scrub-shrub wetland is found adjacent to the tide gate on the south side of the canal along the southern boundary of the site.

*Cover Types:* Trees-Broad-leaved Deciduous; Emergent-Short Persistent; Emergent-Tall Persistent; Scrub-Shrub-Bushy Deciduous; Non-vegetative-Sand; Non-vegetative-Open Water

*Uplands:* Upland portions of the site include a gravel access road and large fill piles of boulders and riprap. Limited areas of vegetated upland areas are located in the northwest corner of the site adjacent to the forested wetlands. These areas are dominated by invasive species, most notably common reed, tree of heaven, and princess tree.

*Cover Types*: Non-vegetative – Rubble; Non-vegetative - Cobble-Gravel

*Stream Channel and Banks:* A majority of the banks of Newark Bay at the site contain mounds of boulders and riprap fill material. Two small areas of the site have a sandy shoreline protected by old tide breaks. A small remnant smooth cordgrass marsh measuring approximately 50 feet by 100 feet is present at the northeast corner of the site and is also protected by old tide breaks.

*Ecological Value:* Upland and wetlands at the site are dominated by nonnative invasive vegetation, limiting ecological value. The majority of the site contains riprap fill material preventing vegetation growth and further limiting ecological value. The pond area, although surrounded by invasive exotic vegetation, does contain *Fundulus heteroclitus* (mummichogs) and a *Butorides virescens* (green heron) was observed foraging. The state-listed black crowned night heron was observed in the ditch adjacent to the site. The few mature trees found on site provide roosting habitat in an area surrounded by industrial development. The remnant smooth cordgrass marsh and panne, although small in size, provides natural habitat for fish and invertebrates which is uncommon in Newark Bay.

### 5.2.6 Passaic Reference Site - Harrison Marsh (PATH Rail Fringe Marsh) (Figure 6; Attachment E)

This site consists of a 50 to 100 foot wide area located along approximately 4,000 feet of the shore of the Lower Passaic River in Harrison, NJ. The adjacent land use is vacant and active industrial, including a railroad yard. The river edge in this location was historically filled for industrial development, resulting in a steep slope along the shore. Tidal flats are exposed at low tide.

*Wetlands:* A fringe of estuarine emergent wetland is present along the river at the toe of the filled slope. Common reed is the dominant wetland vegetation, though pockets of smooth cordgrass, *Solidago sempervirens* (seaside goldenrod), *Iva frutescens* (Jesuit's bark) and *Amorpha fruticosa* (false indigo bush) are also present along the water's edge. *Eleocharis parvula* (dwarf spikerush) is present on the mudflats.

*Cover Types:* Emergent-Short Persistent; Emergent-Tall Persistent; Scrub-Shrub-Bushy Deciduous; Non-vegetative-Open Water; Non-vegetative-Rubble.

*Uplands:* Upland portions of the Harrison Marsh site are dominated by invasive species, most notably Japanese knotweed, *Artemisia vulgaris* (common wormwood), tree of heaven, and princesstree. Upland areas are primarily flat, having been historically filled.

*Cover Types:* Mixed Hardwood Forest - Broad-Leaved Deciduous; Shrubland - Tall Deciduous; Shrubland - Bushy Deciduous; Non-vegetative - Cobble-Gravel; Urban - Paved

*Stream Channel and Banks:* A small cove is present at the east end of the site where a small tributary enters the river from a culvert. This cove area is dominated by mudflats. Elsewhere at the site, the shoreline is composed of cobbles, brick and cement debris, but generally becomes silt and mud towards the low tide line and subtidally. The riverbank appears stable but is unnaturally steep in areas due to having been filled with large boulders and pieces of cement.

*Ecological Value:* Upland and wetlands at the site are dominated by nonnative invasive vegetation, limiting ecological value. The adjacent industrial properties contain groundwater monitoring wells, suggestive of contaminated groundwater from historic industrial activity in the area. The adjacent PSEG property, which borders much of the Harrison Marsh site, regularly treats their approximately 1,800 foot fence line with herbicide, with overspray extending about ten feet past the fence. Evidence of regular human visitation was present in the cove area, with fairly well worn footpaths. Abundant trash and debris was observed along the shoreline. The site is not contiguous with other wooded areas and is bordered on its landward side by chain link fences, so is of limited habitat value for terrestrial wildlife. The state-listed American bittern was observed during the site visit.

## Hackensack River Sites

### 5.2.7 Meadowlark Marsh (Figure 7; Attachment E)

This approximately 85 acre site is bounded to the south by Bellmans Creek, to the west and north by the New Jersey Turnpike – Eastern Spur, and to the east by 83rd Street and active railroad tracks in Ridgefield, Bergen County, NJ. The surrounding environment consists of a combination of commercial developments, roadways, New Jersey Turnpike service area, and common reed-dominated emergent marshes. The site includes powerline and pipeline right-of-ways and associated access roads. Approximately ten feet of pesticide overspray from the utility right-of-way into the site was observed.

*Wetlands:* The site is primarily comprised of common reed-dominated emergent wetlands divided by utility access roads and other areas of fill. Historic fill material bisects the site. Several small emergent marsh areas within the common reed are dominated by sedges and ferns. Forested and scrub-shrub wetlands occur where the upland fill areas transition to emergent marsh. These wetlands are dominated by red maple, eastern cottonwood, and *Baccharis halimifolia* (eastern baccharis). Mudflats are present in the bends of Bellmans Creek along the southern boundary of the site.

*Cover Types:* Emergent - Tall Persistent; Emergent - Short Persistent; Scrub-Shrub - Tall Deciduous; Non-vegetative - Mud; Non-vegetative - Open Water

*Uplands:* A mowed grass vegetated upland access road bisects the northern third of the site. A small, approximately 3 acre, forested upland area is adjacent to the New Jersey Turnpike within the southern third of the site. This upland forested area is found above historic fill material and is dominated by *Prunus serotina* (black cherry), *Robinia pseudoacacia* (black locust) and *Betula populifolia* (gray birch).

*Cover Types:* Mixed Hardwood Forest - Broad-Leaved Deciduous; Grassland - Short Persistent; Shrubland - Tall Deciduous

*Stream Channel and Banks:* The site is primarily connected to the Hackensack River by Bellmans Creek. The banks along Bellmans Creek are mudflat and common reed stands and root mats. These banks appear to be stable. There are a few secondary channels connecting to Bellmans Creek. Several open water channels and ponded areas are interspersed among the northern sections of common reed marsh but their sources and connectivity are unclear. Runoff from development along Westside Avenue, the New Jersey Turnpike, and 83rd Street (Railroad Ave.) may be sources of freshwater for onsite ponds.

*Ecological Value:* Although numerous bird species, deer, and fox were observed on site, the wetland portion of the site is predominantly common reed monoculture, limiting ecological value. Much of the upland area is currently being used as a dirt track for off-road vehicles, severely limiting the habitat value of upland habitats within these areas. The utility rights-of-ways and access roads comprise the remainder of upland areas, and consist of relatively low quality mowed or sparsely vegetated habitat.

### 5.2.8 Metromedia (Figure 8; Attachment E)

The Metromedia site surrounds the Metromedia Broadcast site and its radio towers. It is bordered on the east and south by the Hackensack River and on the north by Marsh Resources Meadowlands Mitigation Bank. The site is undeveloped and dominated by common reed. The site likely contains fill from unknown sources during the construction of the radio towers. The property was acquired by the New Jersey Meadowland Commission in July 2003.

*Wetlands:* The site is primarily comprised of common reed-dominated emergent wetland due to restricted tidal flow. Mudflats are present in some areas.

*Cover Types*: Emergent - Tall Persistent; Non-vegetative - Mud; Non-vegetative - Open Water

*Uplands:* Uplands include tower maintenance roads, parking lots, and a dirt access road.

*Cover Types*: Grassland - Short Persistent; Urban - Paved

*Stream Channel and Banks:* A number of small tidal channels connect this site to the Hackensack River. They are bounded by common reed and have gradually sloped mud banks and bottoms. These channels appear to be stable.

*Ecological Value:* The site is predominantly a common reed monoculture with minimal inundation by the tide, limiting ecological function. An osprey nest was observed on one of the radio towers. The ponded area supports *Zannichelia palustris* (horned pondweed), a locally rare species of submerged aquatic vegetation.

### 5.2.9 Hackensack Reference Site - Marsh Resources Phase 2 (Figure 9; Attachment E)

The approximately 86 acre site is bordered to the south by the Hackensack River, to the east by Marsh Resources Phase 1, to the west by the Transco facilities, and to the north by the western spur of the New Jersey Turnpike. The site was restored by Marsh Resources Inc. as a private wetland mitigation bank in 2001. Prior to restoration, the site was a degraded common reed monoculture underlain with dredge spoils and peat that was isolated from tidal inundation due to topographic elevation and a lack of tidal creeks. Restoration activities included excavation of dredged material, creation of low and high marsh areas and tidal channels, creation of upland islands from the excavated material, and planting of native vegetation within the marsh and upland areas.

*Wetlands:* The site is primarily emergent tidal marsh dominated by native plant species. Low marsh areas are dominated by smooth cordgrass, *Amaranthus cannabinus* (tidalmarsh amaranth), and *Pluchea odorata* (sweetscent). High marsh areas are dominated by *Spartina patens* (saltmeadow cordgrass) and *Distichlis spicata* (saltgrass). Scrub-shrub wetland species include eastern baccharis and Jesuit's bark.

*Cover Types*: Emergent - Tall Persistent; Emergent - Short Persistent; Non-vegetative - Open Water

*Uplands:* Excavated materials were re-used on-site during construction to create four upland island habitats interspersed throughout the tidal marsh. The upland islands increase habitat complexity within the site and support a diversity of native tree, shrub, and herbaceous plant species. Two invasive vines, *Ampelopsis brevipedunculata* (porcelainberry) and *Polygonum perfoliatum* (mile-a-minute), are present along the periphery of the uplands. The uplands are utilized by mammalian and avian species.

*Cover Types:* Mixed Hardwood Forest - Broad-Leaved Deciduous; Non-vegetative - Cobble-Gravel

*Stream Channel and Banks:* The site contains meandering channel network configured to provide the required tidal inundation from the Hackensack River and allow the marsh plain to drain properly at low tide. Channels are gradually sloped, the stream banks appear stable, and no erosion is evident.

*Ecological Value:* The restored tidal marsh site provides functions including floodwater storage, improved water quality, and wetland and upland habitat within a highly industrialized region. A wide variety of wildlife has been observed utilizing the site, particularly avian species. Notable species known to use the site include *Falco peregrinus* (peregrine falcon) and northern harrier, both endangered in New Jersey; and the state threatened osprey and yellow-crowned night-heron. High functioning high marsh habitat, which is extremely limited within the Meadowlands region, occurs within the site. *Ammodramus caudacutus* (saltmarsh sparrow), a state listed species of Special Concern, and *Ammodramus maritima* (seaside sparrow), both very rare in the Meadowlands due to the scarcity of high marsh habitat in the area, may utilize the site as they have been observed breeding within high marsh habitat on the adjacent Marsh Resources Phase 1 high marsh. The site also supports a large variety of waterfowl, especially during spring and fall migrations. Field surveys indicate that the channels and marsh plains within the site are fully utilized by salt marsh-dependent fish and crustacean species.

# 6 Desktop Studies

## 6.1 Uniqueness and Heritage Elements

The following sources were reviewed to support data collection for the EPW's Uniqueness/Heritage Function: NJDEP Freshwater and Tidal wetland maps; USFWS National Wetland Inventory (NWI) maps; NJDEP Landscape Project database; USFWS Information, Planning, and Conservation System; NJDEP Surface Water Quality Standards; the New Jersey State and National Register of Historic Places Listings and the New Jersey State Museum archaeological site records; List of National Wild and Scenic Rivers; and other appropriate reference documents.

Cultural resources (historic architectural and archaeological) are regulated under Section 106 of the National Historic Preservation Act (NHPA). Data was compiled on known cultural resources that are present within the sites. Literature, past reports including a 2014 cultural resources overview survey of the HRE sites, and regulatory agencies' (i.e., State Historic Preservation Office [SHPO], New Jersey State Museum, Automated Wreck and Obstruction Information System {AWOIS} system) databases were queried (Harris et al. 2014) . National Register of Historic Places (NRHP) listed or eligible historic resources were identified within the boundaries of Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve and Essex County Branch Brook Park project sites. There are four archaeological sites located within the boundaries of the Clifton Dundee Canal Green Acres Purchase site. The list of historic districts and properties identified within these site boundaries are included in Attachment F.

A request letter was sent to the New Jersey Natural Heritage Program (NJNHP) for information on the potential presence of rare, threatened, or endangered species and natural communities on or near the project sites. Based on the correspondence with NJNHP (included in Attachment F), there are recent records of rare species at or within the vicinity of four HRE sites: Kearny Point, Meadowlark Marsh, Metromedia, and Oak Island Yards, as well as at both reference sites. An NHP response of records for Dundee Island Park/Pulaski Park and Essex County Branch Brook Park is pending.

The USFWS New Jersey Ecological Services Field Office was contacted through the Information, Planning, and Conservation System (IPaC) regarding the potential presence of species under the jurisdiction of the USFWS within the project and reference sites. The USFWS official species lists (included in Attachment F) indicate that there are no threatened and endangered species or critical habitats under USFSW jurisdiction within the project or reference sites. Further details on the endangered species information for the sites are provided in Attachment F.

## 6.2 Water Quality Classifications

Surface waters in NJ are classified in the N.J.A.C. Surface Water Quality Standards (SWQS) based on the type of waterbody and the designated use of the waterbody. Freshwaters are classified as FW1 (not subject to any man-made wastewater discharges) and FW2 waters (all other freshwaters except Pinelands waters). Freshwaters are further classified based on trout status, trout production (FW2-TP), trout maintenance (FW2-TM), and non-trout (FW2-NT). Saline waters are classified as saline estuarine (SE) and saline coastal (SC). SE waters are further classified into SE1, SE2, and SE3 based on their designated uses. Surface water classifications for the thirteen project sites are provided in Table 4.

While the SWQS protect water quality for all surface waters of the State, the degree of protection varies depending on the anti-degradation designation of the water resource. There are three levels of anti-degradation designations: Outstanding National Resource Waters (ONRW), Category One waters (C1), and Category Two (C2) waters. The highest level of protection is applied to Outstanding National Resource Waters (ONRW), which includes surface waters classified as freshwater 1 (FW1) waters and Pinelands (PL) waters. FW1 waters, also known as non-degradation waters, are set aside for posterity because of their unique ecological significance, exceptional recreational significance, or exceptional water supply significance. Non-degradation waters are not to be subject to any manmade wastewater discharges. Activities that might alter existing water quality in FW1 waters are prohibited. PL waters maintained in their natural state and changes are allowed only toward natural water quality. Category One Waters are protected from any measurable change in water quality because of their exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources. Category Two Waters include all surface waters except those designated as ONRW or Category One waters. As with Category One waters, Category Two waters are protected from any measurable change in existing water quality; however, some lowering of existing water quality may be allowed by the NJDEP based on a social or economic justification.

For the purposes of this EPW assessment, specifically the Fish Function, Category 1 waters, FW2-TP, and FW2-TM waters are considered to have a high water quality rating. As indicated in Table 3, all projects sites and both reference sites are Category Two waters classified as FW2-NT, SE2, or SE3 waters and therefore are considered to have a moderate water quality rating.

Table 4: N.J.A.C. Surface Water Quality Classifications [2]

| River | Site | Classification | Antidegradation Category |
|---|---|---|---|
| Passaic River | Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | SE2 | Category Two |
| | Dundee Island Park/ Pulaski Park | FW2-NT/SE2 | Category Two |
| | Essex County Branch Brook Park | FW2-NT | Category Two |
| | Kearny Point | SE3 | Category Two |
| | Oak Island Yards | SE3 | Category Two |
| | Reference Site - Harrison Marsh | SE3 | Category Two |
| Hackensack River | Meadowlark Marsh | SE2 | Category Two |
| | Metromedia | SE2 | Category Two |
| | Reference Site – Marsh Resources Phase 2 | SE2 | Category Two |

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[2] NJDEP 2011 ,N.J.A.C. 7:9B Surface Water Quality Standards; http://www.nj.gov/dep/rules/rules/njac7_9b.pdf; last amended April 2011

**FW2** waters designated uses are: maintenance, migration and propagation of the natural and established biota; primary contact recreation; industrial and agricultural water supply; public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and any other reasonable uses.

**SE2** waters designated uses are: maintenance, migration and propagation of the natural and established biota; migration of diadromous fish; maintenance of wildlife; secondary contact recreation; and any other reasonable uses.

**SE3** waters designated uses are secondary contact recreation; maintenance and migration of fish populations; migration of diadromous fish; maintenance of wildlife; and any other reasonable uses.

## 7 Evaluation for Planned Wetlands (EPW)

### 7.1 EPW Process: EPW was conducted as described in Section 2.1.1 of the main appendix.

### 7.2 EPW Considerations for the Lower Passaic River and Hackensack River Sites

*Wetland Areas*

As per the EPW handbook, for each element, there are certain rationale and assumptions that need to be considered during the assessment procedure. In general, the typical metrics (e.g. contact once annually or less, Slope <10:1, etc.) in the handbook and on field data sheets were followed. However, there were a few elements for which the condition assessment metric given on the field data sheet was not applicable to this project. For these instances, the field team selected more appropriate condition assessments on which to base the EPW scoring. These include:

- 10. Vegetation Characteristics- During Growing Season (note differences in definitions for upper shore zone, lower shore zone, and entire wetland) – Due to the fact that the wetlands assessed at most sites were very narrow and in most cases, quite steep (2:1 or steeper), an assumption was made for the evaluation of the ‘lower” and ‘upper’ shore zones. The ‘lower shore zone’ was designated as the portion of the bank that was typically wetted and/or saturated under normal water level conditions; the ‘upper shore zone’ was designated as the higher portion of the bank that was rarely inundated but could still support wetland vegetation and/or exhibit signs of wetland hydrology.

- 11a. Number of Layer in Banks – Determination was made to include ‘water column, open water below 25cm (10in) in depth’ in the wetland layers only at sites where the water flow did not prohibit the growth of hydrophytic vascular vegetation.

- 14a. Steepness of Existing Shore & 14b Steepness of Planned Wetland Shore –For these project sites, the potential for shoreline stabilization is not based upon whether or not existing conditions would allow for the construction of a shallow-sloped wetland, but rather whether or not existing infrastructure would prevent shoreline improvements. Therefore, the field team applied the metric “Constructible” and “Not Constructible” in lieu of specific slope ratios.

- 27a. Spawning Substrate, Accessible During Spawning Periods – Assumed substrate dominated by large, anthropogenic construction debris (e.g. bricks, concrete blocks, etc.) fell under choice ‘c. Boulders, bedrock or fines (e.g., silt, mud, clay).’

*Upland Areas*

Although it is recognized that EPW was developed for assessing the functionality of wetland areas, due to the need to account for adjacent upland areas that need to be incorporated into the project designs,

the EPW functional assessment methodology was applied to assess the adjacent uplands. The field data sheets for three of the EPW functions were modified slightly for the assessment: Shoreline Bank Erosion Control, Sediment Stabilization, and Wildlife. General modifications consisted of considering the upland areas as opposed to wetland areas (e.g. wetland, shore zone, shorelines, etc.) for each element. In addition, specific unrelated elements were deleted from each of the three sheets:

- Shoreline Bank Erosion Control (Upland) – deleted elements 1a, 2, 3, 6, 9, 10a, 10g, & 14b; for 14a Steepness of Existing Shore & 14b Steepness of Planned Wetland Shore – utilized <=3:1 for slope gradual and >3:1 for slope steep. Therefore utilized Influences on Rate of Erosion (I) for Shoreline Bank Erosion Control FCI.

- Sediment Stabilization (Upland) – deleted element 7

- Wildlife (Upland) – deleted elements 13a & 13b

The calculation sheets for these elements were also revised to reflect the above modifications. Note, the benefits for upland habitat were not included in the EPW scores.

### 7.3 EPW Baseline Results

Below are summary tables of the EPW baseline Functional Capacity Indices (FCIs) and Functional Capacity Units (FCUs) for the seven (7) sites and two (2) associated reference sites. Table 5 represents the FCI for each EPW function, and Table 6 represents the FCI for each EPW Upland function. The FCU scores for each site varied based on their wetland and upland acreages. The FCI and FCU scores will be the basis for decision-making in the alternatives development for the planned wetlands.

**Table 5: EPW Comparative Table – Functional Capacity Indices (FCIs).**

| Site | Shoreline Bank Erosion Control | Sediment Stabilization | Water Quality | Wildlife | Fish (Tidal/Stream/River) | Uniqueness/ Heritage |
|---|---|---|---|---|---|---|
| Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | 0.54 | 0.62 | 0.50 | 0.41 | 0.37 | 1.00 |
| Dundee Island Park/ Pulaski Park | 0.52 | 0.46 | 0.45 | 0.22 | 0.38 | N/A |
| Essex County Branch Brook Park | 0.64 | 0.66 | 0.52 | 0.47 | 0.37 | 1.00 |
| Kearny Point | 0.58 | 0.49 | 0.45 | 0.31 | 0.34 | 1.00 |
| Oak Island Yards | 0.59 | 0.48 | 0.45 | 0.35 | 0.44 | 1.00 |
| Reference Site - Harrison Marsh | 0.41 | 0.67 | 0.71 | 0.21 | 0.47 | 1.00 |
| Meadowlark Marsh | 0.73 | 1.00 | 0.61 | 0.18 | 0.43 | 1.00 |
| Metromedia | 0.63 | 1.00 | 0.59 | 0.23 | 0.41 | 1.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Reference Site – Marsh Resources Phase 2 | 0.85 | 1.00 | 0.88 | 0.47 | 0.66 | 1.00 |

**Table 6: EPW Comparative Table FCIs (Uplands).**

| Site | Shoreline Bank Erosion Control (Upland) | Sediment Stabilization (Upland) | Wildlife (Upland) |
|---|---|---|---|
| Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | 0.63 | 0.66 | 0.41 |
| Dundee Island Park/ Pulaski Park | 0.36 | 0.37 | 0.17 |
| Essex County Branch Brook Park | 1.00 | 1.00 | 0.22 |
| Kearny Point | 0.13 | 0.33 | 0.31 |
| Oak Island Yards | 0.31 | 0.46 | 0.33 |
| Reference Site - Harrison Marsh | 0.5 | 0.88 | 0.38 |
| Meadowlark Marsh | 0.30 | 0.38 | 0.21 |
| Metromedia | 0.36 | 1.00 | 0.15 |
| Reference Site – Marsh Resources Phase 2 | 0.5 | 0.90 | 0.76 |

In general, the wetland-related FCI scores for the sites were similar for most functions, including Water Quality, Wildlife, Fish, and Uniqueness/Heritage. The extremely lower scores for the Wildlife function are likely due to the narrowness and small areas of the wetlands on the sites, as well as sparse vegetation and low cover type interspersion. The mid-level scores for the Water Quality and Fish functions are likely due to impacts from limiting factors like water level fluctuations and site disturbances, as well as lack of fish habitat. For the other two functions, Shoreline Bank Erosion Control and Sediment Stabilization, scores varied more across the sites; this is due to various levels of stability of the banks and adjacent areas. For these two functions, the Meadowlark Marsh and Marsh Resources Phase 2 sites scored highest.

Marsh Resources Phase 2 and Harrison Marsh reference sites scored higher than average across all categories.  Mid-range scores for Harrison Marsh indicate some stresses, likely due to impacts from the high levels of pollution and industrial development and activity in the surrounding waters and upland areas.  The variance in scores across the functions shows the sites to be a good 'reference' within the region, as a site with FCIs at or close to 1.0 for all functions is unrealistic given the nature and history of impact within the Hackensack and Lower Passaic River systems. Restoration measures focused on increasing functional capacity of the wetlands to mimic the reference site conditions.

For the three (3) modified upland functions, Erosion Control, Sediment Stabilization, and Wildlife, the scores varied more across the sites than the wetland scores. This is expected based on the varied upland buffer conditions, sizes, habitats, and anthropogenic stresses on the sites. It should be noted that the modified upland sheets are not the most accurate depiction of the functions provided by the upland buffers since many elements were not able to be scored. Other factors of upland functionality

and support to the adjacent wetland ecosystems should be factored into restoration planning based on the overall habitat mapping and best professional judgement.

Low Wildlife scores across all sites were the result of the sites' proximity to highly disturbed areas as well as the dominance of non-native forested and herbaceous plant species in the upland buffer area. The Harrison Marsh reference site scored low for the Wildlife function even though this site is quite stable and showed signs of wildlife inhabitants. The lower scores are a result of the dominance of non-native forested and herbaceous plant species in upland buffer areas. This brings down the overall scores due to a lack of multiple cover types and their associated interspersion, which forms most of the scoring basis for these two upland functions. Its relatively small size and location directly adjacent to highly disturbed areas also brought this score down. Both the Harrison Marsh and Marsh Resources Phase 2 sites scored among the highest for modified upland Erosion Control, exceeded only by the Essex County Branch Brook Park, which scored higher due to an upland area stabilized by manmade structures and a thick turf groundcover.

Table 7 represents the baseline FCUs for each EPW function, and Table 8 represents the baseline FCUs for each EPW Upland functions.

Table 7: EPW Comparative Table FCUs.

| Site | Shoreline Bank Erosion Control | Sediment Stabilization | Water Quality | Wildlife | Fish (Tidal/ Stream /River) | Uniqueness/ Heritage |
|---|---|---|---|---|---|---|
| Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | 1.52 | 1.74 | 1.41 | 1.15 | 1.04 | N/A |
| Dundee Island Park/ Pulaski Park | 0.24 | 0.22 | 0.21 | 0.10 | 0.18 | N/A |
| Essex County Branch Brook Park | 22.94 | 23.54 | 18.71 | 16.99 | 13.25 | N/A |
| Kearny Point | 20.13 | 17.00 | 15.62 | 10.76 | 11.80 | N/A |
| Oak Island Yards | 4.60 | 3.74 | 3.51 | 2.73 | 3.43 | N/A |
| Reference Site - Harrison Marsh | 3.92 | 6.35 | 6.72 | 1.99 | 4.50 | N/A |
| Meadowlark Marsh | 62.36 | 85.43 | 52.11 | 15.38 | 36.73 | N/A |
| Metromedia | 37.49 | 59.50 | 35.11 | 13.69 | 24.40 | N/A |
| Reference Site – Marsh Resources Phase 2 | 67.05 | 78.88 | 69.02 | 37.14 | 52.26 | N/A |

Table 8: EPW Comparative Table FCUs (Uplands).

| Site | Shoreline Bank Erosion Control (Upland) | Sediment Stabilization (Upland) | Wildlife (Upland) |
|---|---|---|---|
| Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | 5.13 | 5.37 | 3.34 |
| Dundee Island Park/ Pulaski Park | 2.25 | 2.31 | 1.06 |
| Essex County Branch Brook Park | 172.43 | 172.43 | 37.93 |
| Kearny Point | 3.98 | 10.10 | 9.49 |
| Oak Island Yards | 1.74 | 2.58 | 1.85 |
| Reference Site - Harrison Marsh | 2.65 | 4.66 | 1.98 |
| Meadowlark Marsh | 2.06 | 2.61 | 1.44 |
| Metromedia | 0.63 | 1.76 | 0.26 |
| Reference Site – Marsh Resources Phase 2 | 3.38 | 6.08 | 5.14 |

The FCU scores for each site varied based on their wetland and upland acreages; these scores will be the basis for decision-making in the alternatives development for the planned wetlands.

# 8 Stream Visual Assessment Protocol (SVAP)

## 8.1 SVAP Process

The Natural Resource Conservation Service (NRCS) Stream Visual Assessment Protocol (SVAP)[3] was utilized to assess hydrologic and morphologic stream conditions that were not addressed within the scope of the EPW. SVAP is a qualitative field reconnaissance technique that assesses channel and floodplain conditions, riparian areas, water quality and aquatic habitat developed by NRCS in 1998. It was developed to work as an assessment for existing physical conditions within a project site; it may not detect factors affecting the location from the watershed or stream reaches outside of the project limits.

During a site assessment, the SVAP is recorded on a standard two page worksheet. Following the SVAP guidelines for recording, up to fifteen (15) assessment categories, such as channel, bank stability, riparian zone conditions, and in-stream fish cover, may be scored in a range from 1 to 10, with 10 being the optimal condition. Depending on the existing site conditions, not all elements may need to be recorded. The overall assessment score is created by adding up the scored value for each element and dividing that by the number of the categories assessed. An overall assessment score of less than 6 is determined to be poor; an overall score between 6.1 and 7.4 is considered to be fair; an overall score between 7.5 and 8.9 is considered good; and an overall score over 9 is considered excellent. This numerical score can be used as a general determination of the overall quality of the stream condition.

## 8.2 SVAP Results

**Table 9: SVAP Comparative Table.**

| Sites | Site 887. Essex County Branch Brook Park | Site 719. Meadowlark Marsh |
|---|---|---|
| **Channel Condition** | 3 | 7 |
| **Hydrologic Alteration** | 3 | 10 |
| **Riparian Zone** | 5 | 10 |
| **Bank Stability** | 7 | 10 |
| **Water Appearance** | 3 | 3 |
| **Nutrient Enrichment** | 3 | 3 |
| **Barriers to Fish Movement** | 3 | 10 |
| **In-stream Fish Cover** | 5 | 3 |
| **Pools** | 3 | 1 |
| **Invertebrate Habitat** | 7 | 3 |
| **Canopy Cover** | 7 | 1 |
| **Riffle Embeddedness** | N/A | N/A |
| **Total** | **4.45** | **5.55** |
| **SVAP Score** | **Poor** | **Poor** |

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[3] USDA Natural Resources Conservation Service. 1998. Stream visual assessment protocol, NWCC-TN-99-1. Portland, OR: National Water and Climate Center.

Table 9 depicts the numerical scores for applicable assessment categories for each of the following seven (7) sites that SVAP was conducted at: Essex County Branch Brook Park and Meadowlark Marsh.

In general, those sites with the least amount of adjacent riparian buffers as well as those with the greater proximity to infrastructure and/or human disturbance scored lowest. Another large influence on the SVAP scoring was the water appearance. Those sites that were closer to the mouth of the stream appeared to have poorer water quality and generally scored lower. The sites with fewer hydrological alterations and wider riparian buffers and that were higher in the watershed scored higher. The Essex County Branch Brook Park, site scored the lowest, as the waterbodies are narrowly confined in a very urban setting. The impediments to fish passage further reduced the overall score of the Essex County Branch Brook Park site. The SVAP was not applicable at the other five (5) sites and the two (2) reference sites.

## 9 Proposed Alternatives

Six (6) of the seven (7) sites had three (3) different alternatives, differing in functionality and ecological benefits. These sites had the potential for multiple design approaches (e.g. establishment of different upland and/or wetland habitat types, multiple reroute locations of the stream, varying locations for wetland establishment) and variances of restoration measures. Examples of variances in measures include: a) type of bank stabilization structures (e.g. hard structure vs bioengineering vs plantings, b) acreage of invasive species removal or wetland creation, or c) number of in-stream structures installed. Only one (1) alternative was prepared for Dundee Island Park since it was a relatively small site with limited restoration opportunities.

The restoration measures proposed for the site alternatives are based on the target ecosystem characteristics (TECs) presented in Section 2 of the appendix. The restoration measures proposed were categorized into the TECs. There are different ecological restoration techniques associated with the proposed ecological restoration measures. Table 10 categorizes and explains each restoration measure and techniques proposed for the Lower Passaic River and Hackensack River sites.

Shore softening is the removal of concrete, rock or debris and/or the addition of vegetation to an armored shoreline. Bank stabilization is a natural bank shoreline with no wetlands. It is assumed that restoration measures will include site specific enhancements that could increase various fish habitat and irregularity of stream bank. As part of shoreline softening and bank stabilization measures, wetland plants will be proposed at elevations near the ordinary high water make, with the intent of creating a narrow fringe wetland habitat at the site. Shoreline softening techniques include stacked rock wall with brush layers, select rock/concrete removal with native plant materials, and drilling with native plant materials. Bank stabilization techniques include stacked rock wall with brush layers, tired rock slope with native plant benches and pockets, and vegetated crib walls.

Instream structures that are associated with channel realignment and channel modification include cross vanes, skewed cross vanes, and j-hooks. The instream structures proposed should have little to no maintenance needed to maintain their functionality. One exception may be removal of fallen trees or large debris following major storm events.

Table 10: Ecological Restoration Measures.

| TEC | Measure | Description | Techniques |
|---|---|---|---|
| **Wetlands (Coastal Wetlands)** | Emergent Wetland Creation | Excavating and grading areas to create an emergent wetland to replace upland invasive areas to provide a habitat that is less likely to become revegetated with the same upland invasive species. | • Excavation and Grading<br>• Select Native Planting |
| | Forested and/or Scrub/Shrub Wetland Creation | Excavating and filling areas to create a forested and/or scrub/shrub wetland to provide continuous fringe habitat around and shade for fish habitat (from trees/shrubs). | • Excavation and Grading<br>• Select Native Planting |
| | Invasive Species Removal with Native Plantings | Removal of non-native plants and replanting those areas with plants native to the ecosystem. Invasive species removal will be in coordination with other ecological restoration measures | • Invasive Species Removal with Native Plantings |
| **Shorelines and Shallows** | Shoreline Softening | The removal of existing structures and armoring and creating a living shoreline to protect against erosion and to provide and preserve natural habitat. | • Stacked Rock Wall w-Brush Layers<br>• Select Rock/Concrete Removal w-Native Materials<br>• Drilling w-Native Plantings |
| | Bank Stabilization | Establishing and implementing measures to prevent and/or fix erosion and stabilize the embankment. | • Stacked Rock Wall w-Brush Layers<br>•Tiered Rock Slope w-Native Plant Benches/Pockets<br>• Vegetated Crib Wall |
| | Riparian Buffer | Establishing and implementing measures to prevent and/or fix erosion and stabilize the embankment. | • Invasive Species Removal with Native Plantings<br>• Select Native Planting |
| **Fish, Shellfish and Benthic Habitat & Sediment Control/Nutrient Load Reduction [Habitat for Fish, Crab, & Lobsters]** | Realign Channel w-Instream Structures | Changing the realignment of the channel and utilizing instream structures to modify the channel's hydrologic and hydraulic characteristics. | • Cross Vane<br>• Skewed Cross Vane<br>• J-Hook |
| | Channel Plug with Select Native Plantings (Realign Channel w-Instream Structures) | Block water from entering the secondary channel to create a more adequate stream morphology in the main channel section. | • Excavation and Grading<br>• Select Native Planting |
| | Channel Modification w-Instream Structures | Modifications within the channel to steer, direct, and/or control the channel away from a specific area. The channel will remain within its current banks, but that sinuosity/more stable geometry will be achieved with the structures. | • Cross Vane<br>• Skewed Cross Vane<br>• J-Hook |
| | Bed Restoration | Modifications to the channel bed to create a low flow channel. | • Thalweg Restoration<br>• Bed Material Replacement<br>• Creation of Riffle-Pool Complex |
| | Debris Removal | The removal of substantial debris within the channel. | |
| | Sediment Dredging | Dredging of sediment laden areas within the channel to fix the hydraulic characteristics within the channel. | |
| | Forebay/Sediment Basin | Creation of forbay/sediment basin to capture sediment laden water and reduce the amount of sediment from settling in the channel. | |
| | Sediment Load Reduction | The reduction of sediment erosion in specified location. | • Vegetated Swale<br>• Outlet Protection<br>• Culvert Repair<br>• Sediment Trap<br>• Bioretention Basin/Raingarden |
| **Tributary Connections** | Fish Ladders | A structure that allows fish to migrate around obstacles like damns. | |
| | Weir Modification (Fish Passage) | Modifying the existing weir to create modifications to the hydraulic characteristics of the weir. | |
| **Habitat Connections [Tributary Connections]** | Bench w-Viewshed | The addition of a bench with a viewing area. | |
| | Wildlife View Platform/Designated Area | The addition of a wildlife viewing platform for public. | |

| TEC | Measure | Description | Techniques |
|---|---|---|---|
| **Public Access** | Boat/Water Access | Creating a boat/water access for the public to access the water. | |
| | Proposed Path | Realignment of the existing path to avoid proposed restoration measures. | |
| | Educational Signage | Addition of education signage for public use. | |

Bed restoration techniques include thalweg restoration, bed material replacement, and creation of riffle-pool complex. The sediment load reduction ecosystem restoration measure includes techniques such as vegetated swales, outlet protection, culvert replacement, sediment trap and bioretention/raingardens. Benches, wildlife view platform/designated area, boat/water access, proposed path, and education signage are all possible proposed public access techniques.

Invasive plant species were identified by the LPFT at every site during field investigations. For all alternatives in any areas where existing invasive plant species were found, any measure that is proposed for that area will include the removal of invasive plant species. The alternative maps show ecological restoration measures such as shoreline softening and bank stabilization in areas where existing invasive plant species were observed. The implementation of these measures will include the removal of invasive plant species if present in the proposed measures locations. Based on the Planting Plan for Mamaroneck River Habitat Improvement provided by Westchester County, some large trees and wetland seed mix will be proposed for some sites. In the future, another invasive plant species survey should be conducted before implementation of restoration measures at the site. A tree survey should also be conducted at all of the sites in the future prior to any implementation of site restoration measures to account for type, size, and location of existing trees.

Restoration measures will follow floodway regulations as stated in FEMA’s CFR 44 Chapter 60.3 regarding no net rise in floodway elevations. Restoration measures will take into consideration cut/fill requirements per site. Once the Feasibility level drawings are prepared, a more detailed cut/fill analyses will be completed to address potential flood inducement constraints per site.

## Lower Passaic River Sites

### 9.1 Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

The Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve site consists of approximately 1,800 linear feet of the western shoreline of the Lower Passaic River downstream of the Dundee Dam in Clifton, NJ. NJ State Route 21 and a commercial property border the landward side of the site. The City of Clifton has established Dundee Island Park within the site which includes a trail network, benches, interpretive signage, trash and recycling bins, and fish consumption advisory signage. This site includes the Safas property, which is subject to an NJDEP environmental investigation/cleanup (NJDEP case # E20050092). Large volumes of flood-driven woody debris and floatable trash have been deposited along the shore of the central portion of the site, immediately below a low, flat peninsula projecting out into the river. An active vagrant campsite strewn with trash was observed during the site visit within the southern portion of the site near Ackerman Ave.

Forested and scrub-shrub wetlands occur along portions of the shore of this site. These wetlands are primarily vegetated with river birch, black willow and buttonbush. A thick wrack line of debris wash ashore along some of the wetland areas.

Riparian uplands within the site are primarily forested by native plant species, though some areas are dominated by the invasive plan Japanese knotweed. Large amounts of cement, stone, brick, asphalt and steel debris fill have been historically placed at the site and are now overgrown with vegetation.

The river shore and bottom substrates at the site consist primarily of boulders and cobbles, although wetland areas are comprised of silt, sand and gravel. While portions of the site have been historically

filled, some of the river's original floodplain remains. Stream banks are stable in filled and original floodplain areas.

The environmental stressors are identified as:

- Invasive plant species;
- Nutrient inputs;
- Limited wetlands;
- Poor aquatic habitat; and
- Shoreline debris.

The site functions as an important riparian buffer between the Passaic River and Route 21 and the surrounding commercial and residential development of Clifton. The lack of riparian wetlands, inhabitation by vagrants, and the considerable volume of trash and storm-driven wrack and debris at the site limit its ecological functions and value. Creation of wetlands would help improve water quality, provide flood storage, and enhance fish and wildlife habitat. The state-listed black-crowned night heron was observed between this site and the Dundee Dam and would benefit from habitat enhancement. The adjacent Dundee Dam is the upstream end limit of migratory fish passage in the Lower Passaic River; therefore, enhancements to fish habitat would benefit migrating fish species.

### 9.1.1 Alternative A

Alternative A includes the creation and enhancement of approximately 0.10 acres of emergent wetland along the shoreline located in the northern section of the site, just downstream of the dam. In the northern third of the site within the river starting at the northern edge, just downstream of the dam, approximately 0.27 acres of fish habitat will be restored, enhanced and preserved by removing fill and debris and incorporating and preserving natural cobble substrate within riffle habitat. The creation of approximately 2.84 acres of freshwater forested wetlands will occur in the middle and lower half of the site, extending from the shoreline into the interior of the site. Along the entire shoreline and shallows of the site debris will be removed from approximately 0.82 acres. An approximately 0.11 acre sediment basin will be constructed in the center of the site, along the southern boundary, to treat runoff from the uplands and adjacent industrially developed site. The remainder of the riparian upland forest, 5.50 acres, will be enhanced by removing the invasive plant species and planting of native plant species. To promote public access and usage of the site trail enhancement (1,081 linear feet), an overlook (0.1 acre) and a recreational boat launch (718 linear feet access plus 0.15 acre launch) will be constructed in the northern portion of the site. (Figure 10, Attachment H)

### 9.1.2 Alternative B

Alternative B features some of the same measures included in Alternative A. Alternative B includes the emergent wetland enhancement; fish habitat creation; debris removal; sediment basin; and overlook detailed in Alternative A. Alternative B does not include any forested wetland creation, trail enhancement or boat launch. This alternative includes riparian upland forest enhancement of 7.86 acres in the form of invasive plant species removal and native plant species plantings. (Figure 11, Attachment H)

### 9.1.3 Alternative C

Alternative C includes fewer enhancement measures compared to Alternatives A and B. Alternative C does not include the creation of additional emergent wetland habitat, fish habitat, or forested wetland habitat. Alternative C includes the 0.82 acres shoreline and shallows debris removal and the creation of

an overlook which are also featured in Alternatives A and B. Alternative C includes the enhancement of 7.93 acres of invasive plant removal and native plantings within the riparian forest uplands. (Figure 12, Attachment H)

## 9.2 Dundee Island Park/Pulaski Park

The Dundee Island Park/Pulaski Park site consists of approximately 2,370 linear feet of the western shoreline of the Lower Passaic River located approximately 1.3 miles downstream of the Dundee Dam in Passaic, NJ. An inactive set of railroad tracks and right-of-way border the site to the west and north and a church and commercial properties border the site to the south. The City of Passaic has established Dundee Island Park within the site which includes a soccer field, benches, a playground, trash and recycling bins, a boat launch and fish consumption advisory signage. Flood-driven woody debris and floatable trash has been deposited along the shore of the site. Large ash trees have been removed from the shoreline and bank is now dominated by Japanese knotweed. Within the boundary of the site the bank of the Passaic River is very steep and stabilized with rip-rap and concrete.

A very narrow band of forested wetlands is present along the shoreline. These wetlands are primarily vegetated with river birch, black willow and tree of heaven.

Riparian uplands within the site consist primarily of shrubland with a mix of native and non-native plant species, grassland, and non-vegetated uplands.

The river shore and bottom substrates within the site consist primarily of rip rap, boulders and concrete, although wetland areas are comprised of silt and mud. The stream banks are stable and very steep.

The environmental stressors are identified as:

- Invasive plant species;
- Nutrient inputs;
- Limited wetlands;
- Poor aquatic habitat;
- Shoreline debris; and
- Sparse vegetation.

The site functions as a riparian buffer between the Passaic River and the surrounding commercial and residential development of Passaic. Poorly managed and undirected human visitation throughout the site, the considerable volume of trash and storm-driven trash and debris, steep banks and limited wetland area at the site limit its ecological value. Although the steep banks prohibit wetland creation, shoreline softening and native plantings will enhance wildlife habitat and provide nutrient removal and water quality enhancement.

### 9.2.1 Alternative A

Only one restoration alternative, Alternative A, was developed for this site as there are limited opportunities for restoration available at this site. Alternative A includes bank stabilization and shoreline softening (approximately 0.71 acre) through native plantings in concert with removal of portions of the rip rap, boulders and concrete presently used for bank stabilization. Additionally, approximately 1.79 acres of native plantings will occur in the uplands of the northern portion of the site. An approximately 1,580 linear foot trail will be constructed for along the top of the bank to provide public access to the site. (Figure 13, Attachment H)

## 9.3 Essex County Branch Brook Park

The Essex County Branch Brook Park site consists of approximately 4,200 linear feet of Branch Brook and adjacent parkland in Newark, NJ. The surrounding environment consists primarily of commercial and residential developments and roadways. The site includes a day-lighted section of Branch Brook as well as 3 larger ponds (Branch Brook Lake, Clarks Pond, and an unnamed pond) that were created using weirs. Branch Brook Park was established by Essex County as the first county park in the nation. The park is notable as having the largest collection of cherry blossom trees in the United States. The park is approximately four miles long and a quarter mile wide and includes open grassland with patches of forest stands that line Branch Brook. The stream and adjacent forest areas contain considerable amounts of anthropogenic trash. The ponds suffer from algal blooms and eutrophication indicative of excess nutrient inputs.

A narrow band of forested wetlands is found along the stream. These wetlands are primarily vegetated with *Acer rubrum* (red maple), black willow and *Lindera benzoin* (northern spicebush). Two emergent wetland areas are found in the northern section of this site. These wetland areas are dominated by common reed and broadleaf cattail.

Uplands within the site consist primarily of mowed lawn areas typical of a park setting. Riparian habitats include mixed hardwood trees such as *Fraxinus pennsylvanica* (green ash) and American sycamore. A majority of the south end of the park is forest that is dominated by *Quercus rubra* (red oak), red maple, sweetgum, green ash, and *Acer platanoides* (Norway maple). Shrubland areas are a mixed cover of mowed and unmowed grasses with smaller and newly planted trees such as red maple and red oak.

Most of the stream portions of Branch Brook are stable with limited erosion issues. Low-flow step weirs manage the water levels within the site. The pond sections have banks that have been stabilized with cement and paver stones. Portions of the stream and ponds suffer eutrophication from excess nutrient runoff.

The environmental stressors are identified as:

- Invasive plant species;
- Minimal to no buffers to wetlands/open water;
- Nutrient inputs;
- Limited wetlands; and
- Barriers to fish passage.

The forested riparian habitat within the site provides a vegetated buffer between surrounding mowed fields and the stream. Waterfowl, egrets, and songbirds were observed within the site and would benefit from habitat enhancement. Recreational fishing was observed in the larger open water portions of the site; however, eutrophication, fish barriers, and degraded stream habitat impair the overall health of the aquatic habitat. The park acts as a habitat island in a highly developed and densely populated urban setting and restoration would greatly improve this resource. The understory of the upland and wetland forested habitats of the site are dominated by non-native, invasive vegetation, limiting ecological value. The stream and ponds are isolated within the park so fish passage is not possible beyond the boundary of the site. The presence of weirs along the stream impedes fish passage throughout the site.

### 9.3.1 Alternative A

Alternative A includes restoration measures that affect nearly 100 acres and over 20,000 linear feet of shoreline. These measures include the creation of approximately 26.30 acres of forested and scrub shrub wetland along the stream and edges of ponds. This alternative also includes softening of approximately 10,320 linear feet of shoreline through debris removal and planting with native plants along the stream and ponds throughout the site, and is included in the 26.30 acres above. In order to enhance fish habitat, approximately 23.52 acres of the larger open water ponds will be dredged to deepen these water bodies. Where the stream is confined to a narrower channel, approximately 2.04 acres of stream naturalization and clearing will occur. In steeper upland areas, approximately 8.25 acres will be re-graded and stabilized. New sediment basins totaling approximately 3.80 acres will be constructed throughout the site to capture and treat upland runoff. Invasive plant species removal and native plantings will enhance approximately 5.23 acres of degraded upland riparian forest. In order to alleviate herbivory and nutrient inputs, approximately 29.98 acres of goose management measures will be implemented. Finally, to promote public access, approximately 10,453 linear feet of trail enhancement will occur, and 17 interpretive signs will be erected to educate the public and promote awareness of the restoration efforts (Figure 14, Attachment H).

### 9.3.2 Alternative B

Alternative B features many of the same restoration measures proposed in Alternative A with some notable differences. Alternative B proposes the creation of approximately 22.90 acres of emergent wetland; these same areas in Alternative A were proposed to be converted to forested wetlands. Similar to Alternative A, Alternative B proposes the deepening of approximately 17.07 acres of the pond areas, but does not propose any stream naturalization and clearing as in Alternative A. Alternative B includes approximately 15,007 linear feet of shoreline softening which is included in the 22.90 acres above. Alternative B features the same bank and slope stabilization as well as invasive plant species removal with native plantings, and goose management measures proposed in Alternative A. Approximately 5.32 acres of sediment basins will be created in Alternative B. Alternative B also features the creation of 17 interpretive signs for the purpose of public education. (Figure 15, Attachment H)

### 9.3.3 Alternative C

Alternative C features a reduced number of restoration features. This alternative features approximately 10,320 linear feet of shoreline softening as well as approximately 23.52 acres of channel deepening of the pond areas. Alternative C includes the same approximately 5.23 acres of invasive plant species removal with native plantings to enhance the upland riparian forest. Finally, Alternative C includes the construction of 12 interpretive signs. (Figure 16, Attachment H)

## 9.4 Kearny Point

The Kearny Point site consists of an approximately 300 to 1,000 foot wide area located along approximately 3,000 linear feet of the northern shore of Newark Bay in Kearny, NJ. The surrounding land use consists entirely of commercial developments and roadways. Adjacent commercial development includes the Hudson County Correctional Center and River Terminal, a massive distribution warehouse that includes the former site of Western Electric's Kearny Works manufacturing plant and the Kearny Yard of Federal Shipbuilding and Drydock Company. Half of the site is an active soil sorting site and half of the site is an undeveloped forested area.

A narrow fringe of smooth cordgrass dominated low marsh is located at the base of a bulkhead along the western half of the site. A combination of high marsh vegetated with smooth cordgrass and common reed dominated wetlands are present along the eastern shore of the site. Cement, riprap, and boulders stabilize the shoreline in the western half of the site, while root mats from common reed and smooth cordgrass stabilize the shoreline in the eastern half. The eastern interior portion of the site contains forested wetlands dominated with eastern cottonwood and *Acer saccharinum* (silver maple) with an understory of common reed.

Uplands found within the western half of the site include gravel access roads, massive soil piles, mounds of boulders and active soil sorting areas. Upland areas within eastern half of the site include a forested area which contains a number of non-native and invasive plant species. Trees in this area include eastern cottonwood, silver maple, tree of heaven and princess tree. Herbaceous vegetation in this area is dominated by common reed and Japanese knotweed.

The environmental stressors are identified as:
- Invasive plant species;
- Nutrient inputs;
- Highly degraded wetlands;
- Poor aquatic and wildlife habitat; and
- Shoreline debris.

The site presents high potential for ecological restoration. Presently the site contains very little wetland area and very limited wildlife habitat. Half of the site is devoid of vegetation and a seawall greatly limits the available shoreline wetlands. Even with these constraints, an active *Haliaeetus leucocephalus* (bald eagle) nest is located within one of the eastern cottonwood trees located on site. Shorebirds were observed foraging within the narrow bands of smooth cordgrass marsh and mudflats found along the eastern shoreline and would benefit from ecological enhancement and restoration. Wetland creation would provide flood storage and water quality improvement. Creation of tidal channels would provide wetland flushing and outwelling of organic nutrients and detritus as well as new fish habitat.

### 9.4.1 Alternative A

Alternative A includes the creation of approximately 17.83 acres of tidal low marsh emergent wetland and approximately 2.53 acres of tidal high marsh emergent wetland. This alternative also includes the creation of approximately 6.61 acres of forested wetland. Alternative A enhances approximately 6.95 acres of riparian forest presently found on site. Alternative A creates an approximately 3,404 linear feet of tidal channels which will provide approximately 1.82 acres of new fish habitat. Approximately 29.11 acres of existing fish habitat will be enhanced with this alternative through the removal of debris within mudflats, installing boulder and piles, and connecting the mudflats to tidal channels and tidal marsh habitat. Alternative A also includes approximately 1,724 linear feet of bank stabilization and shoreline softening. To provide public access and guide proper public usage of the site, approximately 1,614 linear feet of trail enhancement along with the creation of a 0.07 acre overlook deck is proposed (Figure 17, Attachment H).

### 9.4.2 Alternative B

Alternative B features all of the restoration measures featured in Alternative A with different proposed acreages. The major difference between Alternative A and B is that Alternative B proposes higher acreage of upland riparian forest creation and enhancement and a subsequent reduction in the acreage of wetland creation. This translates into approximately 11.28 more acres of riparian forest creation and

enhancement compared to Alternative A. Alternative B incorporates the creation of approximately 17.17 acres of emergent low marsh wetland, approximately 2.11 acres of emergent high marsh wetland, and approximately 3.87 acres of forested wetland. Alternative B creates approximately 3,391 linear feet of tidal channels, providing approximately 1.72 acres of new fish habitat. Similar to Alternative A, approximately 29.17 acres of existing fish habitat will be enhanced through this alternative. This alternative includes approximately 1,771 linear feet of bank stabilization and shoreline softening. To provide public access and guide proper public usage of the site, approximately 3,097 linear feet of trail enhancement along with the creation of a 0.07 acre overlook deck is proposed (Figure 18, Attachment H).

### 9.4.3 Alternative C

Alternative C proposes a lesser amount of emergent marsh creation with higher acreages of forested wetland creation and upland riparian forest creation and enhancement. Alternative C features the creation of approximately 8.77 acres of emergent low marsh wetland and approximately 1.68 acres of emergent high marsh. This alternative creates approximately 11.73 acres, the highest acreage of forested wetland proposed among the alternatives. Additionally, approximately 13.49 acres of upland riparian forest will be created or enhanced. Alternative C will create approximately 1,750 linear feet of tidal channel, providing 0.48 acres of new fish habitat. Similar to Alternatives A and B, approximately 29.17 acres of existing fish habitat will be enhanced through this alternative. Alternative C includes approximately 1,776 linear feet of bank stabilization and shoreline softening. To provide public access and guide proper public usage of the site, approximately 4,530 linear feet of trail enhancement is proposed (Figure 19, Attachment H).

## 9.5 Oak Island Yards

The Oak Island Yards site is located along approximately 900 feet of Newark Bay and is bordered by a shipping container yard, railroad tracks, and a HESS petroleum tank farm. A ditch with a tide gate is located adjacent to the site, below the railroad track embankment on the southeast border of the site. Since the date of the project mapping aerial photo (2012), the shipping container storage yard has been extended southeast to within approximately 100 feet of the onsite pond and runs the full width of the northwestern boundary of the site. Also, a considerable amount of rock and gravel fill has been placed onsite. Rock fill extends from the shipping containers all the way to the river along the southeast portion of the site and has also been placed in the river. The remainder of the site is vegetated.

A pond surrounded by common reed is present in the center of the site. A small remnant smooth cordgrass marsh and panne measuring approximately 50 feet by 100 feet is present at the northeast corner of the site. A forested wetland area is located in the northeast portion of the site beyond the shoreline. This forested area has a canopy dominated by red maple and eastern cottonwood and a near monoculture of common reed in the understory. A small area of scrub-shrub wetland is found adjacent to the tide gate on the south side of the canal along the southern boundary of the site.

Upland portions of the site include a gravel access road and large fill piles of boulders and riprap. Limited areas of vegetated upland areas are located in the northwest corner of the site adjacent to the forested wetlands. These areas are dominated by invasive plant species, most notably common reed, tree of heaven, and princess tree.

A majority of the banks of Newark Bay at the site contain mounds of boulders and riprap fill material. Two small areas of the site have a sandy shoreline protected by old tide breaks. A small remnant

smooth cordgrass marsh measuring approximately 50 feet by 100 feet is present at the northeast corner of the site and is also protected by old tide breaks.

The environmental stressors are identified as:

- Invasive plant species;
- Nutrient inputs;
- Highly degraded wetlands;
- Poor aquatic and wildlife habitat; and
- Shoreline debris.

Upland and wetlands at the site are dominated by non-native invasive vegetation, limiting ecological value. The majority of the site contains riprap fill material preventing vegetation growth and further limiting ecological value. The pond area, although surrounded by invasive exotic vegetation, is utilized by *Fundulus heteroclitus* (mummichogs) and a *Butorides virescens* (green heron) was observed foraging. The state-listed black crowned night heron was observed in the ditch adjacent to the site. These species would benefit from habitat enhancement. The remnant smooth cordgrass marsh and panne provide natural habitat for fish and invertebrates, and this ecosystem is uncommon in Newark Bay and the region would therefore benefit from restoration and expansion of this habitat type. Restoration would provide improved flood storage as well as nutrient and toxicant filtration which would help improve water quality. Creation of tidal channels would provide wetland flushing and outwelling of organic nutrients and detritus as well as provide fish habitat.

### 9.5.1 Alternative A

Alternative A includes the creation of approximately 5.85 acres emergent low marsh, approximately 1.31 acres of emergent high marsh, and approximately 1.68 acres of forested wetland. Alternative A creates approximately 1.86 acres of riparian forested habitat. Approximately 1,526 linear feet of tidal channels will be created in Alternative A, which will provide approximately 0.89 acres of new fish habitat. Approximately 1.40 acres of existing fish habitat will be enhanced. Restoration measures included in Alternative A also include approximately 0.22 acres of bank stabilization and shoreline softening. In order to promote public access, approximately 3,711 linear feet of trail enhancement will occur in concert with the construction of an approximately 0.04 acre pier overlook. (Figure 20, Attachment H)

### 9.5.2 Alternative B

Alternative B includes the creation of approximately 5.05 acres of emergent low marsh wetland, approximately 2.34 acres of emergent high marsh wetland, and approximately 0.99 acre of forested wetland. Similar to Alternative A, Alternative B includes the creation of 1.86 upland forest habitat. Alternative B creates approximately 1,873 linear feet of new tidal channels which would provide approximately 1.25 acres of new fish habitat. Alternative B enhances approximately 1.40 acres of existing fish habitat. This alternative includes approximately 0.30 acre of bank stabilization and shoreline softening. As in Alternative A, in order to promote public access, Alternative B includes approximately 3,711 linear feet of trail enhancement coupled with the construction of an approximately 0.04 acre pier overlook. (Figure 21, Attachment H)

### 9.5.3 Alternative C

Alternative C includes the same restoration measures in alternatives A and B. Alternative C includes the creation of approximately 4.70 acres of emergent low marsh wetland and approximately 2.04 acres of emergent high marsh wetland, which are reduced acreages compared to Alternative A and B.

However, this alternative calls for the creation of the greatest acreages of forested wetland among the three alternatives, approximately 2.21 acres. Similar to Alternatives A and B, Alternative C includes the creation of 1.86 upland forest habitat. Alternative C creates approximately 1,369 linear feet of new tidal channels which would provide approximately 0.54 acres of new fish habitat. Alternative C enhances approximately 1.55 acres of existing fish habitat. This alternative includes approximately 0.28 acre of bank stabilization and shoreline softening. As in the previous alternatives, in order to promote public access, Alternative C includes approximately 3,711 linear feet of trail enhancement coupled with the construction of an approximately 0.04 acre pier overlook (Figure 22, Attachment H).

**Hackensack River Sites**

## 9.6 Meadowlark Marsh

The Meadowlark Marsh Site is an approximately 85 acre site bounded to the south by Bellmans Creek, to the west and north by the New Jersey Turnpike – Eastern Spur, and to the east by 83rd Street and active railroad tracks in Ridgefield, Bergen County, NJ. The surrounding environment consists of a combination of commercial developments, roadways, New Jersey Turnpike service area, and common reed dominated emergent marshes. The site includes powerline and pipeline rights-of-way and associated access roads.

The site is primarily comprised of common reed-dominated emergent wetlands divided by utility access roads and other areas of fill. Historic fill material bisects the site. Several small emergent marsh areas within the common reed are dominated by sedges and ferns. Forested and scrub-shrub wetlands occur where the upland fill areas transition to emergent marsh. These wetlands are dominated by red maple, eastern cottonwood, and eastern baccharis. Mudflats are present in the bends of Bellmans Creek along the southern boundary of the site.

A mowed grass vegetated upland access road bisects the northern third of the site. A small, approximately 3 acre forested upland area is adjacent to the New Jersey Turnpike within the southern third of the site. This upland forested area is found above historic fill material and is dominated by black cherry, black locust and gray birch.

The site is primarily connected to the Hackensack River by Bellmans Creek. The banks along Bellmans Creek consist of mudflat and common reed stands and root mats. These banks appear to be stable. There are a few secondary channels connecting to Bellmans Creek. Several open water channels and ponded areas are interspersed among the northern sections of common reed marsh but their sources and connectivity are unclear. Runoff from development along Westside Avenue, the New Jersey Turnpike, and 83rd Street (Railroad Ave.) may be sources of freshwater hydrology supporting the onsite ponds.

The environmental stressors are identified as:
- Invasive plant species;
- Nutrient inputs;
- Highly degraded wetlands;
- Poor aquatic and wildlife habitat; and
- Accelerated anthropogenic degradation of upland areas.

Although numerous bird species, deer, and fox were observed on site, the wetland portion of the site is a highly degraded common reed monoculture wetland which provides little ecological value. Much of

the upland area is currently being used as a dirt track for off-road vehicles, severely limiting the habitat value of upland habitats within these areas. The utility rights-of-ways and access roads comprise the remainder of upland areas, and consist of relatively low quality mowed or sparsely vegetated habitat. Restoration of these wetland areas would increase biodiversity and provide greatly improved fish and wildlife habitat. Additionally, restoration would provide improved flood storage as well as nutrient and toxicant filtration for runoff from the surround developed areas. Creation of tidal channels would provide new fish habitat and wetland flushing and outwelling of organic nutrients and detritus. Upland areas within the rights-of-ways could be enhanced by providing seeding with a native seed mix to stabilize exposed soils, and removal of invasive plants.

### 9.6.1 Alternative A

Alternatives A, B and C feature similar restoration measures with different proposed acreages of each measure. Alternative A proposes the enhancement of approximately 55.04 acres of emergent low marsh wetland. This alternative includes the creation of approximately 6.43 acres of emergent high marsh wetland and approximately 8.67 acres of forested wetland. Alternative A also creates and enhances approximately 2.31 of upland forest habitat. Approximately 8,319 linear feet of tidal channels are proposed to be constructed in this alternative, creating approximately 9.87 acres of new fish habitat. This restoration measure includes the construction of two new open span bridges. Approximately 2.58 acres of existing fish habitat would be enhanced. (Figure 23, Attachment H)

### 9.6.2 Alternative B

Alternative B includes the enhancement of approximately 58.80 acres of emergent low marsh wetland. Alternative B proposes the creation of approximately 5.04 acres of emergent high marsh wetland and 8.38 acres of forested wetland. This alternative would create and enhance approximately 2.44 acres of upland forest habitat. Approximately 7,086 linear feet of tidal channels are proposed to be constructed in this alternative, creating approximately 7.12 acres of new fish habitat. This restoration measure includes the replacement of two culvert structures. Approximately 3.28 acres of existing fish habitat would be enhanced. (Figure 24, Attachment H)

### 9.6.3 Alternative C

Alternative C includes the enhancement of approximately 53.20 acres of emergent low marsh wetland. Alternative C also includes the creation of approximately 4.94 acres of emergent high marsh and approximately 8.59 of forested wetland. This alternative would create and enhance approximately 3.21 acres of upland forest habitat. Alternative C does not include the creation of any new tidal channel or the creation of new fish habitat, but includes the enhancement of approximately 12.72 acres of existing fish habitat. (Figure 25, Attachment H)

## 9.7 Metromedia

The Metromedia site surrounds the Metromedia Broadcast property and its radio towers. It is bordered on the east and south by the Hackensack River and on the north by the Marsh Resources Meadowlands Mitigation Bank. The site is undeveloped and dominated by common reed. The site likely contains fill from unknown sources during the construction of the radio towers. The property was acquired by the New Jersey Meadowland Commission (now the New Jersey Sports and Exposition Authority) in July 2003.

The site is primarily comprised of common reed-dominated emergent wetland due to restricted tidal flow. A number of small tidal channels connect this site to the Hackensack River. They are bounded by common reed and have gradually sloped mud banks and bottoms. Upland areas, which include tower maintenance roads, parking lots, and a dirt access road, will not be included in any restoration measures.

The environmental stressors are identified as:

- Invasive plant species;
- Highly degraded wetlands; and
- Poor aquatic and wildlife habitat.

The site is predominantly a common reed monoculture with minimal inundation by the tide, limiting ecological function. Restoration of these areas would increase habitat diversity and provide improved fish and wildlife habitat. Additionally, restoration of the site would provide improved flood storage as well as nutrient and toxicant filtration which would help improve water quality. Enhancement of tidal channels would improve wetland flushing and outwelling of organic nutrients and detritus. Additionally, channel enhancement would improve fish habitat.

### 9.7.1 Alternative A

Alternatives A, B and C feature similar restoration measures but different acreages of each. Alternative A proposes the enhancement of approximately 38.0 acres of emergent low marsh wetland. This alternative calls for the conversion of highly degraded common reed dominated marsh to approximately 4.8 acres of native emergent high marsh wetland and approximately 5.3 acres of scrub-shrub wetland. Alternative A also converts existing wetland to approximately 11.5 acres of forested upland. (Figure 26, Attachment H)

### 9.7.2 Alternative B

Alternative B features the enhancement of approximately 43.1 acres of emergent low marsh wetland. Alternative B also includes the conversion of highly degraded common reed dominated marsh to approximately 4.5 acres of native emergent high marsh wetland and approximately 11.8 acres of scrub-shrub wetland. Alternative B does not include any conversion of wetlands to uplands. (Figure 26, Attachment H)

### 9.7.3 Alternative C

Alternative C includes the enhancement of approximately 50.6 acres emergent low marsh. Alternative C includes the conversion of highly degraded common reed dominated marsh to approximately 4.1 acres of native emergent high marsh wetland and approximately 3.5 acres of scrub-shrub wetland. Alternative C also includes the conversion of emergent wetland to approximately 1.1 acres of forested upland. (Figure 26, Attachment H)

## 10 Uplands

Uplands were assessed using a modified method of EPW (see chapter 6). In reviewing the data collected on Uplands, the Alternative designs were targeted to remove upland stressors to the greatest extent possible. Table 10 below identifies the sites and upland enhancements that were considered.

# 11 SVAP

A Stream Visual Assessment Protocol (SVAP) was performed for only the Essex County Branch Brook Park site, for 1, 20 and 50 years after construction.

## 11.1 SVAP Results

The existing conditions scores are provided in Table 12 and 13. In addition, SVAP scores were also calculated for the project area for Alternatives A, B, and C for one year after construction (Table 13) and 20 years after construction (Table 14). Per SVAP guidelines, streams are ranked from poor to excellent based on the following scoring: Poor <6; Fair 6.1-7.4; Good 7.5 – 8.9; and Excellent >9.0.

### 11.1.1 Essex County Branch Brook Park

Currently, the stream portion of Essex County Branch Brook Park is rated 4.45 (poor). All three alternatives raise this overall SVAP score. Following implementation of the restoration, Alternative B and C scores remain poor one year after construction (year 1) but increase to a fair rating 20 years after construction, and are either good or fair after 50 years after construction. Alternative A increases the score for the assessed portion of Branch Brook from poor to fair one year after construction, further increasing to 8.73 (good) 20 years after construction and 9.09 (excellent) 50 years after construction.

### 11.1.2 Meadowlark Marsh

Currently, the stream portion of Meadowlark Marsh is rated 5.55 (poor). All three alternatives raise this overall SVAP score. Following implementation of the restoration, Alternative C score remains poor one, 20 and 50 years after construction. Alternatives A and B increased to fair one year after construction (year 1), and remain within the fair range 20 years and 50 years after construction.

## Table 11: Corrective Actions for Each Alternative (Uplands)

| Site | Major Upland Environmental Stressors | Alt A | Alt B | Alt C |
|---|---|---|---|---|
| Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve | Invasive species, very disturbed wildlife habitat, debris | Invasive species removal with select native plantings.<br>Debris removal. | Invasive species removal with select native plantings.<br>Debris removal. | Invasive species removal with select native plantings.<br>Debris removal. |
| Dundee Island Park/ Pulaski Park | Invasive species, very limited and disturbed wildlife habitat | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. |
| Essex County Branch Brook Park | Invasive species, very limited and disturbed wildlife habitat | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Invasive species removal with select native plantings. |
| Kearny Point | Invasive species, very limited and disturbed wildlife habitat, anthropogenic activities | Select native plantings to increase woodlands.<br>Shoreline stabilization. | Select native plantings to increase woodlands.<br>Shoreline stabilization. | Select native plantings to increase woodlands.<br>Shoreline stabilization. |
| Oak Island Yards | Invasive species, very limited and disturbed wildlife habitat, anthropogenic activities | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. |
| Meadowlark Marsh | Invasive species, very limited and disturbed wildlife habitat | Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Invasive species removal with select native plantings.<br>Bank and slope stabilization. | Invasive species removal with select native plantings.<br>Bank and slope stabilization. |
| Metromedia | Invasive species, very limited and disturbed wildlife habitat | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. |  | Select native plantings to increase woodlands.<br>Invasive species removal with select native plantings.<br>Bank and slope stabilization. |

## Table 12: SVAP Scores - One Year After Construction.

| Sites | Metrics | Existing Conditions | Alternatives | | |
|---|---|---|---|---|---|
| | | | A<br>Yr 1 | B<br>Yr 1 | C<br>Yr 1 |
| **Essex County Branch Brook Park** | Channel Condition | 3 | 3 | 3 | 3 |
| | Hydrologic Alteration | 3 | 3 | 3 | 7 |
| | Riparian Zone | 5 | 10 | 8 | 5 |
| | Bank Stability | 7 | 7 | 7 | 7 |
| | Water Appearance | 3 | 7 | 7 | 7 |
| | Nutrient Enrichment | 3 | 7 | 7 | 3 |
| | Barriers to Fish Movement | 3 | 8 | 5 | 3 |
| | Instream Fish Cover | 5 | 6 | 6 | 5 |
| | Pools | 3 | 7 | 3 | 3 |
| | Invertebrate Habitat | 7 | 7 | 7 | 7 |
| | Canopy Cover | 7 | 1 | 1 | 7 |
| | Manure Presence | | | | |
| | Salinity | | | | |
| | Riffle Embeddedness | | | | |
| | **Final Score** | 4.45 | 6.00 | 5.18 | 5.18 |
| **Meadowlark Marsh** | Channel Condition | 7 | 7 | 7 | 7 |
| | Hydrologic Alteration | 10 | 10 | 10 | 10 |
| | Riparian Zone | 10 | 10 | 10 | 10 |
| | Bank Stability | 10 | 10 | 10 | 10 |
| | Water Appearance | 3 | 3 | 3 | 3 |
| | Nutrient Enrichment | 3 | 3 | 3 | 3 |
| | Barriers to Fish Movement | 10 | 10 | 10 | 10 |
| | Instream Fish Cover | 3 | 5 | 5 | 3 |
| | Pools | 1 | 3 | 3 | 1 |
| | Invertebrate Habitat | 3 | 3 | 3 | 3 |
| | Canopy Cover | 1 | 1 | 1 | 1 |
| | Manure Presence | | | | |
| | Salinity | | | | |
| | Riffle Embeddedness | | | | |
| | **Final Score** | 5.55 | 6.36 | 6.36 | 5.55 |

## 11.2 SVAP Results – 20 and 50 Years After Construction

The SVAP scores provided in Table 13 represent conditions 20 and 50 years after construction. Per SVAP guidelines, streams are ranked from poor to excellent based on the following scoring: Poor <6; Fair 6.1-7.4; Good 7.5 – 8.9; and Excellent >9.0.

Table 13: SVAP Scores - 20 and 50 Years After Construction.

| Sites | Metrics | Existing Conditions | Alternatives | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A Yr 20 | B Yr 20 | C Yr 20 | A Yr 50 | B Yr 50 | C Yr 50 |
| **Essex County Branch Brook Park** | Channel Condition | 3 | 10 | 7 | 7 | 10 | 7 | 7 |
| | Hydrologic Alteration | 3 | 3 | 3 | 7 | 7 | 7 | 7 |
| | Riparian Zone | 5 | 10 | 8 | 5 | 10 | 10 | 5 |
| | Bank Stability | 7 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Water Appearance | 3 | 10 | 10 | 7 | 10 | 10 | 7 |
| | Nutrient Enrichment | 3 | 10 | 10 | 7 | 10 | 10 | 7 |
| | Barriers to Fish Movement | 3 | 8 | 5 | 3 | 8 | 5 | 3 |
| | Instream Fish Cover | 5 | 8 | 5 | 5 | 8 | 5 | 5 |
| | Pools | 3 | 7 | 3 | 3 | 7 | 7 | 3 |
| | Invertebrate Habitat | 7 | 10 | 10 | 7 | 10 | 10 | 7 |
| | Canopy Cover | 7 | 10 | 1 | 7 | 10 | 3 | 7 |
| | Manure Presence | | | | | | | |
| | Salinity | | | | | | | |
| | Riffle Embeddedness | | | | | | | |
| | **Final Score** | 4.45 | 8.73 | 6.55 | 6.18 | 9.09 | 7.64 | 6.18 |
| **Meadowlark Marsh** | Channel Condition | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Hydrologic Alteration | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Riparian Zone | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Bank Stability | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Water Appearance | 3 | 7 | 7 | 3 | 7 | 7 | 3 |
| | Nutrient Enrichment | 3 | 7 | 7 | 3 | 7 | 7 | 3 |
| | Barriers to Fish Movement | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Instream Fish Cover | 3 | 5 | 5 | 3 | 5 | 5 | 3 |
| | Pools | 1 | 3 | 5 | 1 | 3 | 3 | 1 |
| | Invertebrate Habitat | 3 | 3 | 3 | 3 | 7 | 7 | 3 |
| | Canopy Cover | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Manure Presence | | | | | | | |
| | Salinity | | | | | | | |
| | Riffle Embeddedness | | | | | | | |
| | **Final Score** | 5.55 | 6.63 | 6.63 | 5.55 | 7.00 | 7.00 | 5.55 |

## 12 Evaluation of Planned Wetlands (EPW) Results– Functional Capacity Units (FCUs) for Baseline and Proposed Alternatives

Evaluation of Planned Wetland (EPW) scores were calculated for Alternatives A, B, and C for 1, 20, 50 years after construction (See Attachment A). For each alternative, it was assumed that the wetlands would form in 10 percent of the mapped polygons identified for bank stabilization. Uniqueness/Heritage scores are 1.0 for all alternatives. Rounding results in minor summation and multiplication variability of the presented data.

### 12.1 Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Alternative A, which entails emergent wetland enhancement and creation, forested wetland creation, shoreline and shallows debris removal, fish habitat creation, upland forest invasive plant species removal coupled with native plantings, sediment basin creation and public access and enhancement measures, results in the highest FCUs (Table 15). Conversely, Alternative C, which only incorporates debris removal, and invasive plant species removal, has the lowest FCUs.

Table 14: EPW Scores - Clifton Dundee Canal
Green Acres Purchase and Dundee Island Preserve.

| | Existing Conditions WAA | | | Alternative A | | | Alternative B | | | Alternative C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Function | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.54 | 2.81 | 1.52 | 0.83 | 5.99 | 4.97 | 0.56 | 2.88 | 1.61 | 0.64 | 2.81 | 1.80 |
| SS | 0.62 | 2.81 | 1.74 | 0.66 | 5.99 | 3.95 | 0.66 | 2.88 | 1.90 | 0.62 | 2.81 | 1.74 |
| WQ | 0.50 | 2.81 | 1.41 | 0.84 | 5.99 | 5.03 | 0.62 | 2.88 | 1.79 | 0.65 | 2.81 | 1.83 |
| WL | 0.41 | 2.81 | 1.15 | 0.40 | 5.99 | 2.40 | 0.60 | 2.88 | 1.73 | 0.46 | 2.81 | 1.29 |
| FT | 0.37 | 2.81 | 1.04 | 0.47 | 5.99 | 2.82 | 0.42 | 2.88 | 1.21 | 0.37 | 2.81 | 1.04 |
| UH | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| TOTAL | | | 6.86 | | | 19.17 | | | 8.24 | | | 7.70 |

### 12.2 Dundee Island Park/ Pulaski Park

Alternative A, was the only alternative evaluated for this site. This alternative incorporates bank stabilization and shoreline softening as well as select native plantings results in slightly higher FCUs relative to existing conditions (Table15).

Table 15: EPW Scores - Dundee Island Park/ Pulaski Park.

| | Existing Conditions WAA | | | Alternative A | | |
|---|---|---|---|---|---|---|
| Function | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.52 | 0.47 | 0.24 | 0.53 | 0.47 | 0.25 |
| SS | 0.46 | 0.47 | 0.22 | 0.62 | 0.47 | 0.29 |
| WQ | 0.45 | 0.47 | 0.21 | 0.50 | 0.47 | 0.24 |
| WL | 0.22 | 0.47 | 0.10 | 0.29 | 0.47 | 0.14 |
| FT | 0.38 | 0.47 | 0.18 | 0.37 | 0.47 | 0.17 |
| UH | N/A | | | 1.00 | | |
| TOTAL | | | 0.95 | | | 1.09 |

## 12.3 Essex County Branch Brook Park

Alternative A, which entails forested wetland enhancement and creation, shoreline softening, channel deepening, stream naturalization and clearing, goose management measures, invasive plant species removal coupled with native plantings, public access and trail enhancement measures, and interpretive sign construction, results in the highest FCUs (Table 16). Conversely, Alternative C, which only incorporates shoreline softening, channel deepening, goose management measures, and invasive plant species removal, has the lowest FCUs.

Table 16: EPW Scores - Essex County Branch Brook Park.

| | Existing Conditions WAA | | | Alternative A | | | Alternative B | | | Alternative C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Function | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.64 | 35.80 | 22.94 | 0.82 | 53.33 | 43.73 | 0.65 | 42.88 | 27.87 | 0.66 | 35.90 | 23.69 |
| SS | 0.66 | 35.80 | 23.54 | 0.66 | 53.33 | 35.20 | 0.95 | 42.88 | 40.74 | 0.66 | 35.90 | 23.69 |
| WQ | 0.52 | 35.80 | 18.71 | 0.66 | 53.33 | 35.20 | 0.57 | 42.88 | 24.44 | 0.58 | 35.90 | 20.82 |
| WL | 0.47 | 35.80 | 16.99 | 0.32 | 53.33 | 17.07 | 0.34 | 42.88 | 14.58 | 0.47 | 35.90 | 16.87 |
| FP | 0.37 | 35.80 | 13.25 | 0.36 | 53.33 | 19.20 | 0.40 | 42.88 | 17.15 | 0.39 | 35.90 | 14.00 |
| UH | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| TOTAL | | | 95.42 | | | 150.39 | | | 124.78 | | | 99.08 |

## 12.4 Kearny Point

Alternative A, which entails emergent wetland enhancement and creation, forested wetland creation, tidal channel creation, fish habitat creation and enhancement, bank stabilization and softening upland forest creation and enhancement, and public access and enhancement measures, results in the highest FCUs (Table 17). Conversely, Alternative C, which includes less emergent wetland creation, higher forested wetland creation and the greatest acreage of upland, has the lowest FCUs.

Table 17: EPW Scores - Kearny Point.

| | Existing Conditions WAA | | | Alternative A | | | Alternative B | | | Alternative C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Function | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.58 | 34.70 | 20.13 | 0.53 | 57.89 | 30.68 | 0.52 | 54.04 | 28.10 | 0.52 | 51.77 | 30.03 |
| SS | 0.49 | 34.70 | 17.00 | 0.60 | 57.89 | 34.73 | 0.60 | 54.04 | 32.42 | 0.64 | 51.77 | 25.37 |
| WQ | 0.45 | 34.70 | 15.62 | 0.76 | 57.89 | 44.00 | 0.76 | 54.04 | 41.07 | 0.62 | 51.77 | 32.10 |
| WL | 0.31 | 34.70 | 10.76 | 0.46 | 57.89 | 26.63 | 0.32 | 54.04 | 17.29 | 0.32 | 51.77 | 16.05 |
| FT | 0.34 | 34.70 | 11.80 | 0.43 | 57.89 | 24.89 | 0.43 | 54.04 | 23.24 | 0.41 | 51.77 | 17.60 |
| UH | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| TOTAL | | | 75.30 | | | 160.93 | | | 142.13 | | | 121.14 |

## 12.5 Oak Island Yards

Alternative A, which entails emergent wetland enhancement and creation, forested wetland creation, tidal channel creation, fish habitat creation and enhancement, bank stabilization, and public access and enhancement measures, results in the highest FCUs (Table 18). Conversely, Alternative C, which

features less emergent marsh creation, higher forested wetland creation, and less channel and fish habitat creation, has the lowest FCUs.

Table 18: EPW Scores – Oak Island Yards.

| Function | Existing Conditions WAA | | | Alternative A | | | Alternative B | | | Alternative C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.59 | 7.80 | 4.60 | 0.60 | 11.44 | 6.86 | 0.56 | 11.40 | 6.38 | 0.71 | 11.39 | 8.09 |
| SS | 0.48 | 7.80 | 3.74 | 0.67 | 11.44 | 7.66 | 0.70 | 11.40 | 7.98 | 0.71 | 11.39 | 8.09 |
| WQ | 0.45 | 7.80 | 3.51 | 0.78 | 11.44 | 8.92 | 0.65 | 11.40 | 7.41 | 0.62 | 11.39 | 7.06 |
| WL | 0.35 | 7.80 | 2.73 | 0.37 | 11.44 | 4.23 | 0.35 | 11.40 | 3.99 | 0.32 | 11.39 | 3.64 |
| FT | 0.44 | 7.80 | 3.43 | 0.53 | 11.44 | 6.06 | 0.57 | 11.40 | 6.50 | 0.45 | 11.39 | 5.13 |
| UH | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| TOTAL | | | 18.02 | | | 33.75 | | | 32.26 | | | 32.01 |

## 12.6 Meadowlark Marsh

Alternatives A and B, which both include emergent wetland enhancement and creation, scrub-shrub wetland creation, tidal channel creation, fish habitat creation and enhancement, and upland forest enhancement, result in similarly high FCUs (Table 19). Conversely Alternative C, which features less emergent wetland creation or enhancement, less forested wetland creation and no new tidal channel or fish habitat creation, has the lowest FCUs overall.

Table 19: EPW Scores – Meadowlark Marsh.

| Function | Existing Conditions WAA | | | Alternative A | | | Alternative B | | | Alternative C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.73 | 85.43 | 62.36 | 0.63 | 87.22 | 54.95 | 0.63 | 87.22 | 54.95 | 0.63 | 85.43 | 53.82 |
| SS | 1.00 | 85.43 | 85.43 | 0.60 | 87.22 | 52.33 | 0.60 | 87.22 | 52.33 | 0.64 | 85.43 | 54.68 |
| WQ | 0.61 | 85.43 | 52.11 | 0.76 | 87.22 | 66.29 | 0.83 | 87.22 | 72.39 | 0.76 | 85.43 | 64.93 |
| WL | 0.18 | 85.43 | 15.38 | 0.52 | 87.22 | 45.35 | 0.48 | 87.22 | 41.87 | 0.42 | 85.43 | 35.88 |
| FT | 0.43 | 85.43 | 36.73 | 0.48 | 87.22 | 41.87 | 0.48 | 87.22 | 41.87 | 0.55 | 85.43 | 46.99 |
| UH | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| TOTAL | | | 252.02 | | | 260.79 | | | 263.40 | | | 256.29 |

## 12.7 Metromedia

Alternative B, which entails emergent wetland enhancement and creation and scrub-shrub wetland creation, results in the highest FCUs (Table 20). Conversely, Alternative A, which has higher acreages of conversion of degraded wetlands to forested upland areas, has the lowest FCUs.

**Table 20: EPW Scores – Metromedia.**

| Function | Existing Conditions WAA | | | Alternative A | | | Alternative B | | | Alternative C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU | FCI | Area | FCU |
| SB | 0.63 | 59.50 | 37.49 | 0.63 | 48.10 | 30.30 | 0.63 | 59.40 | 37.42 | 0.63 | 58.20 | 36.67 |
| SS | 1.00 | 59.50 | 59.50 | 0.64 | 48.10 | 30.78 | 0.64 | 59.40 | 38.02 | 0.64 | 58.20 | 37.25 |
| WQ | 0.59 | 59.50 | 35.11 | 0.76 | 48.10 | 36.56 | 0.76 | 59.40 | 45.14 | 0.76 | 58.20 | 44.23 |
| WL | 0.23 | 59.50 | 13.69 | 0.62 | 48.10 | 29.82 | 0.49 | 59.40 | 29.11 | 0.62 | 58.20 | 36.08 |
| FT | 0.41 | 59.50 | 24.40 | 0.56 | 48.10 | 26.94 | 0.45 | 59.40 | 26.73 | 0.56 | 58.20 | 32.59 |
| UH | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| TOTAL | | | 170.17 | | | 154.40 | | | 176.42 | | | 186.82 |

## 13 Average Annualized Functional Capacity Units (AAFCUs)

Average Annualized Functional Capacity Units (AAFCUs) for each site and each of the alternatives were calculated for Years 1, 20, and 50 (Tables 21-27). For Year 1, it was assumed that the Lower Passaic River sites, shoreline bank erosion control, sediment stabilization, water quality, wildlife, and fish functions would not be fully realized until Year 20 for riparian and forested sites. For estuarine tidal marsh sites, the benefits would be fully realized by the end of Year 3. For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1. For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.

The following calculations were used:

AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:

$$\text{Cumulative FCUs} = (Time_{\,2} - Time_{\,1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

T1 = First Target Year time interval;
T2 = Second Target Year time interval;
A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2;
F1 = FCI at beginning of T1;
F2 = FCI at end of T2

*Rounding results in minor summation and multiplication variability of the presented data.

## Table 21: AAFCU Scores - Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | | Year 20 | | | | Year 50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU |
| Alternative A | SB | 0.54 | 2.81 | 1.52 | 5.99 | 3.09 | 1.55 | 6.30 | 5.99 | 62.47 | 3.12 | 14.51 | 5.69 | 155.34 | 3.11 | 14.43 |
| | SS | 0.62 | 2.81 | 1.74 | 5.99 | 2.83 | 1.41 | | 5.99 | 67.29 | 3.36 | | 5.69 | 167.37 | 3.35 | |
| | WQ | 0.50 | 2.81 | 1.41 | 5.99 | 3.04 | 1.52 | | 5.99 | 65.22 | 3.26 | | 5.69 | 162.08 | 3.24 | |
| | WL | 0.41 | 2.81 | 1.15 | 5.99 | 1.78 | 0.89 | | 5.99 | 49.26 | 2.46 | | 5.69 | 122.47 | 2.45 | |
| | FT | 0.37 | 2.81 | 1.04 | 5.99 | 1.87 | 0.94 | | 5.99 | 45.92 | 2.30 | | 5.69 | 114.14 | 2.28 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative B | SB | 0.54 | 2.81 | 1.52 | 2.88 | 1.56 | 0.78 | 3.77 | 2.88 | 34.07 | 1.70 | 8.16 | 2.74 | 84.87 | 1.70 | 8.36 |
| | SS | 0.62 | 2.81 | 1.74 | 2.88 | 1.82 | 0.91 | | 2.88 | 40.30 | 2.01 | | 2.74 | 109.95 | 2.20 | |
| | WQ | 0.50 | 2.81 | 1.41 | 2.88 | 1.59 | 0.80 | | 2.88 | 37.61 | 1.88 | | 2.74 | 94.32 | 1.89 | |
| | WL | 0.41 | 2.81 | 1.15 | 2.88 | 1.44 | 0.72 | | 2.88 | 28.95 | 1.45 | | 2.74 | 69.91 | 1.40 | |
| | FT | 0.37 | 2.81 | 1.04 | 2.88 | 1.12 | 0.56 | | 2.88 | 22.17 | 1.11 | | 2.74 | 59.07 | 1.18 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative C | SB | 0.54 | 2.81 | 1.52 | 2.81 | 1.66 | 0.83 | 4.08 | 2.81 | 31.50 | 1.58 | 6.93 | 2.67 | 73.82 | 1.48 | 6.74 |
| | SS | 0.62 | 2.81 | 1.74 | 2.81 | 1.74 | 0.87 | | 2.81 | 33.10 | 1.66 | | 2.67 | 83.23 | 1.66 | |
| | WQ | 0.50 | 2.81 | 1.41 | 2.81 | 1.62 | 0.81 | | 2.81 | 32.03 | 1.60 | | 2.67 | 74.44 | 1.49 | |
| | WL | 0.41 | 2.81 | 1.15 | 2.81 | 1.22 | 0.61 | | 2.81 | 23.76 | 1.19 | | 2.67 | 59.70 | 1.19 | |
| | FT | 0.37 | 2.81 | 1.04 | 2.81 | 1.92 | 0.96 | | 2.81 | 18.15 | 0.91 | | 2.67 | 45.68 | 0.91 | |
| | UH | 1.00 | | | | | | | | | | | | | | |

Table 22: AAFCU Scores - Dundee Island Park/ Pulaski Park.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.52 | 0.47 | 0.24 | 0.47 | 0.25 | 0.12 | 0.54 | 6.76 | 0.34 | 0.51 | 15.10 | 0.30 |
| | SS | 0.46 | 0.47 | 0.22 | 0.47 | 0.25 | 0.13 | 0.54 | 6.53 | 0.33 | 0.51 | 17.08 | 0.34 |
| | WQ | 0.45 | 0.47 | 0.21 | 0.47 | 0.22 | 0.11 | 0.54 | 6.09 | 0.30 | 0.51 | 15.25 | 0.31 |
| | WL | 0.22 | 0.47 | 0.10 | 0.47 | 0.12 | 0.06 | 0.54 | 2.75 | 0.14 | 0.51 | 7.26 | 0.15 |
| | FT | 0.38 | 0.47 | 0.18 | 0.47 | 0.18 | 0.09 | 0.54 | 3.85 | 0.19 | 0.51 | 9.89 | 0.20 |
| | UH | N/A | | | | | | | | | | | |






## Table 23: AAFCU Scores - Essex County Branch Brook Park.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | | Year 20 | | | | Year 50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU |
| Alternative A | SB | 0.64 | 35.80 | 22.94 | 53.33 | 32.81 | 16.40 | 61.23 | 53.33 | 691.06 | 34.55 | 145.43 | 50.66 | 1647.61 | 32.95 | 142.82 |
| | SS | 0.66 | 35.80 | 23.54 | 53.33 | 29.36 | 14.68 | | 53.33 | 688.68 | 34.43 | | 50.66 | 1641.99 | 32.84 | |
| | WQ | 0.52 | 35.80 | 18.71 | 53.33 | 26.55 | 13.27 | | 53.33 | 608.21 | 30.41 | | 50.66 | 1507.19 | 30.14 | |
| | WL | 0.47 | 35.80 | 16.99 | 53.33 | 17.48 | 8.74 | | 53.33 | 557.70 | 27.89 | | 50.66 | 1392.24 | 27.84 | |
| | FP | 0.37 | 35.80 | 13.25 | 53.33 | 16.25 | 8.13 | | 53.33 | 362.92 | 18.15 | | 50.66 | 951.77 | 19.04 | |
| | UH | | | | | | | | | | | | | | | |
| Alternative B | SB | 0.64 | 35.80 | 22.94 | 42.88 | 25.39 | 12.70 | 54.91 | 42.88 | 605.66 | 30.28 | 121.84 | 40.74 | 1516.77 | 30.34 | 120.54 |
| | SS | 0.66 | 35.80 | 23.54 | 42.88 | 31.79 | 15.90 | | 42.88 | 623.30 | 31.16 | | 40.74 | 1560.92 | 31.22 | |
| | WQ | 0.52 | 35.80 | 18.71 | 42.88 | 21.52 | 10.76 | | 42.88 | 512.77 | 25.64 | | 40.74 | 1207.22 | 24.14 | |
| | WL | 0.47 | 35.80 | 16.99 | 42.88 | 15.95 | 7.97 | | 42.88 | 395.34 | 19.77 | | 40.74 | 990.94 | 19.82 | |
| | FP | 0.37 | 35.80 | 13.25 | 42.88 | 15.16 | 7.58 | | 42.88 | 299.66 | 14.98 | | 40.74 | 751.26 | 15.03 | |
| | UH | | | | | | | | | | | | | | | |
| Alternative C | SB | 0.64 | 35.80 | 22.94 | 35.90 | 23.32 | 11.66 | 48.63 | 35.90 | 442.99 | 22.15 | 99.71 | 34.11 | 1113.70 | 22.27 | 100.04 |
| | SS | 0.66 | 35.80 | 23.54 | 35.90 | 23.62 | 11.81 | | 35.90 | 510.04 | 25.50 | | 34.11 | 1281.10 | 25.62 | |
| | WQ | 0.52 | 35.80 | 18.71 | 35.90 | 19.76 | 9.88 | | 35.90 | 385.72 | 19.29 | | 34.11 | 960.70 | 19.21 | |
| | WL | 0.47 | 35.80 | 16.99 | 35.90 | 16.93 | 8.47 | | 35.90 | 396.69 | 19.83 | | 34.11 | 995.86 | 19.92 | |
| | FP | 0.37 | 35.80 | 13.25 | 35.90 | 13.62 | 6.81 | | 35.90 | 258.84 | 12.94 | | 34.11 | 650.68 | 13.01 | |
| | UH | | | | | | | | | | | | | | | |

Table 24: AAFCU Scores – Kearny Point.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | | Year 20 | | | | Year 50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU |
| Alternative A | SB | 0.58 | 34.70 | 20.13 | 57.89 | 25.60 | 12.80 | 57.88 | 57.89 | 557.82 | 27.89 | 145.47 | 55.00 | 1392.74 | 27.85 | 145.00 |
| | SS | 0.49 | 34.70 | 17.00 | 57.89 | 25.44 | 12.72 | | 57.89 | 674.03 | 33.70 | | 55.00 | 1679.43 | 33.59 | |
| | WQ | 0.45 | 34.70 | 15.62 | 57.89 | 28.61 | 14.30 | | 57.89 | 638.85 | 31.94 | | 55.00 | 1591.53 | 31.83 | |
| | WL | 0.31 | 34.70 | 10.76 | 57.89 | 18.11 | 9.06 | | 57.89 | 572.89 | 28.64 | | 55.00 | 1425.67 | 28.51 | |
| | FT | 0.34 | 34.70 | 11.80 | 57.89 | 18.00 | 9.00 | | 57.89 | 465.85 | 23.29 | | 55.00 | 1160.74 | 23.21 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative B | SB | 0.58 | 34.70 | 20.13 | 54.04 | 24.31 | 12.15 | 53.61 | 54.04 | 534.17 | 26.71 | 133.52 | 51.34 | 1334.79 | 26.70 | 135.01 |
| | SS | 0.49 | 34.70 | 17.00 | 54.04 | 24.36 | 12.18 | | 54.04 | 643.67 | 32.18 | | 51.34 | 1605.06 | 32.10 | |
| | WQ | 0.45 | 34.70 | 15.62 | 54.04 | 27.34 | 13.67 | | 54.04 | 578.30 | 28.92 | | 51.34 | 1520.74 | 30.41 | |
| | WL | 0.31 | 34.70 | 10.76 | 54.04 | 13.99 | 7.00 | | 54.04 | 487.41 | 24.37 | | 51.34 | 1225.63 | 24.51 | |
| | FT | 0.34 | 34.70 | 11.80 | 54.04 | 17.23 | 8.61 | | 54.04 | 426.79 | 21.34 | | 51.34 | 1064.49 | 21.29 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative C | SB | 0.58 | 34.70 | 20.13 | 51.77 | 23.69 | 11.85 | 57.49 | 51.77 | 485.20 | 24.26 | 124.59 | 49.18 | 1213.69 | 24.27 | 125.27 |
| | SS | 0.49 | 34.70 | 17.00 | 51.77 | 24.64 | 12.32 | | 51.77 | 625.78 | 31.29 | | 49.18 | 1561.20 | 31.22 | |
| | WQ | 0.45 | 34.70 | 15.62 | 51.77 | 23.37 | 11.69 | | 51.77 | 562.27 | 28.11 | | 49.18 | 1402.93 | 28.06 | |
| | WL | 0.31 | 34.70 | 10.76 | 51.77 | 13.63 | 6.82 | | 51.77 | 429.76 | 21.49 | | 49.18 | 1071.75 | 21.44 | |
| | FT | 0.34 | 34.70 | 11.80 | 51.77 | 29.64 | 14.82 | | 51.77 | 388.74 | 19.44 | | 49.18 | 1013.87 | 20.28 | |
| | UH | 1.00 | | | | | | | | | | | | | | |

## Table 25: AAFCU Scores – Oak Island Yards.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | | Year 20 | | | | Year 50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU |
| Alternative A | SB | 0.59 | 7.80 | 4.60 | 11.44 | 5.73 | 2.86 | 12.75 | 11.46 | 131.31 | 6.57 | 31.64 | 10.89 | 328.12 | 6.56 | 30.77 |
| | SS | 0.48 | 7.80 | 3.74 | 11.44 | 5.59 | 2.79 | | 11.46 | 138.43 | 6.92 | | 10.89 | 345.39 | 6.91 | |
| | WQ | 0.45 | 7.80 | 3.51 | 11.44 | 6.02 | 3.01 | | 11.46 | 135.86 | 6.79 | | 10.89 | 295.42 | 5.91 | |
| | WL | 0.35 | 7.80 | 2.73 | 11.44 | 3.47 | 1.73 | | 11.46 | 116.58 | 5.83 | | 10.89 | 293.11 | 5.86 | |
| | FT | 0.44 | 7.80 | 3.43 | 11.44 | 4.69 | 2.35 | | 11.46 | 110.68 | 5.53 | | 10.89 | 276.35 | 5.53 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative B | SB | 0.59 | 7.80 | 4.60 | 11.40 | 5.51 | 2.76 | 12.41 | 11.43 | 131.09 | 6.55 | 28.82 | 10.86 | 327.56 | 6.55 | 29.03 |
| | SS | 0.48 | 7.80 | 3.74 | 11.40 | 5.73 | 2.87 | | 11.43 | 113.90 | 5.70 | | 10.86 | 284.51 | 5.69 | |
| | WQ | 0.45 | 7.80 | 3.51 | 11.40 | 5.34 | 2.67 | | 11.43 | 131.72 | 6.59 | | 10.86 | 328.65 | 6.57 | |
| | WL | 0.35 | 7.80 | 2.73 | 11.40 | 3.36 | 1.68 | | 11.43 | 98.89 | 4.94 | | 10.86 | 249.19 | 4.98 | |
| | FT | 0.44 | 7.80 | 3.43 | 11.40 | 4.89 | 2.44 | | 11.43 | 100.77 | 5.04 | | 10.86 | 261.40 | 5.23 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative C | SB | 0.59 | 7.80 | 4.60 | 11.39 | 6.27 | 3.14 | 13.62 | 11.42 | 131.00 | 6.55 | 28.80 | 10.85 | 327.35 | 6.55 | 29.54 |
| | SS | 0.48 | 7.80 | 3.74 | 11.39 | 5.78 | 2.89 | | 11.42 | 113.83 | 5.69 | | 10.85 | 284.32 | 5.69 | |
| | WQ | 0.45 | 7.80 | 3.51 | 11.39 | 5.18 | 2.59 | | 11.42 | 124.84 | 6.24 | | 10.85 | 328.43 | 6.57 | |
| | WL | 0.35 | 7.80 | 2.73 | 11.39 | 3.21 | 1.60 | | 11.42 | 105.62 | 5.28 | | 10.85 | 275.52 | 5.51 | |
| | FT | 0.44 | 7.80 | 3.43 | 11.39 | 6.79 | 3.40 | | 11.42 | 100.70 | 5.04 | | 10.85 | 261.23 | 5.22 | |
| | UH | 1.00 | | | | | | | | | | | | | | |

## Table 26: AAFCU Scores – Meadowlark Marsh.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | | Year 20 | | | | Year 50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU |
| Alternative A | SB | 0.73 | 85.43 | 62.36 | 87.22 | 58.69 | 29.34 | 128.20 | 87.22 | 1419.52 | 70.98 | 304.88 | 82.86 | 3563.63 | 71.27 | 306.02 |
| | SS | 1.00 | 85.43 | 85.43 | 87.22 | 69.00 | 34.50 | | 87.22 | 1640.18 | 82.01 | | 82.86 | 4123.08 | 82.46 | |
| | WQ | 0.61 | 85.43 | 52.11 | 87.22 | 59.16 | 29.58 | | 87.22 | 1321.45 | 66.07 | | 82.86 | 3314.99 | 66.30 | |
| | WL | 0.18 | 85.43 | 15.38 | 87.22 | 30.26 | 15.13 | | 87.22 | 797.21 | 39.86 | | 82.86 | 1993.29 | 39.87 | |
| | FT | 0.43 | 85.43 | 36.73 | 87.22 | 39.29 | 19.64 | | 87.22 | 919.23 | 45.96 | | 82.86 | 2306.20 | 46.12 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative B | SB | 0.73 | 85.43 | 62.36 | 87.22 | 58.69 | 29.34 | 128.85 | 87.22 | 1419.52 | 70.98 | 302.82 | 82.86 | 3563.63 | 71.27 | 307.25 |
| | SS | 1.00 | 85.43 | 85.43 | 87.22 | 69.00 | 34.50 | | 87.22 | 1640.18 | 82.01 | | 82.86 | 4123.08 | 82.46 | |
| | WQ | 0.61 | 85.43 | 52.11 | 87.22 | 62.19 | 31.09 | | 87.22 | 1321.45 | 66.07 | | 82.86 | 3314.99 | 66.30 | |
| | WL | 0.18 | 85.43 | 15.38 | 87.22 | 28.53 | 14.27 | | 87.22 | 756.07 | 37.80 | | 82.86 | 2054.82 | 41.10 | |
| | FT | 0.43 | 85.43 | 36.73 | 87.22 | 39.29 | 19.64 | | 87.22 | 919.23 | 45.96 | | 82.86 | 2306.20 | 46.12 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative C | SB | 0.73 | 85.43 | 62.36 | 85.43 | 58.09 | 29.05 | 139.25 | 85.43 | 1387.81 | 69.39 | 287.71 | 81.16 | 3485.25 | 69.71 | 294.22 |
| | SS | 1.00 | 85.43 | 85.43 | 85.43 | 70.05 | 35.03 | | 85.43 | 1623.17 | 81.16 | | 81.16 | 4081.42 | 81.63 | |
| | WQ | 0.61 | 85.43 | 52.11 | 85.43 | 58.52 | 29.26 | | 85.43 | 1306.65 | 65.33 | | 81.16 | 3278.74 | 65.57 | |
| | WL | 0.18 | 85.43 | 15.38 | 85.43 | 25.63 | 12.81 | | 85.43 | 616.80 | 30.84 | | 81.16 | 1685.59 | 33.71 | |
| | FT | 0.43 | 85.43 | 36.73 | 85.43 | 66.21 | 33.10 | | 85.43 | 819.70 | 40.99 | | 81.16 | 2179.90 | 43.60 | |
| | UH | 1.00 | | | | | | | | | | | | | | |

## Table 27: AAFCU Scores – Metromedia.

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 2 | | | | Year 20 | | | | Year 50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU | Area | Cumulative FCU | AAFCU | Cumulative AAFCU |
| Alternative A | SB | 0.63 | 59.50 | 37.49 | 48.10 | 33.89 | 16.95 | 81.48 | 48.10 | 737.67 | 36.88 | 179.46 | 45.70 | 2054.98 | 41.10 | 187.10 |
| | SS | 1.00 | 59.50 | 59.50 | 48.10 | 44.46 | 22.23 | | 48.10 | 1022.20 | 51.11 | | 45.70 | 2577.28 | 51.55 | |
| | WQ | 0.59 | 59.50 | 35.11 | 48.10 | 36.15 | 18.08 | | 48.10 | 785.53 | 39.28 | | 45.70 | 2025.82 | 40.52 | |
| | WL | 0.23 | 59.50 | 13.69 | 48.10 | 22.49 | 11.25 | | 48.10 | 516.14 | 25.81 | | 45.70 | 1369.10 | 27.38 | |
| | FT | 0.41 | 59.50 | 24.40 | 48.10 | 25.95 | 12.98 | | 48.10 | 527.57 | 26.38 | | 45.70 | 1327.78 | 26.56 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative B | SB | 0.63 | 59.50 | 37.49 | 59.40 | 37.45 | 18.73 | 86.65 | 59.40 | 818.89 | 40.94 | 194.56 | 56.43 | 2282.04 | 45.64 | 202.72 |
| | SS | 1.00 | 59.50 | 59.50 | 59.40 | 48.75 | 24.38 | | 59.40 | 1129.55 | 56.48 | | 56.43 | 2840.29 | 56.81 | |
| | WQ | 0.59 | 59.50 | 35.11 | 59.40 | 40.13 | 20.06 | | 59.40 | 835.82 | 41.79 | | 56.43 | 2154.35 | 43.09 | |
| | WL | 0.23 | 59.50 | 13.69 | 59.40 | 21.40 | 10.70 | | 59.40 | 519.52 | 25.98 | | 56.43 | 1385.22 | 27.70 | |
| | FT | 0.41 | 59.50 | 24.40 | 59.40 | 25.56 | 12.78 | | 59.40 | 587.33 | 29.37 | | 56.43 | 1474.19 | 29.48 | |
| | UH | 1.00 | | | | | | | | | | | | | | |
| Alternative C | SB | 0.63 | 59.50 | 37.49 | 58.20 | 37.08 | 18.54 | 98.00 | 58.20 | 815.84 | 40.79 | 196.10 | 55.29 | 2049.58 | 40.99 | 198.37 |
| | SS | 1.00 | 59.50 | 59.50 | 58.20 | 48.30 | 24.15 | | 58.20 | 1118.15 | 55.91 | | 55.29 | 2812.36 | 56.25 | |
| | WQ | 0.59 | 59.50 | 35.11 | 58.20 | 39.71 | 19.85 | | 58.20 | 865.80 | 43.29 | | 55.29 | 2228.77 | 44.58 | |
| | WL | 0.23 | 59.50 | 13.69 | 58.20 | 24.97 | 12.48 | | 58.20 | 541.25 | 27.06 | | 55.29 | 1369.11 | 27.38 | |
| | FT | 0.41 | 59.50 | 24.40 | 58.20 | 45.95 | 22.98 | | 58.20 | 580.99 | 29.05 | | 55.29 | 1458.64 | 29.17 | |
| | UH | 1.00 | | | | | | | | | | | | | | |






# 14 Tentatively Selected Plan

A TSP was chosen for each Lower Passaic River and Hackensack River Feasibility Study site. In order to choose a TSP, Cost Effectiveness and Incremental Cost Analyses (CE/ICA) for each site. Proposed restoration, AAFCUs and first level project costs were differentiators used in the CE/ICA to identify the alternatives considered to be cost effective best buy plans. Based on the CE/ICA (Appendix M), the following alternatives were selected as the TSP for each site. One page summaries of each site are included in Appendix K.

## 14.1 Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Alternative A was selected for the Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve site. Alternative A restoration measures will create and enhance emergent wetlands, create forested wetlands, remove debris and enhance the shoreline and shallows resulting in fish habitat creation. Upland forest invasive plant species removal coupled with native plantings, sediment basin creation and public access and enhancement measures also are part of the restoration measures incorporated into this alternative. These restoration measures would help improve water quality, provide flood storage, and enhance fish and wildlife habitat.

## 14.2 Dundee Island Park/ Pulaski Park

Alternative A was selected for the Dundee Island Park/Pulaski Park site. Due to limited restoration potential, only one restoration alternative was developed for the site. Alternative A includes approximately 0.71 acre of bank stabilization and shoreline softening through native plantings in concert with removal of portions of the rip-rap, boulders, and concrete presently used for bank stabilization; approximately 1.79 acres of native plantings within uplands in the northern portion of the site; and construction of an approximately 1,580 linear foot trail for public access. The selected alternative would enhance wildlife habitat and provide nutrient removal and water quality enhancement.

## 14.3 Essex County Branch Brook Park

Alternative C was selected for the Essex County Branch Brook Park site. The selected alternative provides shoreline softening, channel deepening, goose management measures, and invasive plant species removal. Restoration measures incorporated into this design would enhance terrestrial and aquatic habitats and provide enhanced fish habitat.

## 14.4 Kearny Point

Alternative A was selected as the TSP for the Kearny Point site. Restoration measures included in Alternative A, are emergent wetland enhancement and creation, forested wetland creation, tidal channel creation, fish habitat creation and enhancement, bank stabilization and softening upland forest creation and enhancement, and public access and enhancement measures. This alternative was selected because it provides the greatest increase in wetland functional uplift. Wetland creation would provide flood storage and water quality improvement, and the creation of tidal channels would provide tidal flushing as well as new fish habitat.

## 14.5 Oak Island Yards

Oak Island Yards Alternative A was selected as the TSP for the Oak Island Yards site. Alternative A, which entails emergent wetland enhancement and creation, forested wetland creation, tidal channel creation, fish habitat creation and enhancement, bank stabilization, and public access and enhancement measures, results in the highest wetland functional uplift. Restoration would provide improved flood storage as well as nutrient and toxicant filtration which would help improve water quality. Creation of tidal channels would provide wetland flushing and outwelling of organic nutrients and detritus as well as provide fish habitat.

## 14.6 Meadowlark Marsh

Alternative C was selected as the TSP for the Meadowlark Marsh Site. Restoration measures incorporated in this alternative design include emergent wetland enhancement and creation, forested wetland creation, scrub-shrub wetland creation, fish habitat enhancement, and upland forest enhancement. Restoration would increase diversity and provide improved fish and wildlife habitat. Additionally, restoration would provide improved flood storage as well as nutrient and toxicant filtration for runoff from the surrounding developed areas.

## 14.7 Metromedia

Alternative C was selected for the Metromedia site. Alternative C, entails emergent wetland enhancement and creation, including low marsh enhancement and high marsh creation. It also includes the conversion of emergent wetlands into scrub shrub wetlands and forested upland habitat, as well as enhancement of tidal channels. Restoration would increase diversity and provide improved fish and wildlife habitat. Additionally, restoration of the site would provide improved flood storage as well as nutrient and toxicant filtration which would help improve water quality. Enhancement of tidal channels would improve wetland flushing and outwelling of organic nutrients and detritus and improve fish habitat.

# Attachments

# Attachment A

# EPW Database

# Site 902 - Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.83 | 5.99 | 4.97 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.66 | 5.99 | 3.95 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.84 | 5.99 | 5.03 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.40 | 5.99 | 2.40 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.47 | 5.99 | 2.82 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative A Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.75 | 4.96 | 3.72 | |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.69 | 4.96 | 3.42 | |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.39 | 4.96 | 1.93 | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 1.00

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 0.75

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.56 / 0.56

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.66

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 /** **0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 2

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / 0.50 Disturbance Factors (DF)

**Equation #7** = 0.47 / 0.63 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.82 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 0.66**

**Sediment Stabilization FCI**

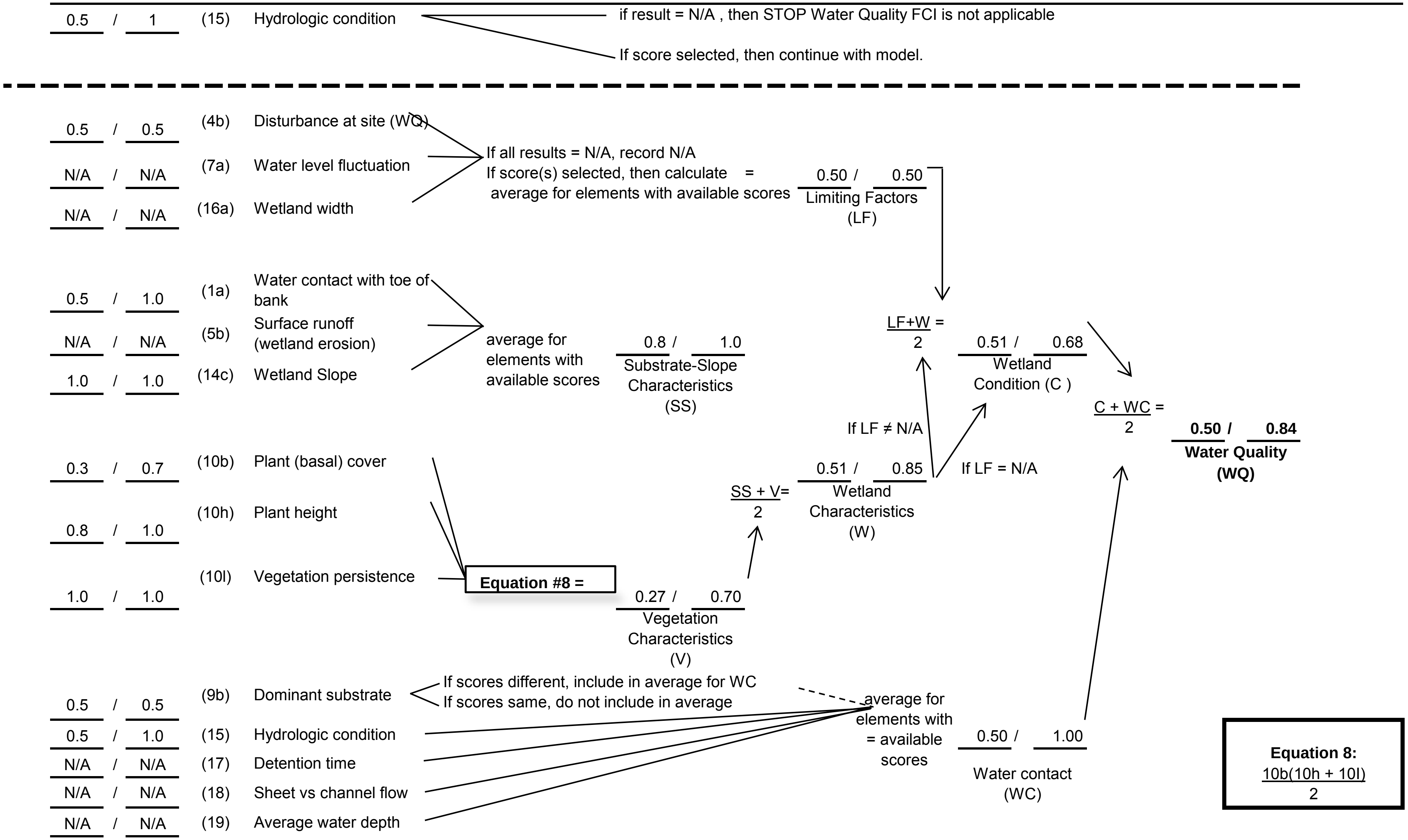
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 2



| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

average for elements with available scores

0.8 / 1.0 Substrate-Slope Characteristics (SS)

Equation #8 =

0.27 / 0.70 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.51 / 0.85 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.51 / 0.68 Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

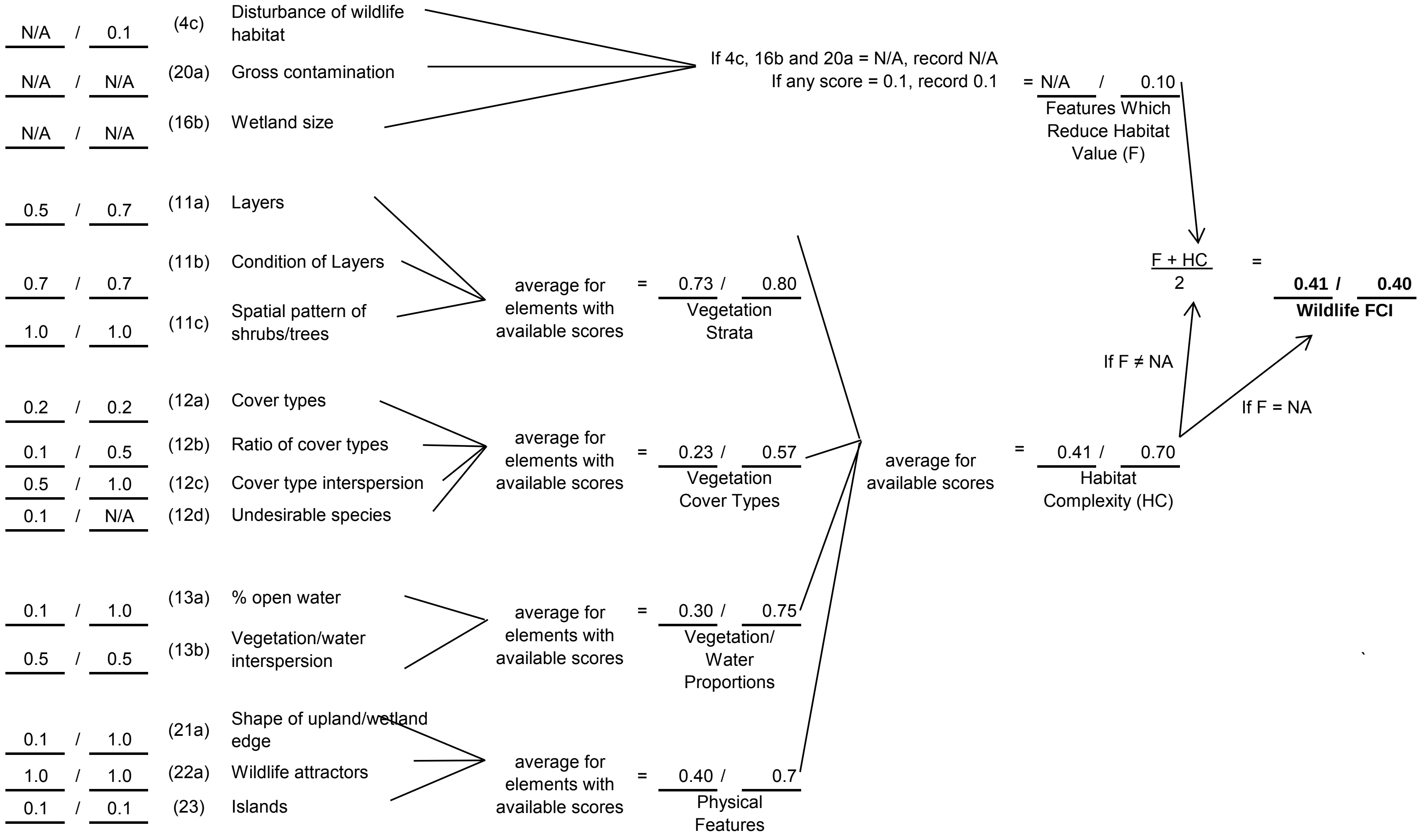
**0.50 / 0.84**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 2



| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | 0.1 | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.5 | 0.7 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.2 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 1.0 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| 0.1 | 1.0 | (13a) | % open water |
| 0.5 | 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| 0.1 | 0.1 | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / 0.10 Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.73 / 0.80 Vegetation Strata

average for elements with available scores = 0.23 / 0.57 Vegetation Cover Types

average for elements with available scores = 0.30 / 0.75 Vegetation/ Water Proportions

average for elements with available scores = 0.40 / 0.7 Physical Features

average for available scores = 0.41 / 0.70 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ =

**0.41 / 0.40**

**Wildlife FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

→ if result = 0.1, STOP. There is no potential for providing tidal fish habitat

→ if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.2 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitabuility for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.1 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.4 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

→ If score available, record score for WQ

→ If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.47**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | / N/A | (29) | Endangered species |
| N/A | / N/A | (30) | Rarity |
| N/A | / N/A | (31) | Unique features |
| 1.0 | / 1.0 | (32) | Historical or archaeological significance |
| N/A | / N/A | (33) | Natural landmark |
| N/A | / N/A | (34) | Connected to Wild and Scenic River |
| N/A | / 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$\frac{10a\ (10g + 10i + 10k)}{3}$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 2

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.50 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.75 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.88 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **0.66 / 0.69** **Sediment Stabilization FCI**

If DF= N/A

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.3 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.41 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.41 / 0.39 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.39**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative A Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.91 | 5.99 | 5.45 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.95 | 5.99 | 5.69 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 1.00 | 5.99 | 5.99 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.73 | 5.99 | 4.37 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.69 | 5.99 | 4.13 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative A Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.70 | 4.96 | 3.47 | |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.95 | 4.96 | 4.71 | |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.74 | 4.96 | 3.67 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.5 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / N/A Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 0.75 Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.56 / 0.88 Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.81 Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 /** **0.91**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.47 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 0.95**

**Sediment Stabilization FCI**

Equation #7:

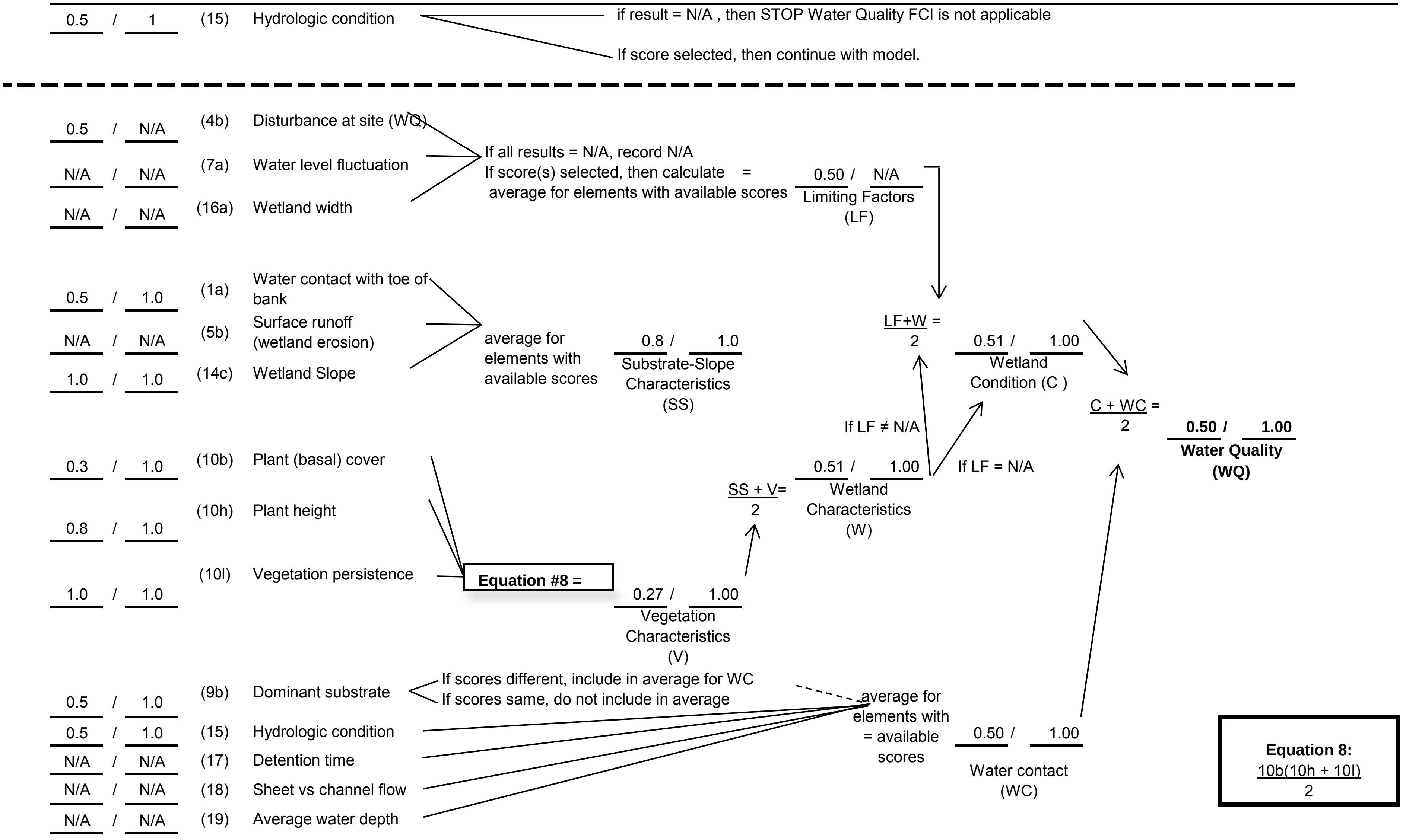
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20



PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 1.0 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.87
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.23 / 0.59
Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.75
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.7
Physical Features

average for available scores = 0.41 / 0.73
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.41 / 0.73**
**Wildlife FCI**

`

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.2 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 1.0 | (10d) | Plant (basal) cover |
| 0.1 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.9 Food/Cover

average for avaliable scores = **0.37 / 0.69**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.90

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.70**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2} =$ **0.63 / 0.70**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 / 0.95**

**Sediment Stabilization FCI**

Equation #7:

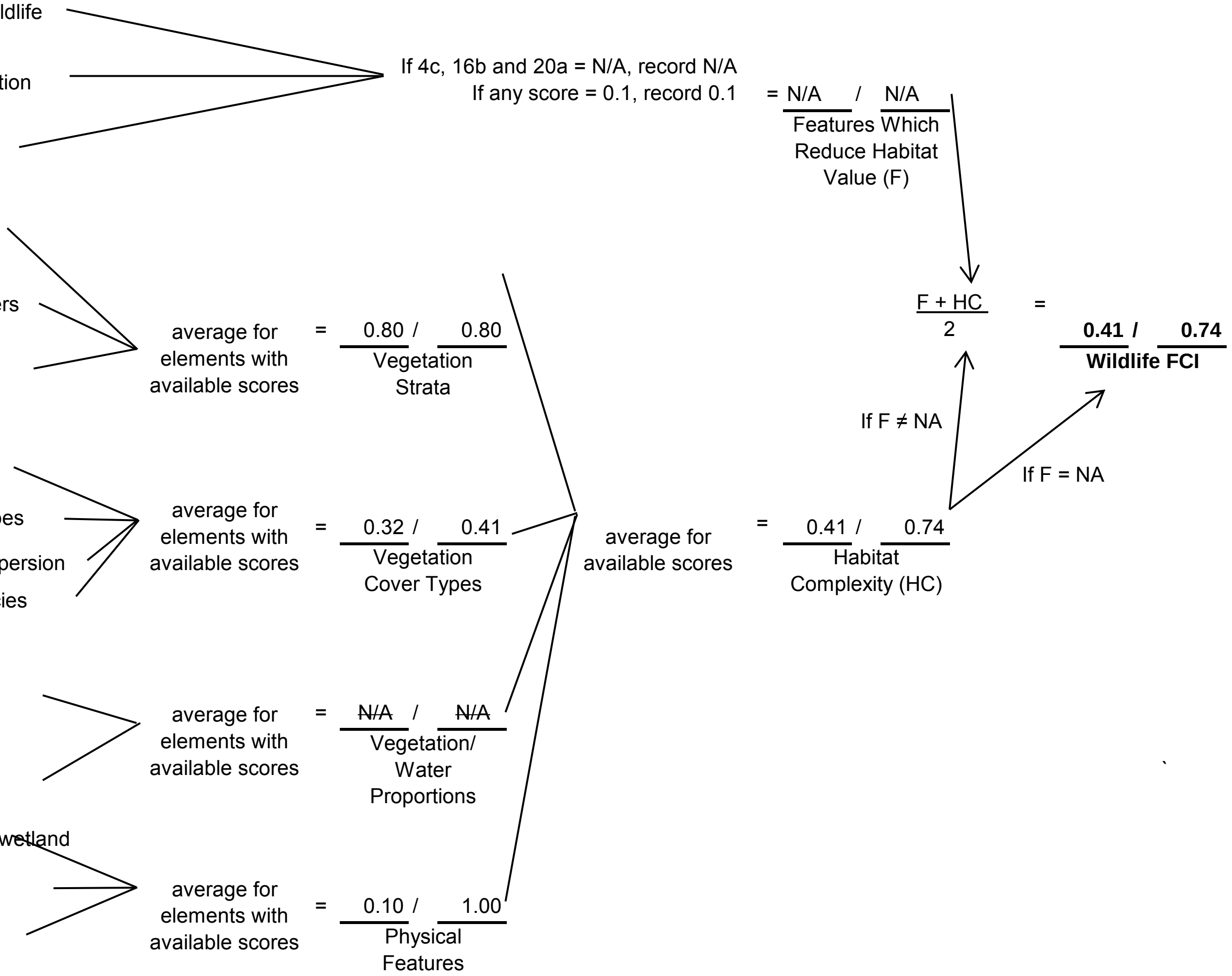
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |



If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.80 / 0.80 Vegetation Strata

average for elements with available scores = 0.32 / 0.41 Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.41 / 0.74 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ =

**0.41 / 0.74**
**Wildlife FCI**

### Table A.1.
### Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.91 | 5.69 | 5.18 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.95 | 5.69 | 5.41 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 1.00 | 5.69 | 5.69 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.73 | 5.69 | 4.15 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.69 | 5.69 | 3.93 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative A Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.70 | 5.26 | 3.68 | |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.95 | 5.26 | 5.00 | |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.74 | 5.26 | 3.89 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.5 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 1.00

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 0.75

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.56 / 0.88

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.81

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 / 0.91**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

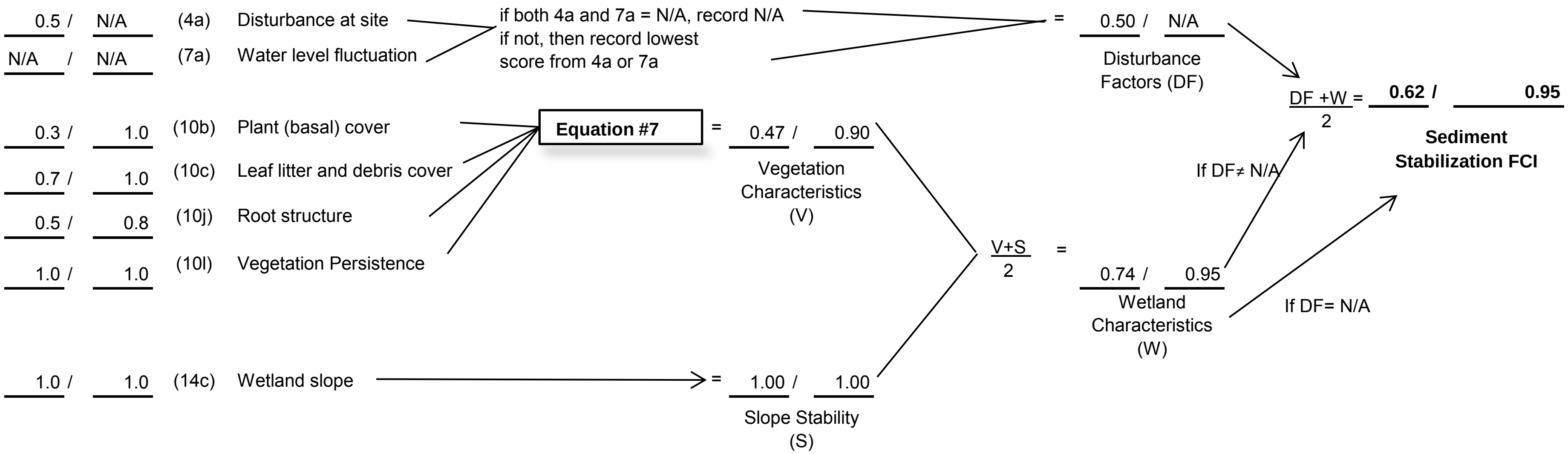
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest score from 4a or 7a
= 0.50 / N/A Disturbance Factors (DF)

**Equation #7** = 0.47 / 0.90 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.95 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 0.95**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

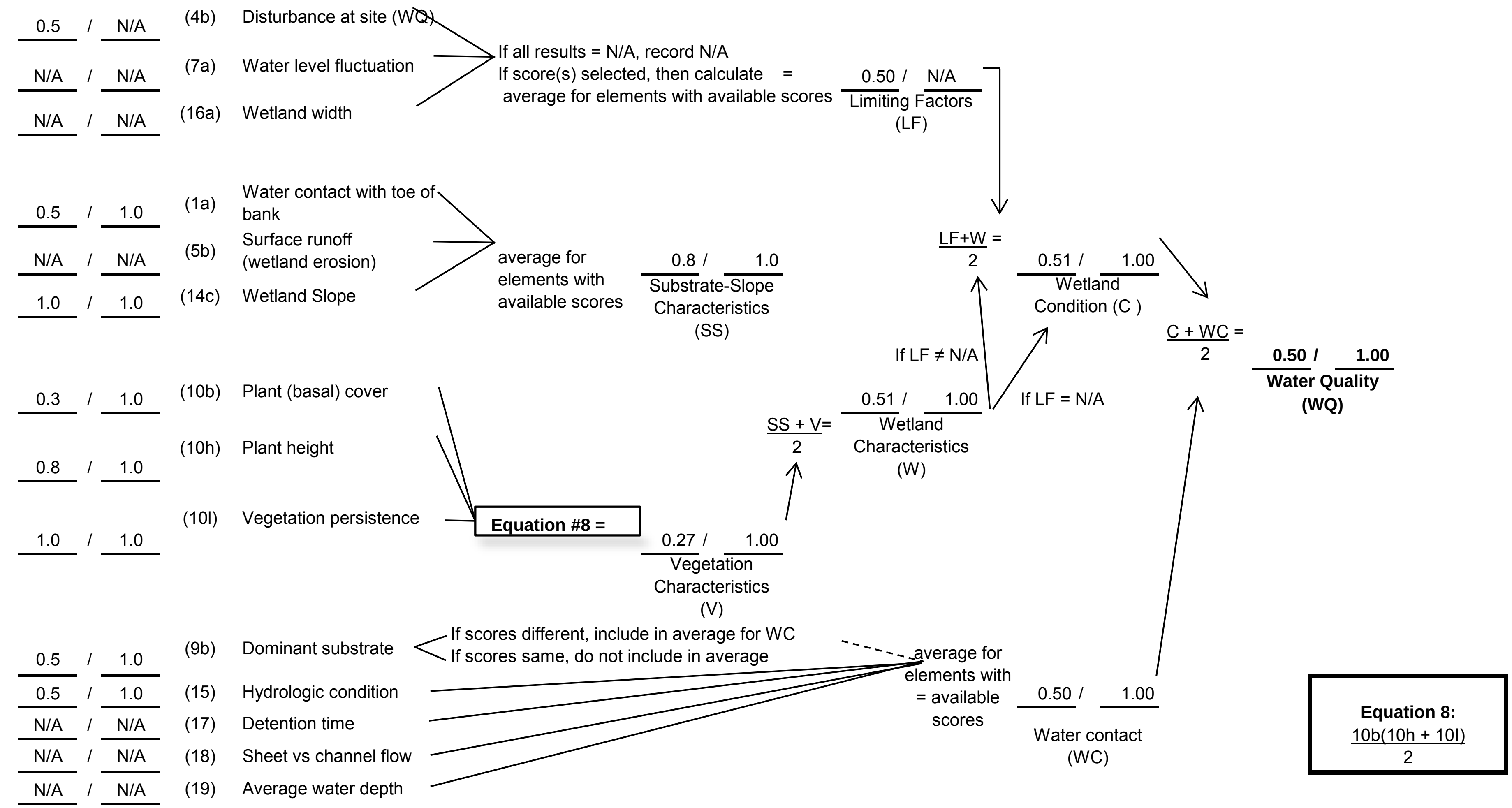
PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Water Quality

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50 |
| 0.5 | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |
| 0.5 | 1.0 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |
| 0.3 | 1.0 | (10b) | Plant (basal) cover |
| 0.8 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.5 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If all results = N/A, record N/A

If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

average for elements with available scores

0.8 / 1.0 Substrate-Slope Characteristics (SS)

Equation #8 =

0.27 / 1.00 Vegetation Characteristics (V)

If scores different, include in average for WC

If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{SS + V}{2}$ =

0.51 / 1.00 Wetland Characteristics (W)

If LF ≠ N/A

If LF = N/A

$\frac{LF+W}{2}$ =

0.51 / 1.00 Wetland Condition (C )

$\frac{C + WC}{2}$ =

**0.50 / 1.00**

**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 1.0 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 1.0 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.73 / 0.90
Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.23 / 0.59
Vegetation Cover Types

(13a)–(13b): average for elements with available scores = 0.30 / 0.75
Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.40 / 0.7
Physical Features

average for available scores = 0.41 / 0.73
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.41 / 0.73**
**Wildlife FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.2 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 1.0 | (10d) | Plant (basal) cover |
| 0.1 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.9 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.69**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

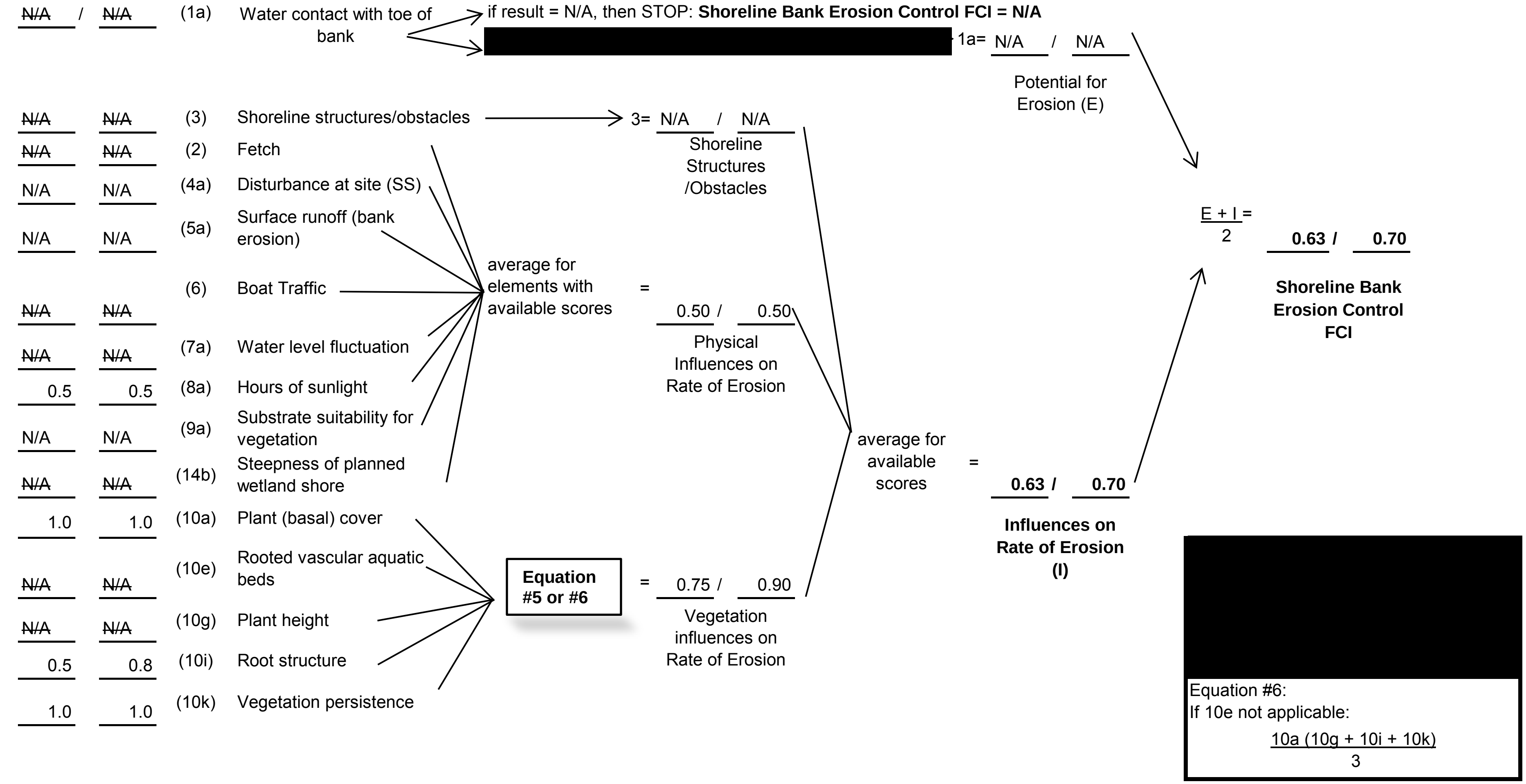
Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]



| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.90

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.70**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.70**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | UAA baseline / Planned Upland Alternative A - Yr 50 |
| 0.5 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.66 /** **0.95**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.7 | 0.7 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.2 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.80 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.32 / 0.41 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.41 / 0.74 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.74 Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative B Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.56 | 2.88 | 1.61 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.66 | 2.88 | 1.90 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.62 | 2.88 | 1.79 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.60 | 2.88 | 1.73 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.42 | 2.88 | 1.21 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative B Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.63 | 8.07 | 5.08 | |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.73 | 8.07 | 5.89 | ✓ |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.41 | 8.07 | 3.31 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.50

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / 0.50

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 0.75

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.56 / 0.62

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.62

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 /** **0.56**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.50 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.47 / 0.63 Vegetation Characteristics (V)

(14c) = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.82 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF + W}{2}$ = **0.62 / 0.66** **Sediment Stabilization FCI**

If DF= N/A

Equation #7:

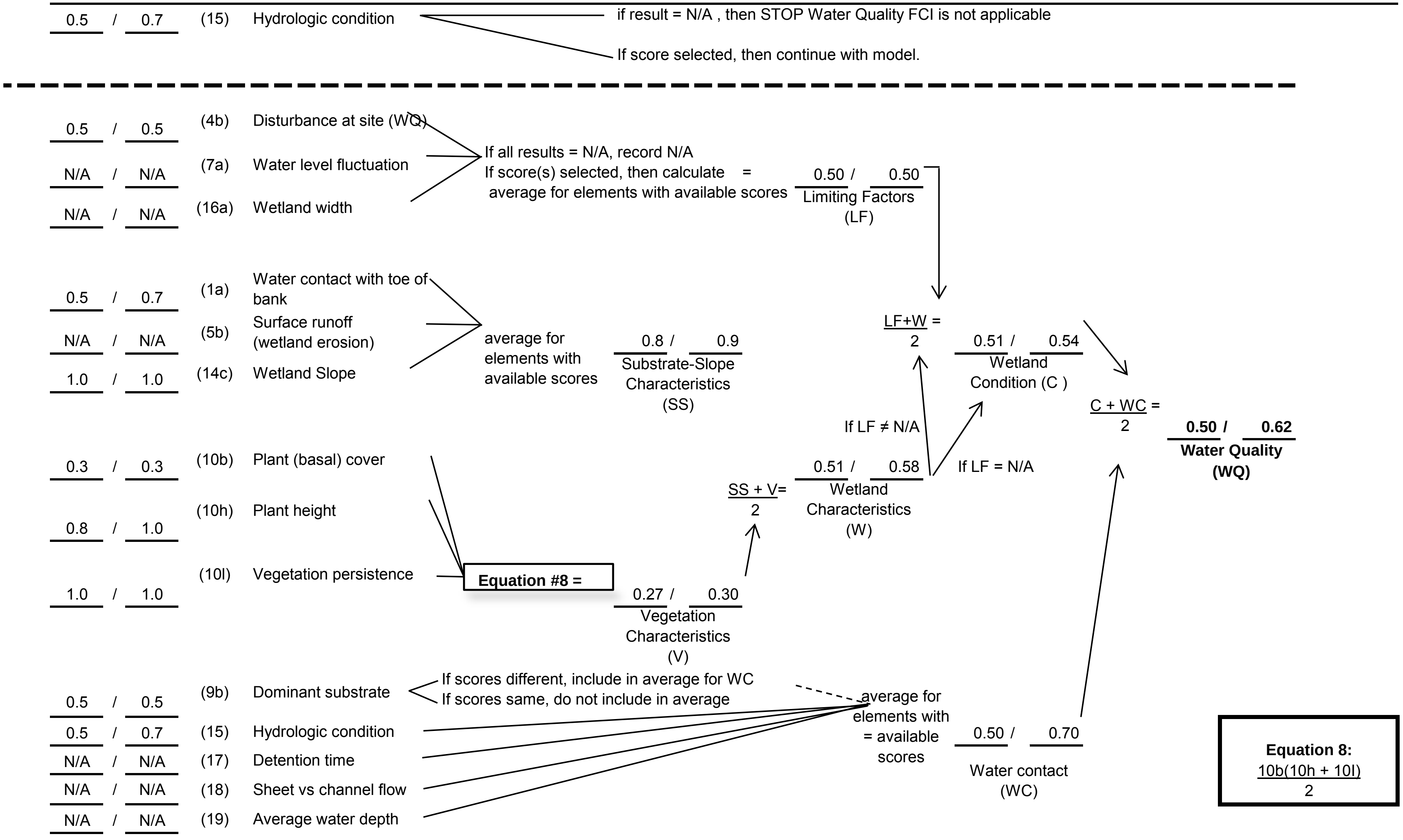
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (15) | Hydrologic condition |
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 0.3 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 0.7 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



(15) Hydrologic condition:
if result = N/A , then STOP Water Quality FCI is not applicable
If score selected, then continue with model.

(4b), (7a), (16a):
If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores
0.50 / 0.50 Limiting Factors (LF)

(1a), (5b), (14c): average for elements with available scores
0.8 / 0.9 Substrate-Slope Characteristics (SS)

(10b), (10h), (10l): **Equation #8 =**
0.27 / 0.30 Vegetation Characteristics (V)

SS + V= / 2
0.51 / 0.58 Wetland Characteristics (W)

If LF ≠ N/A: LF+W = / 2
If LF = N/A
0.51 / 0.54 Wetland Condition (C )

(9b) Dominant substrate:
If scores different, include in average for WC
If scores same, do not include in average

(9b), (15), (17), (18), (19): average for elements with = available scores
0.50 / 0.70 Water contact (WC)

C + WC = / 2
**0.50 / 0.62 Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.23 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.7 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.41 / 0.60 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.60**
**Wildlife FCI**

`

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calclation of Fish (Tidal)

Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| N/A / | N/A | (7b) | Most permanent hydroperiod |
| N/A / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.2 / | 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.5 / | 0.5 | (9c) | Substrate suitabiulity for fish |
| 0.7 / | 0.7 | (10d) | Plant (basal) cover |
| 0.1 / | 0.3 | (10f) | Rooted vascular aquatic beds |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.3 Food/Cover

average for avaliable scores = **0.37 / 0.42**

**Fish (Tidal) FCI**

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / | INA | (20d) | Dissolved Oxygen |
| INA / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| 1.0 / | 1.0 | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.75 / 0.63

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~ = 0.50 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.90 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 / 0.73**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Wildlife (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| | | | |
|---|---|---|---|
| N/A | N/A | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

| | | | |
|---|---|---|---|
| 0.7 | 0.5 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.80 / 0.73
Vegetation Strata

| | | | |
|---|---|---|---|
| 0.2 | 0.2 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |

average for elements with available scores = 0.32 / 0.39
Vegetation Cover Types

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.10 / 0.10
Physical Features

average for available scores = 0.41 / 0.41
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.41 / 0.41**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative B Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.72 | 2.88 | 2.07 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.87 | 2.88 | 2.51 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.89 | 2.88 | 2.56 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.66 | 2.88 | 1.90 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.45 | 2.88 | 1.30 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative B Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.63 | 8.07 | 5.08 | |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.95 | 8.07 | 7.67 | ✓ |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.73 | 8.07 | 5.89 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

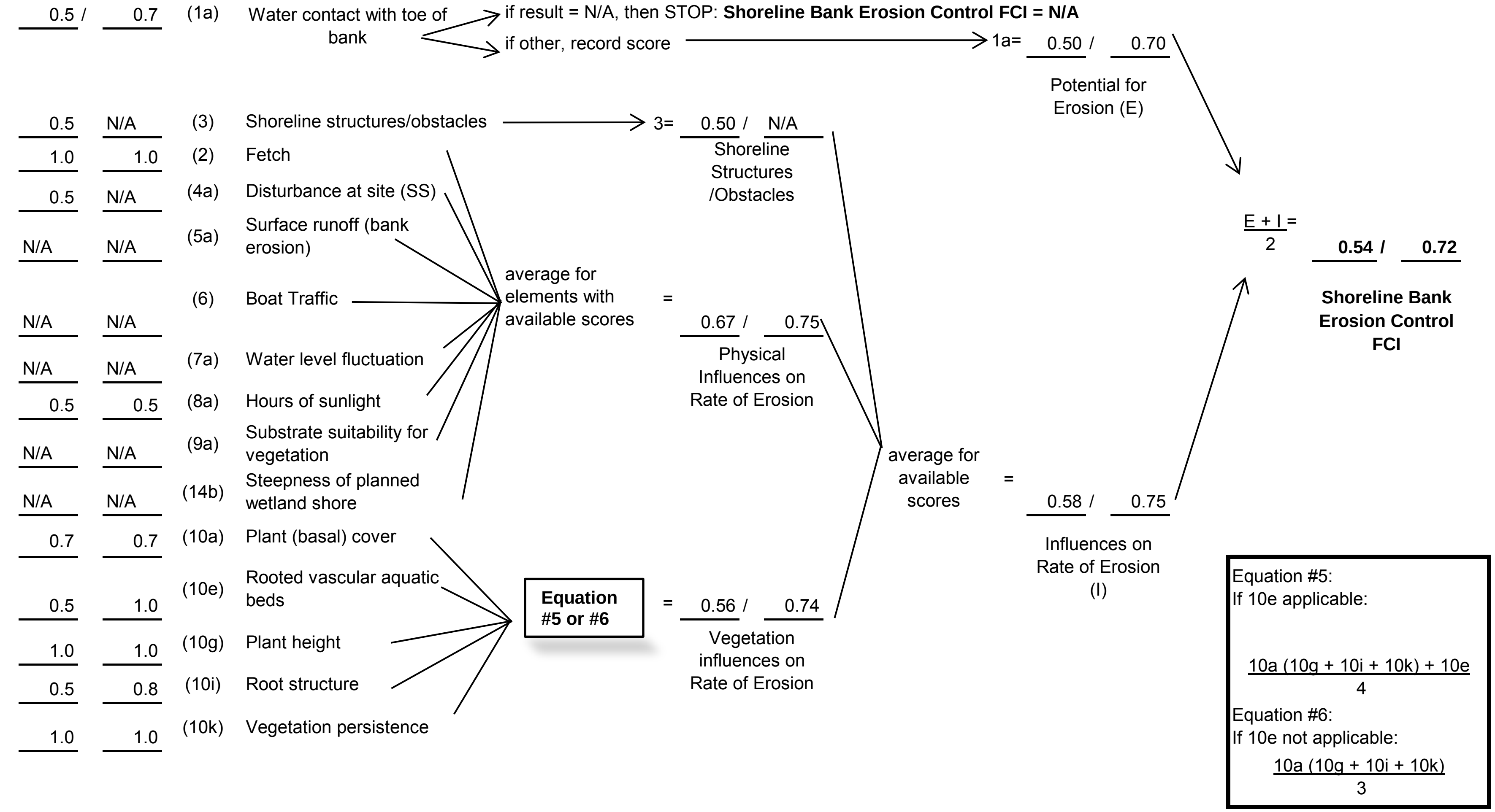
Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| | | | |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 0.75

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.56 / 0.74

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.75

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 /** **0.72**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

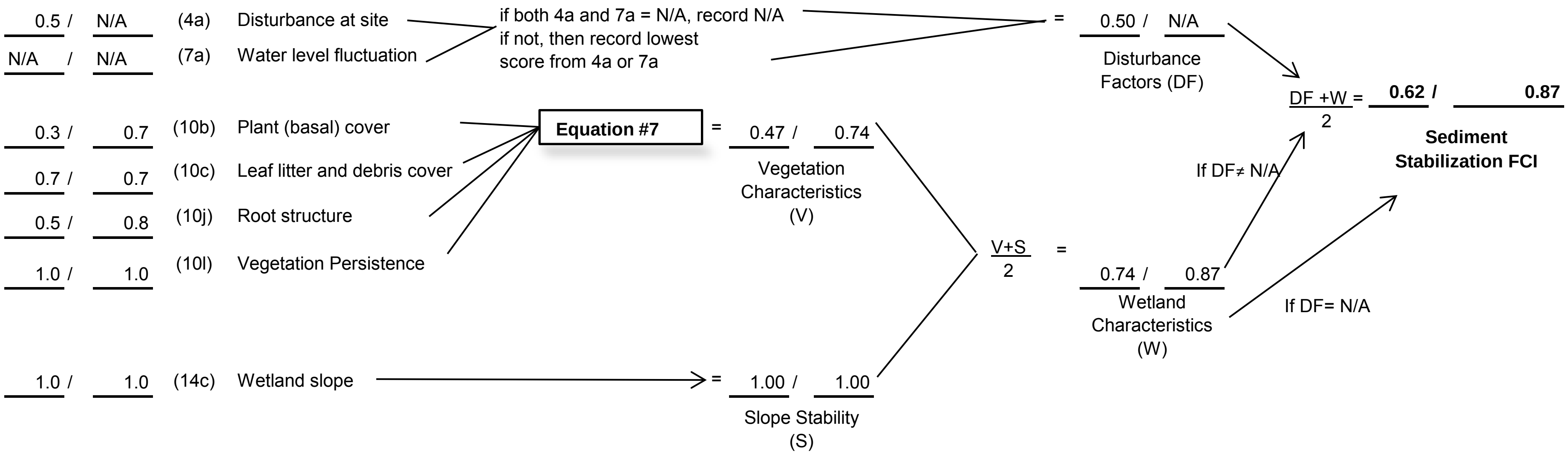
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20



| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.7 / 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / 0.8 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.47 / 0.74
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.87
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 0.87**

**Sediment Stabilization FCI**

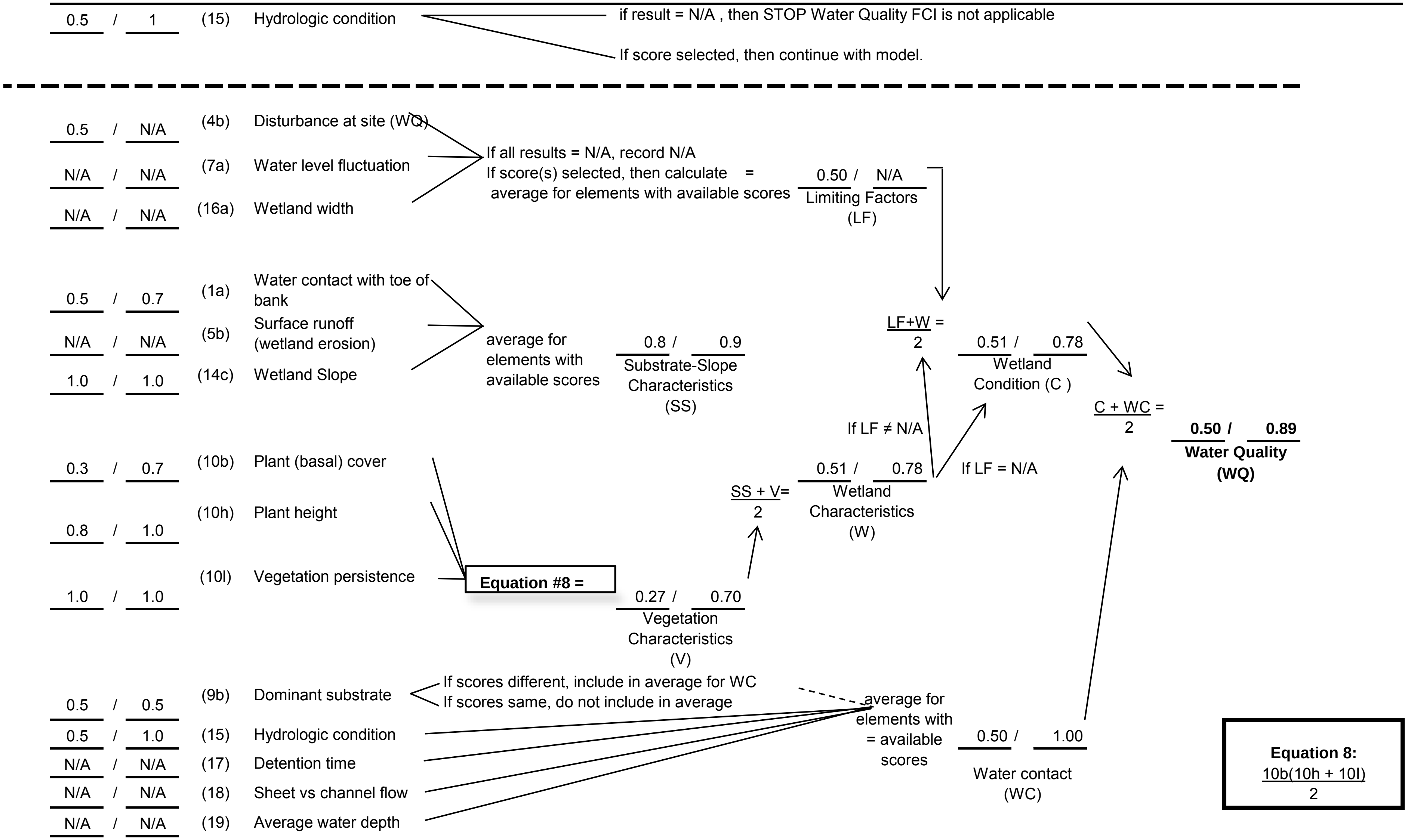
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20



| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

Hydrologic condition (15): if result = N/A , then STOP Water Quality FCI is not applicable. If score selected, then continue with model.

(4b), (7a), (16a): If all results = N/A, record N/A. If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

(1a), (5b), (14c): average for elements with available scores

0.8 / 0.9 Substrate-Slope Characteristics (SS)

(10b), (10h), (10l): Equation #8 =

0.27 / 0.70 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.51 / 0.78 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ =

If LF = N/A

0.51 / 0.78 Wetland Condition (C )

(9b) Dominant substrate: If scores different, include in average for WC. If scores same, do not include in average

(9b), (15), (17), (18), (19): average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.50 / 0.89**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.5 | 0.9 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.2 | (12a) | Cover types |
| 0.1 | 1.0 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| 0.1 | 0.5 | (13a) | % open water |
| 0.5 | 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| 0.1 | 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.23 / 0.57 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.7 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.41 / 0.66 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.66**
**Wildlife FCI**

`

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.2 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitabuility for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.1 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.4 Food/Cover

| Selected Scores | (#) | Element | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.45**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.75
Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.63**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.66 / 0.95**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.80 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.32 / 0.39 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.41 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.73**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative B Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.71 | 2.74 | 1.94 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 1.00 | 2.74 | 2.74 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.89 | 2.74 | 2.44 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.62 | 2.74 | 1.70 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.50 | 2.74 | 1.37 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative B Year 50

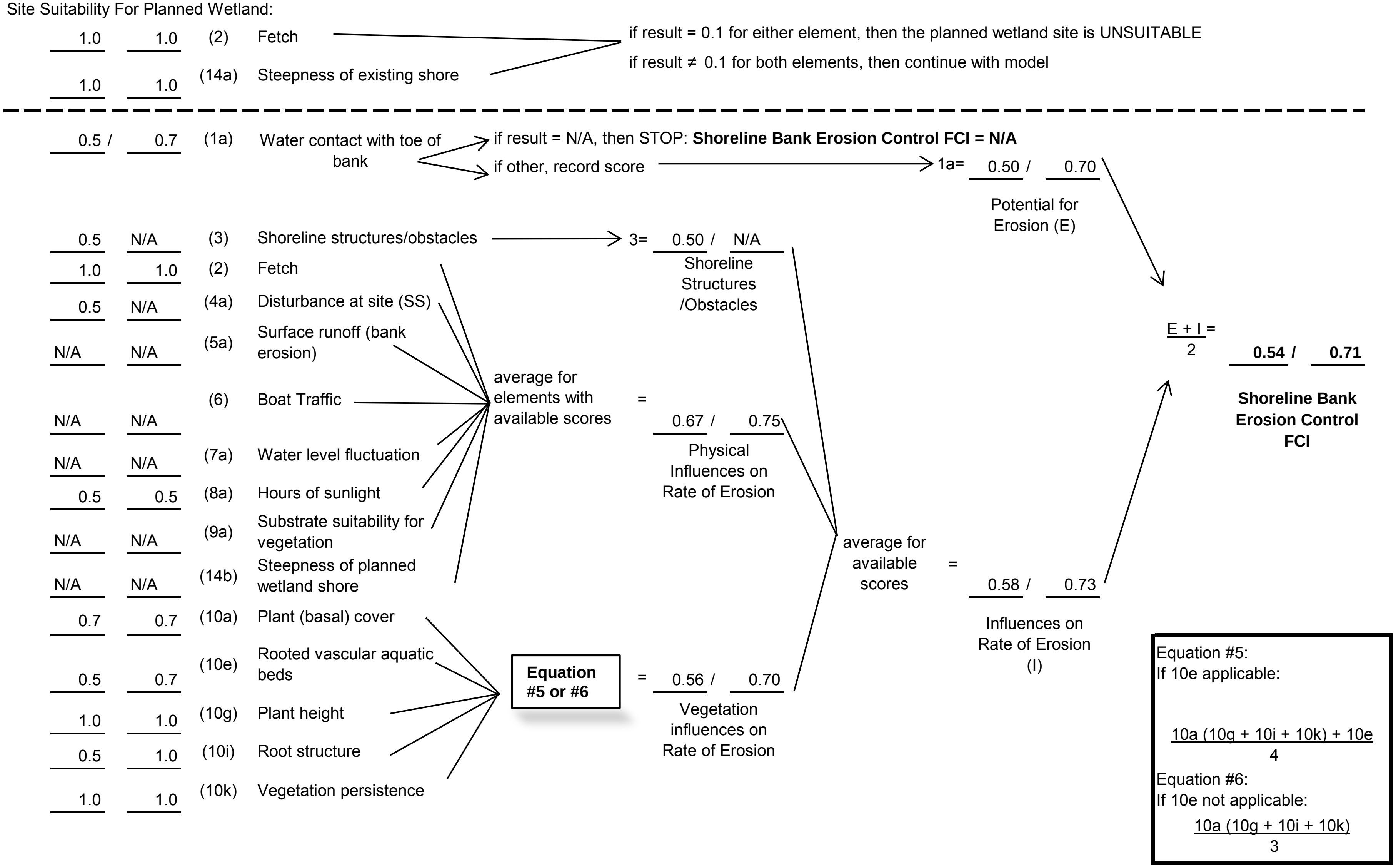
| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.63 | 8.21 | 5.17 | ✓ |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.88 | 8.21 | 7.23 | ✓ |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.73 | 8.21 | 6.00 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50



Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 0.75

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.56 / 0.70

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.73

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 / 0.71**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / N/A Disturbance Factors (DF)

**Equation #7** = 0.47 / 1.00 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

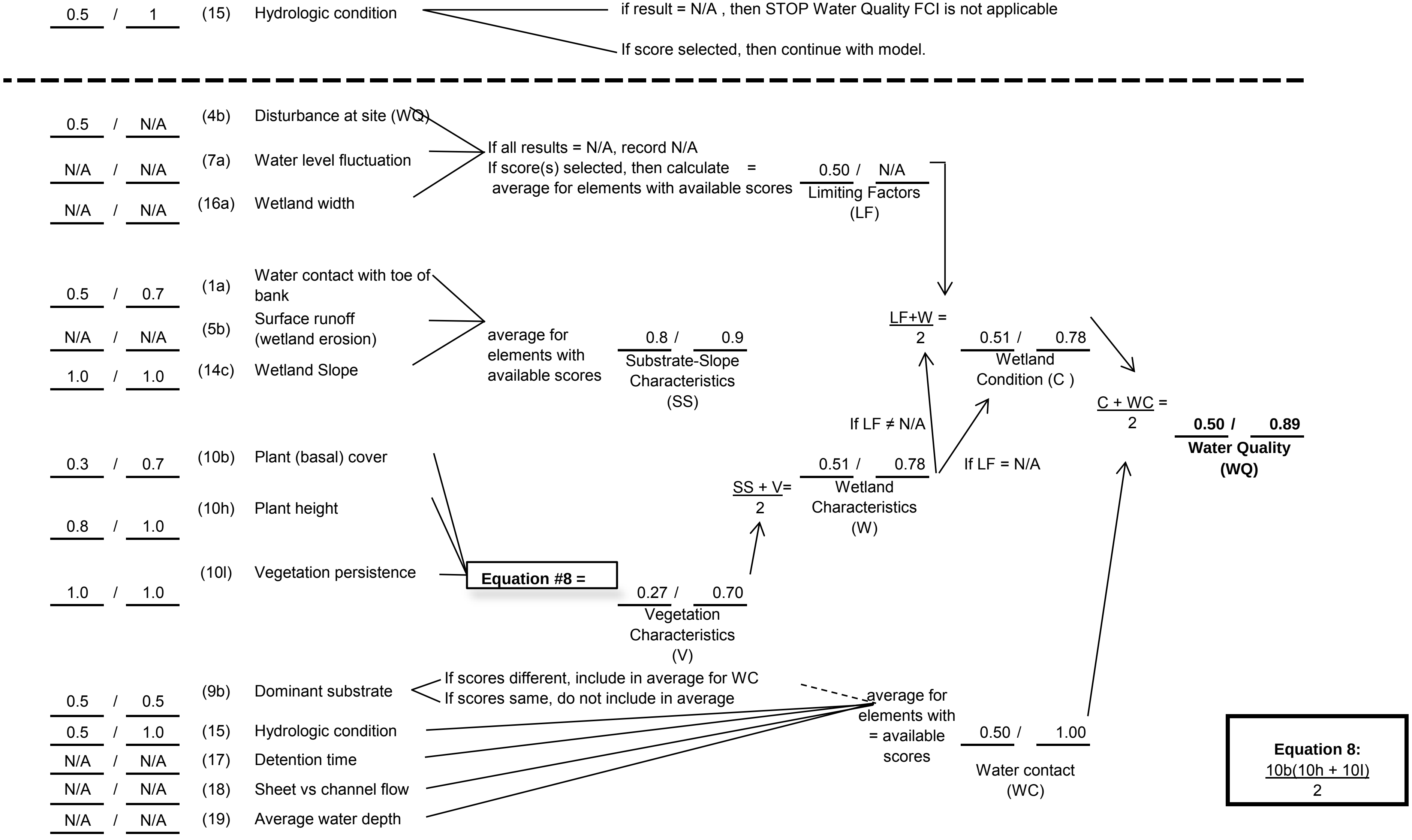
$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



(15) Hydrologic condition: if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

(4b), (7a), (16a): If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A
Limiting Factors (LF)

(1a), (5b), (14c): average for elements with available scores

0.8 / 0.9
Substrate-Slope Characteristics (SS)

(10b), (10h), (10l): **Equation #8 =**

0.27 / 0.70
Vegetation Characteristics (V)

SS + V= / 2

0.51 / 0.78
Wetland Characteristics (W)

If LF ≠ N/A: LF+W = / 2

If LF = N/A:

0.51 / 0.78
Wetland Condition (C )

(9b) Dominant substrate:
If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00
Water contact (WC)

C + WC = / 2

**0.50 / 0.89**
**Water Quality (WQ)**

**Equation 8:**
$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.87
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.23 / 0.40
Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.7
Physical Features

average for available scores = 0.41 / 0.62
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.62**
**Wildlife FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| N/A / | N/A | (7b) | Most permanent hydroperiod |
| N/A / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.2 / | 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.5 / | 1.0 | (9c) | Substrate suitabuility for fish |
| 0.7 / | 1.0 | (10d) | Plant (basal) cover |
| 0.1 / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / | 1.0 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.5 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 1.0 | (20c) | Nutrient/sediment/contaminant sources |
| INA / | INA | (20d) | Dissolved Oxygen |
| INA / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.50**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| 1.0 / | 1.0 | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

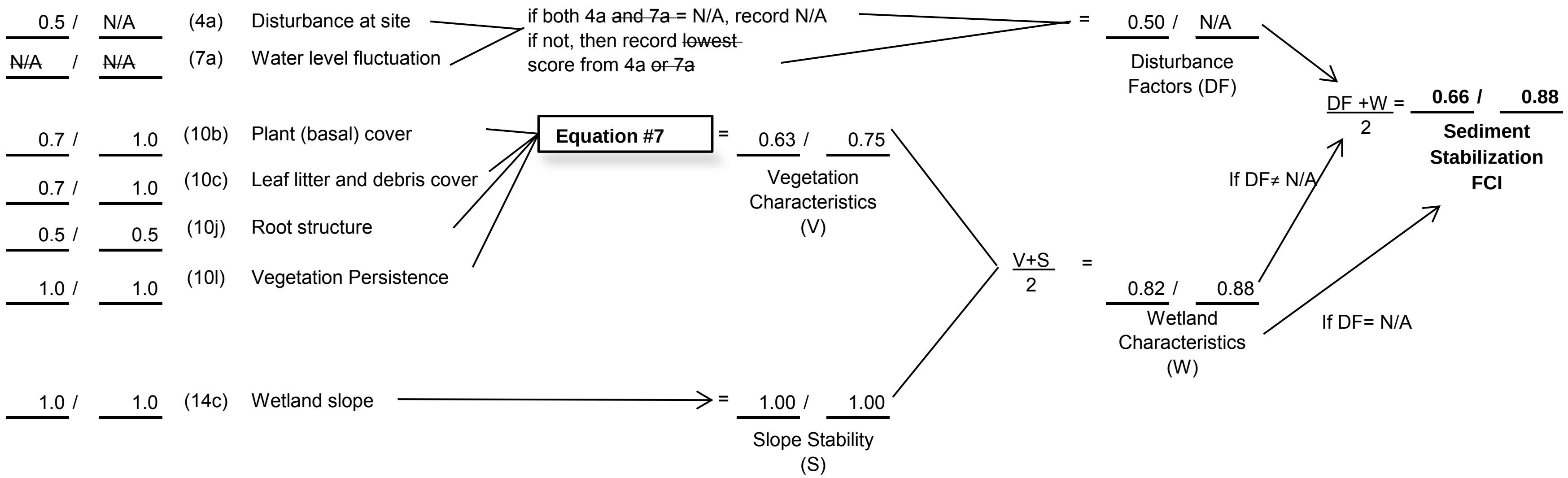
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50



| | | | |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.75
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.88
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.80 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.32 / 0.39 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.41 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.73**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative C Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.64 | 2.81 | 1.80 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.62 | 2.81 | 1.74 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.65 | 2.81 | 1.83 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.46 | 2.81 | 1.29 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.37 | 2.81 | 1.04 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative C Year 2

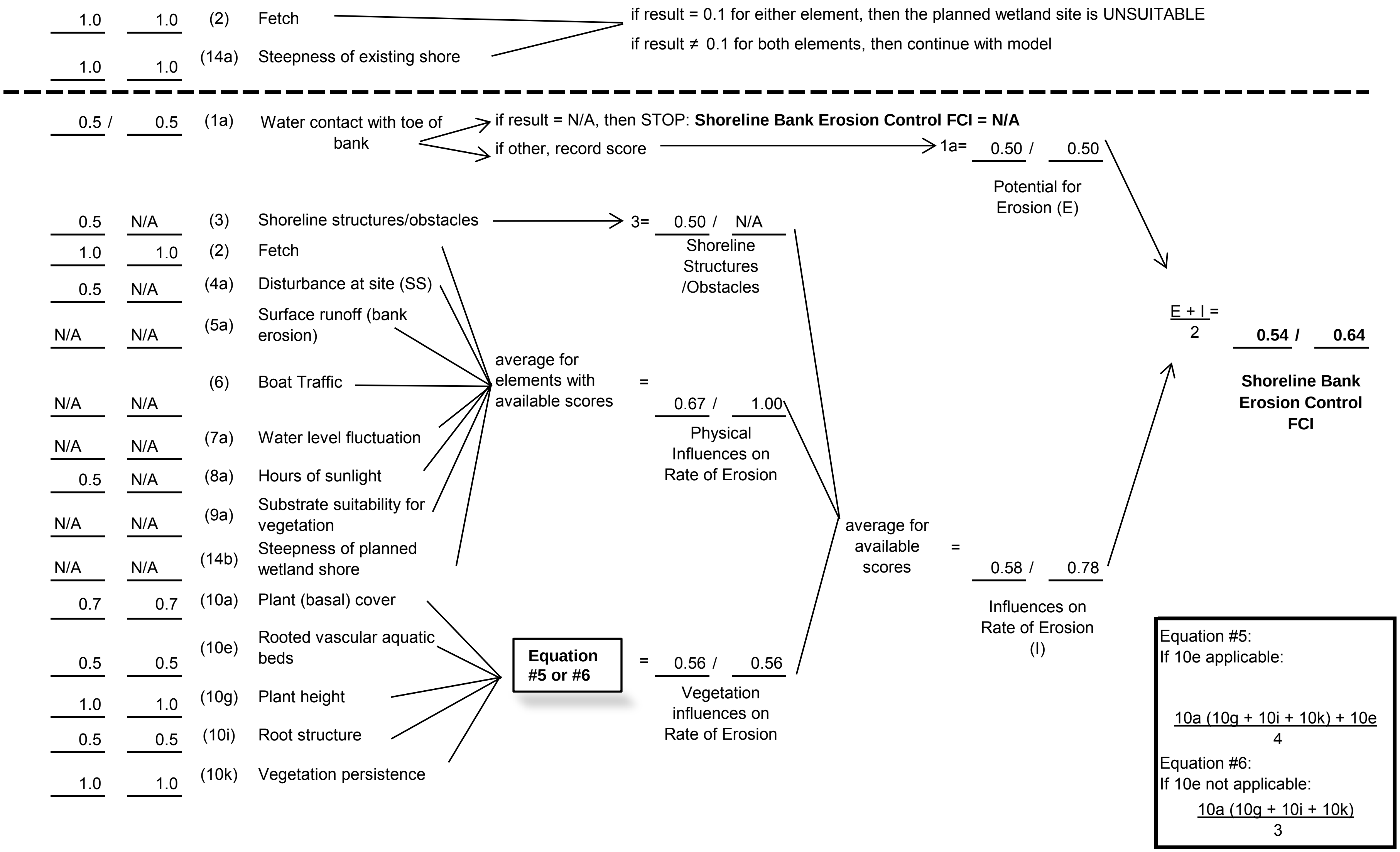
| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.63 | 8.14 | 5.13 | ✓ |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.67 | 8.14 | 5.45 | ✓ |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.43 | 8.14 | 3.50 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1



Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.50

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 1.00

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.56 / 0.56

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.78

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 /** **0.64**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 0.3 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.47 / 0.47
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.74
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 0.62**

**Sediment Stabilization FCI**

Equation #7:

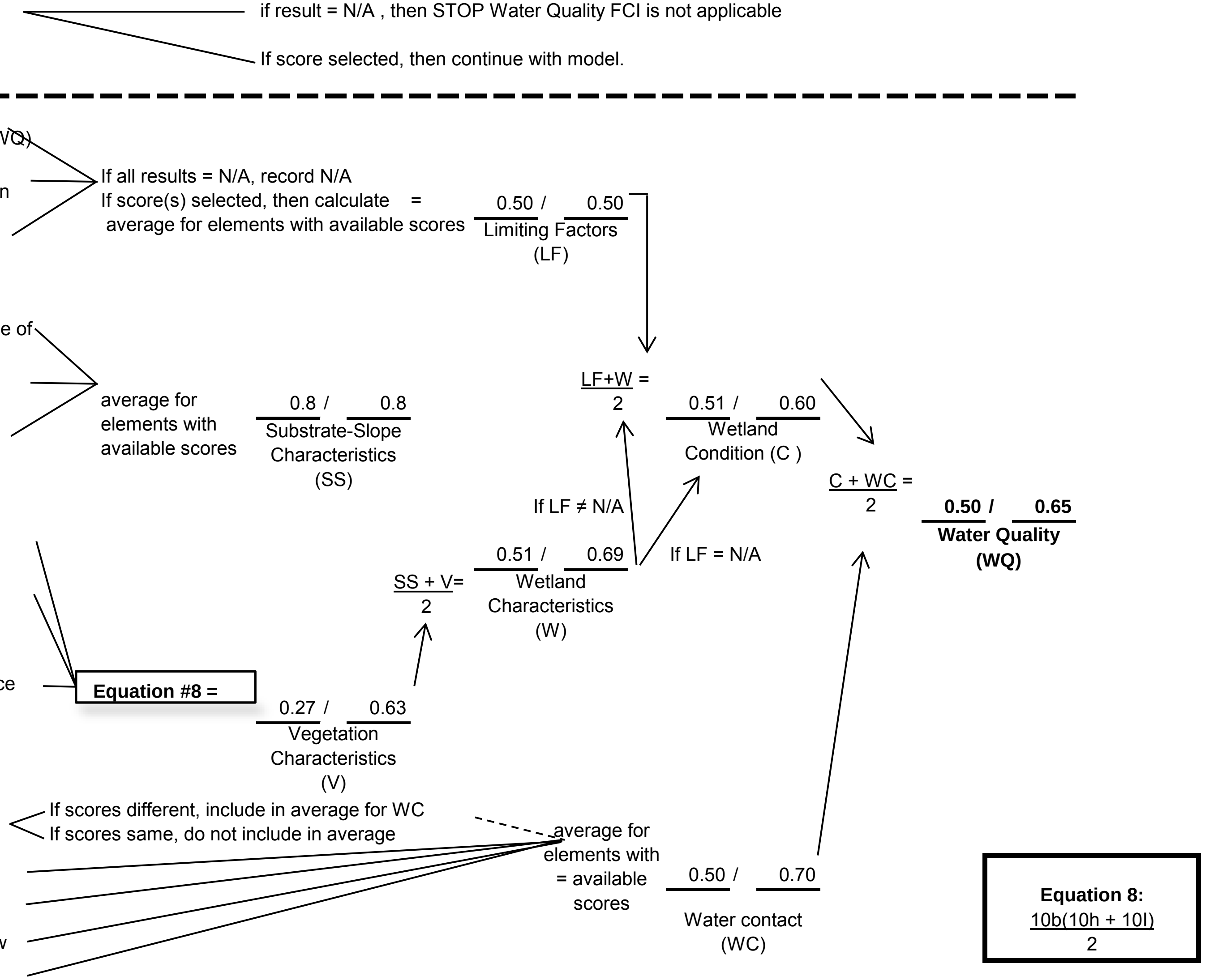
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (15) | Hydrologic condition |
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 0.5 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 0.8 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 0.7 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A

If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

average for elements with available scores

0.8 / 0.8 Substrate-Slope Characteristics (SS)

Equation #8 =

0.27 / 0.63 Vegetation Characteristics (V)

SS + V= / 2

0.51 / 0.69 Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

0.51 / 0.60 Wetland Condition (C )

If LF = N/A

C + WC = / 2

**0.50 / 0.65**

**Water Quality (WQ)**

If scores different, include in average for WC

If scores same, do not include in average

average for elements with = available scores

0.50 / 0.70

Water contact (WC)

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.5 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 0.1 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.73
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.23 / 0.40
Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.30
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.4
Physical Features

average for available scores = 0.41 / 0.46
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.46**
**Wildlife FCI**

`

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calclation of Fish (Tidal)

Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

| | | | |
|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability | |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) | |
| N/A / N/A | (4d) | Disturbance in channel/open water | |
| N/A / N/A | (7b) | Most permanent hydroperiod | |
| N/A / N/A | (24) | Obstruction to fish passage | |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| | | |
|---|---|---|
| 0.2 / 0.2 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitabiulity for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.1 / 0.1 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.1 Food/Cover

average for avaliable scores = **0.37 / 0.37**

**Fish (Tidal) FCI**

| | | |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | |
|---|---|---|
| 0.1 / 0.1 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.75
Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

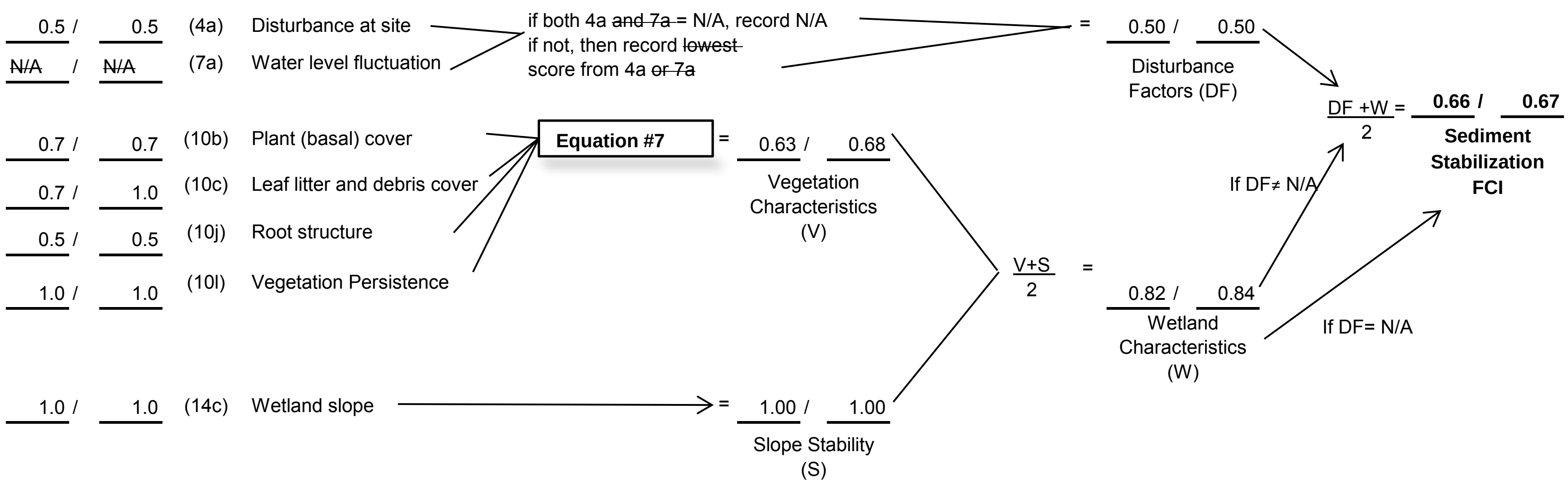
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.50 / 0.50 Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.68 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.66 /** **0.67** **Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.39 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.41 / 0.43 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.43**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative C Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.64 | 2.81 | 1.80 | ✓ |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.62 | 2.81 | 1.74 | ✓ |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.70 | 2.81 | 1.97 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.48 | 2.81 | 1.35 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.31 | 2.81 | 0.87 | |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative C Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.63 | 8.14 | 5.13 | ✓ |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.88 | 8.14 | 7.16 | ✓ |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.79 | 8.14 | 6.43 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

→ if other, record score → 1a= 0.50 / 0.50

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.67 / 1.00

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.56 / 0.56

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.78

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 /** **0.64**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

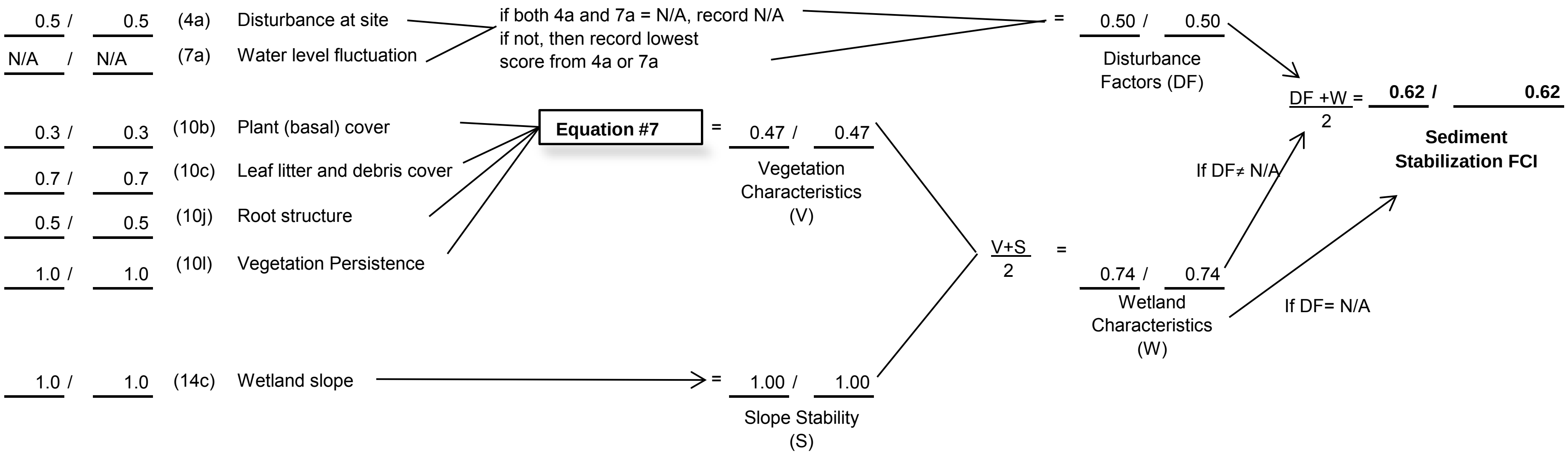
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization

Selected Scores (#) Element

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20



0.5 / 0.5 (4a) Disturbance at site

N/A / N/A (7a) Water level fluctuation

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / 0.50 Disturbance Factors (DF)

0.3 / 0.3 (10b) Plant (basal) cover

0.7 / 0.7 (10c) Leaf litter and debris cover

0.5 / 0.5 (10j) Root structure

1.0 / 1.0 (10l) Vegetation Persistence

**Equation #7** = 0.47 / 0.47 Vegetation Characteristics (V)

1.0 / 1.0 (14c) Wetland slope = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.74 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.62 / 0.62**

**Sediment Stabilization FCI**

Equation #7:

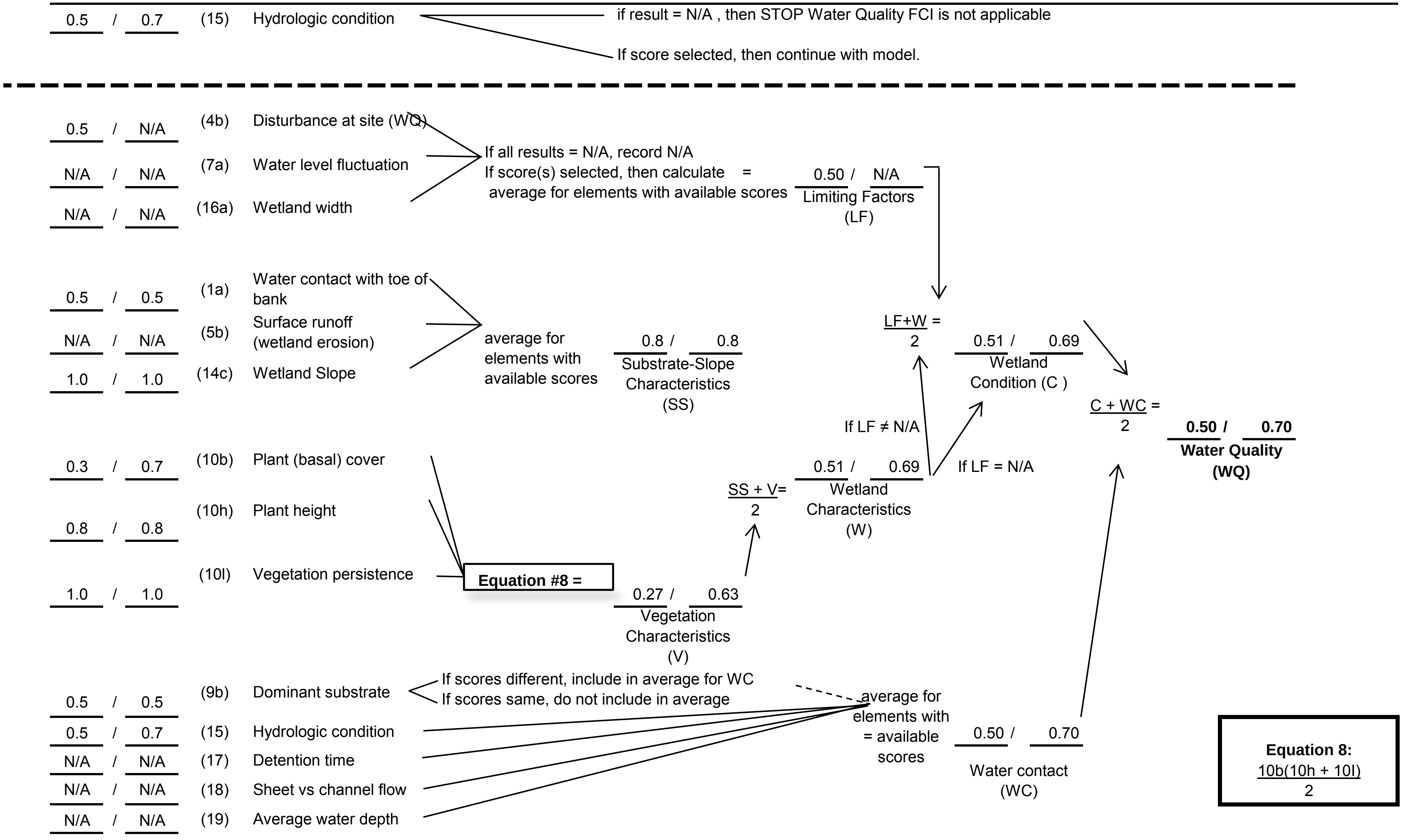
$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Water Quality

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20



0.5 / 0.7 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

0.5 / N/A (4b) Disturbance at site (WQ)

N/A / N/A (7a) Water level fluctuation

N/A / N/A (16a) Wetland width

If all results = N/A, record N/A

If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

0.5 / 0.5 (1a) Water contact with toe of bank

N/A / N/A (5b) Surface runoff (wetland erosion)

1.0 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.8 / 0.8 Substrate-Slope Characteristics (SS)

0.3 / 0.7 (10b) Plant (basal) cover

0.8 / 0.8 (10h) Plant height

1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

0.27 / 0.63 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.51 / 0.69 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

0.51 / 0.69 Wetland Condition (C )

If LF = N/A

$\frac{C + WC}{2}$ =

**0.50 / 0.70 Water Quality (WQ)**

0.5 / 0.5 (9b) Dominant substrate

If scores different, include in average for WC

If scores same, do not include in average

0.5 / 0.7 (15) Hydrologic condition

N/A / N/A (17) Detention time

N/A / N/A (18) Sheet vs channel flow

N/A / N/A (19) Average water depth

average for elements with = available scores

0.50 / 0.70 Water contact (WC)

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 0.1 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.23 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.30 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.4 Physical Features

average for available scores = 0.41 / 0.48 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.48**
**Wildlife FCI**

`

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calclation of Fish (Tidal)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| N/A | N/A | (24) | Obstruction to fish passage |
|---|---|---|---|

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

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| | | | | |
|---|---|---|---|---|
| N/A | / | N/A | (1b) | Shoreline bank stability |
| 0.5 | / | N/A | (4a) | Disturbance at site (SS) |
| N/A | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| | | | | |
|---|---|---|---|---|
| 0.2 | / | 0.2 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 0.5 | (9c) | Substrate suitabuility for fish |
| 0.7 | / | 0.7 | (10d) | Plant (basal) cover |
| 0.1 | / | 0.1 | (10f) | Rooted vascular aquatic beds |
| 0.5 | / | 0.5 | (21b) | Shape of wetland/water edge |
| 0.5 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.1 / 0.1 Food/Cover

average for avaliable scores = **0.37 / 0.31**

**Fish (Tidal) FCI**

**x= 0.2**

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | | | |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| 1.0 / 1.0 | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.75 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

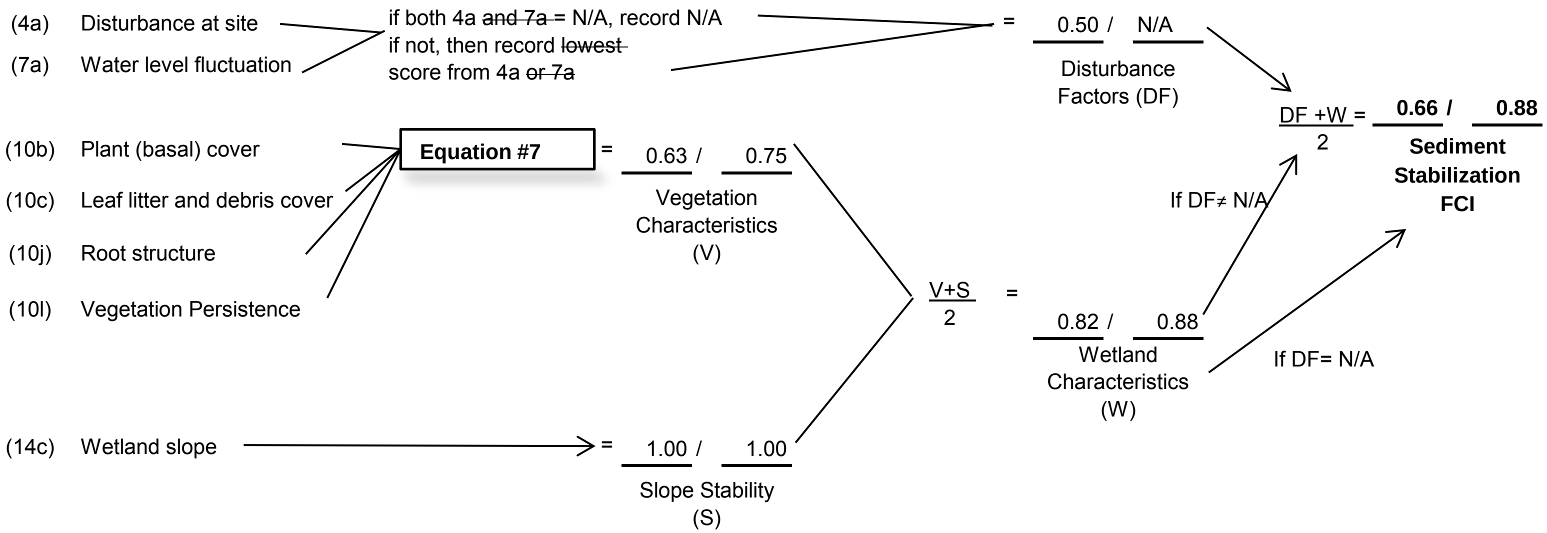
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: UAA baseline / Planned Upland Alternative C - Yr 20 |
| 0.5 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |



if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.50 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.75
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.88
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.80 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.32 / 0.56 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.41 / 0.79 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.79**
**Wildlife FCI**

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between WAA# baseline and wetland # Alternative C Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.54 | 2.81 | 1.52 | 0.62 | 1 | 1.52 | 0.62 | 2.44 | 0.56 | 2.67 | 1.49 | |
| SS | 0.62 | 2.81 | 1.74 | 0.68 | 1 | 1.74 | 0.68 | 2.55 | 0.62 | 2.67 | 1.66 | |
| WQ | 0.50 | 2.81 | 1.41 | 0.53 | 1 | 1.41 | 0.53 | 2.68 | 0.61 | 2.67 | 1.63 | ✓ |
| WL | 0.41 | 2.81 | 1.15 | 0.45 | 1 | 1.15 | 0.45 | 2.55 | 0.48 | 2.67 | 1.28 | ✓ |
| FT | 0.37 | 2.81 | 1.04 | 0.41 | 1 | 1.04 | 0.41 | 2.55 | 0.31 | 2.67 | 0.83 | |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Comparison between UAA# Baseline and upland # Alternative C Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 8.14 | 5.13 | 0.72 | 1 | 5.13 | 0.72 | 7.08 | 0.63 | 8.28 | 5.22 | ✓ |
| SS | 0.66 | 8.14 | 5.37 | 0.73 | 1 | 5.37 | 0.73 | 7.40 | 0.88 | 8.28 | 7.29 | ✓ |
| WL | 0.41 | 8.14 | 3.34 | 0.45 | 1 | 3.34 | 0.45 | 7.40 | 0.76 | 8.28 | 6.29 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.50

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.5 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 0.67

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.56 / 0.56

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.61

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.54 / 0.56**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.3 / | 0.3 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.47 / 0.47 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.74 / 0.74 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.62 /** **0.62**

**Sediment Stabilization FCI**

Equation #7:

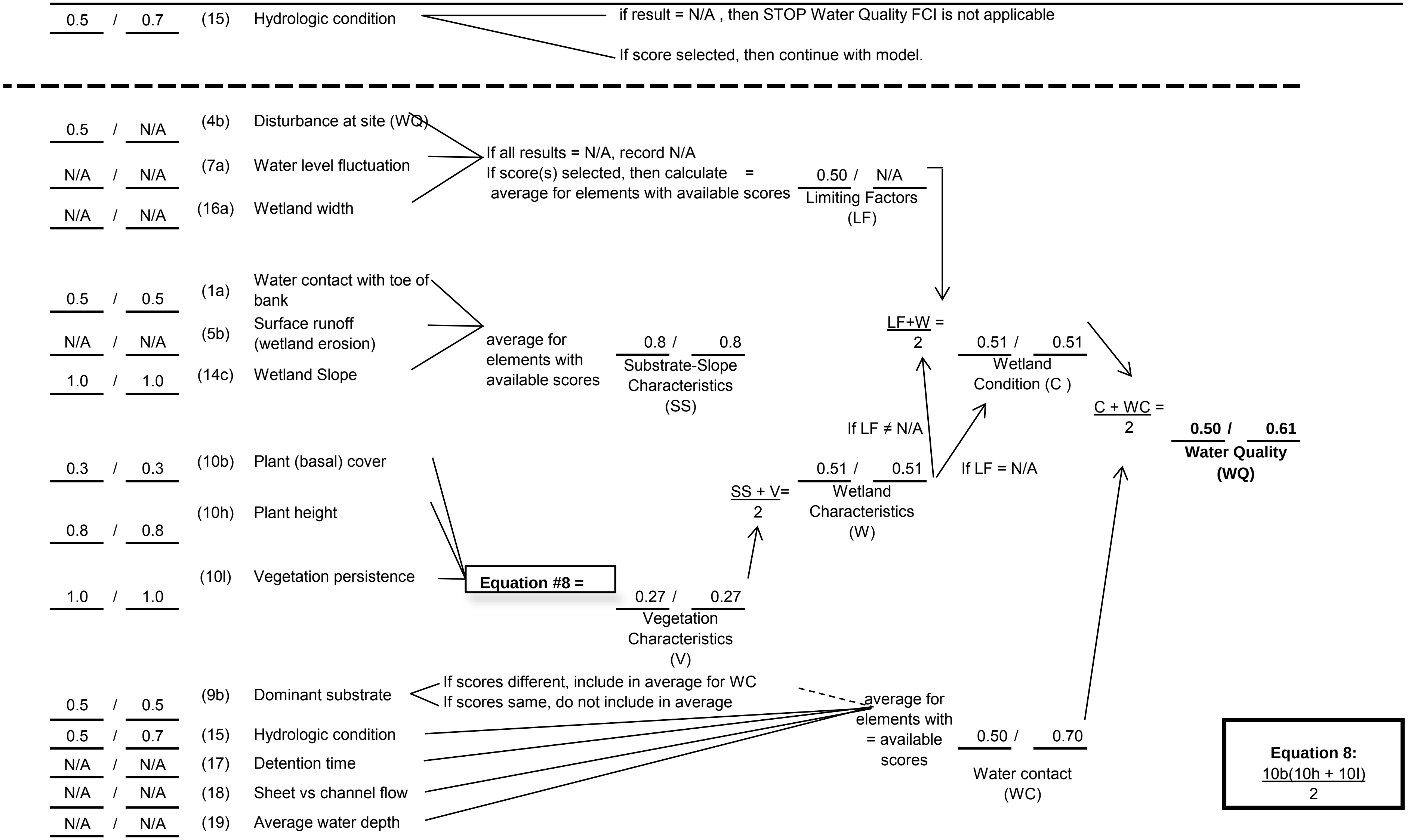
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50



0.5 / 0.7 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

0.5 / N/A (4b) Disturbance at site (WQ)

N/A / N/A (7a) Water level fluctuation

N/A / N/A (16a) Wetland width

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

0.5 / 0.5 (1a) Water contact with toe of bank

N/A / N/A (5b) Surface runoff (wetland erosion)

1.0 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.8 / 0.8 Substrate-Slope Characteristics (SS)

0.3 / 0.3 (10b) Plant (basal) cover

0.8 / 0.8 (10h) Plant height

1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

0.27 / 0.27 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.51 / 0.51 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.51 / 0.51 Wetland Condition (C )

0.5 / 0.5 (9b) Dominant substrate

If scores different, include in average for WC
If scores same, do not include in average

0.5 / 0.7 (15) Hydrologic condition

N/A / N/A (17) Detention time

N/A / N/A (18) Sheet vs channel flow

N/A / N/A (19) Average water depth

average for elements with = available scores

0.50 / 0.70 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.50 / 0.61 Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.1 / 0.1 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.73 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.23 / 0.40 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = 0.30 / 0.30 Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.40 / 0.4 Physical Features

average for available scores = 0.41 / 0.48 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.48**
**Wildlife FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50 |
|---|---|---|---|

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

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| | | | | |
|---|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability | average for elements with available scores | = 0.5 / N/A Limiting Factors |
| 0.5 / N/A | (4a) | Disturbance at site (SS) | | |
| N/A / N/A | (4d) | Disturbance in channel/open water | | |
| N/A / N/A | (7b) | Most permanent hydroperiod | | |
| N/A / N/A | (24) | Obstruction to fish passage | | |
| 0.2 / 0.2 | (7c) | Spatially dominant hydroperiod | **Equation #9** | = 0.1 / 0.1 Food/Cover |
| 0.5 / 0.5 | (9c) | Substrate suitabuility for fish | | |
| 0.7 / 0.7 | (10d) | Plant (basal) cover | | |
| 0.1 / 0.1 | (10f) | Rooted vascular aquatic beds | | |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge | | |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors | | |
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue | |
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | average for elements with available scores | = 0.5 / 0.5 Water Quality (WQ) |
| INA / INA | (20d) | Dissolved Oxygen | | |
| INA / INA | (20f) | Maximum water temperature | | |

average for avaliable scores = **0.37 / 0.31**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.75 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.63 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | UAA baseline / Planned Upland Alternative C - Yr 50 | | |
| 0.5 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.50 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.75 Vegetation Characteristics (V)

(14c) = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.88 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.90
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.39
Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00
Physical Features

average for available scores = 0.41 / 0.76
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.41 / 0.76**
**Wildlife FCI**

# Site 900 - Dundee Island Park/Pulaski Park

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 900. Dundee Island Park/ Pulaski Park

Comparison between WAA# baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.52 | 0.47 | 0.24 | 0.60 | 1 | 0.24 | 0.60 | 0.41 | 0.53 | 0.47 | 0.25 | ✓ |
| SS | 0.46 | 0.47 | 0.22 | 0.51 | 1 | 0.22 | 0.51 | 0.43 | 0.62 | 0.47 | 0.29 | ✓ |
| WQ | 0.45 | 0.47 | 0.21 | 0.47 | 1 | 0.21 | 0.47 | 0.45 | 0.50 | 0.47 | 0.24 | ✓ |
| WL | 0.22 | 0.47 | 0.10 | 0.24 | 1 | 0.10 | 0.24 | 0.43 | 0.29 | 0.47 | 0.14 | ✓ |
| FT | 0.38 | 0.47 | 0.18 | 0.42 | 1 | 0.18 | 0.42 | 0.43 | 0.37 | 0.47 | 0.17 | |
| UH | N/A | | | N/A | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 900. Dundee Island Park/ Pulaski Park

Comparison between UAA# baseline and upland # Alternative A Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 6.25 | 2.25 | 0.41 | 1 | 2.25 | 0.41 | 5.43 | 0.75 | 6.25 | 4.69 | ✓ |
| SS | 0.37 | 6.25 | 2.31 | 0.41 | 1 | 2.31 | 0.41 | 5.68 | 0.62 | 6.25 | 3.88 | ✓ |
| WL | 0.17 | 6.25 | 1.06 | 0.19 | 1 | 1.06 | 0.19 | 5.68 | 0.49 | 6.25 | 3.06 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 0.1 | 0.1 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | 0.1 | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.5 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.50

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.53 / 0.53

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.58 / 0.58

Vegetation influences on Rate of Erosion

average for available scores = 0.54 / 0.56

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.52 /** **0.53**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

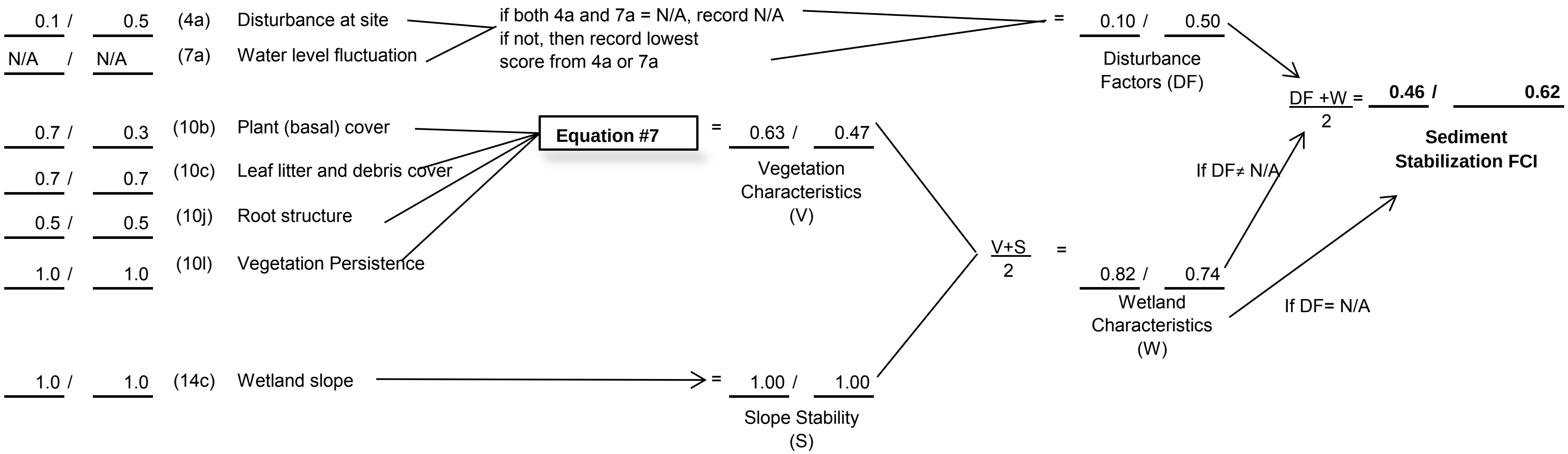
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50 Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.47 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.74 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.46 /** **0.62**

**Sediment Stabilization FCI**

Equation #7:

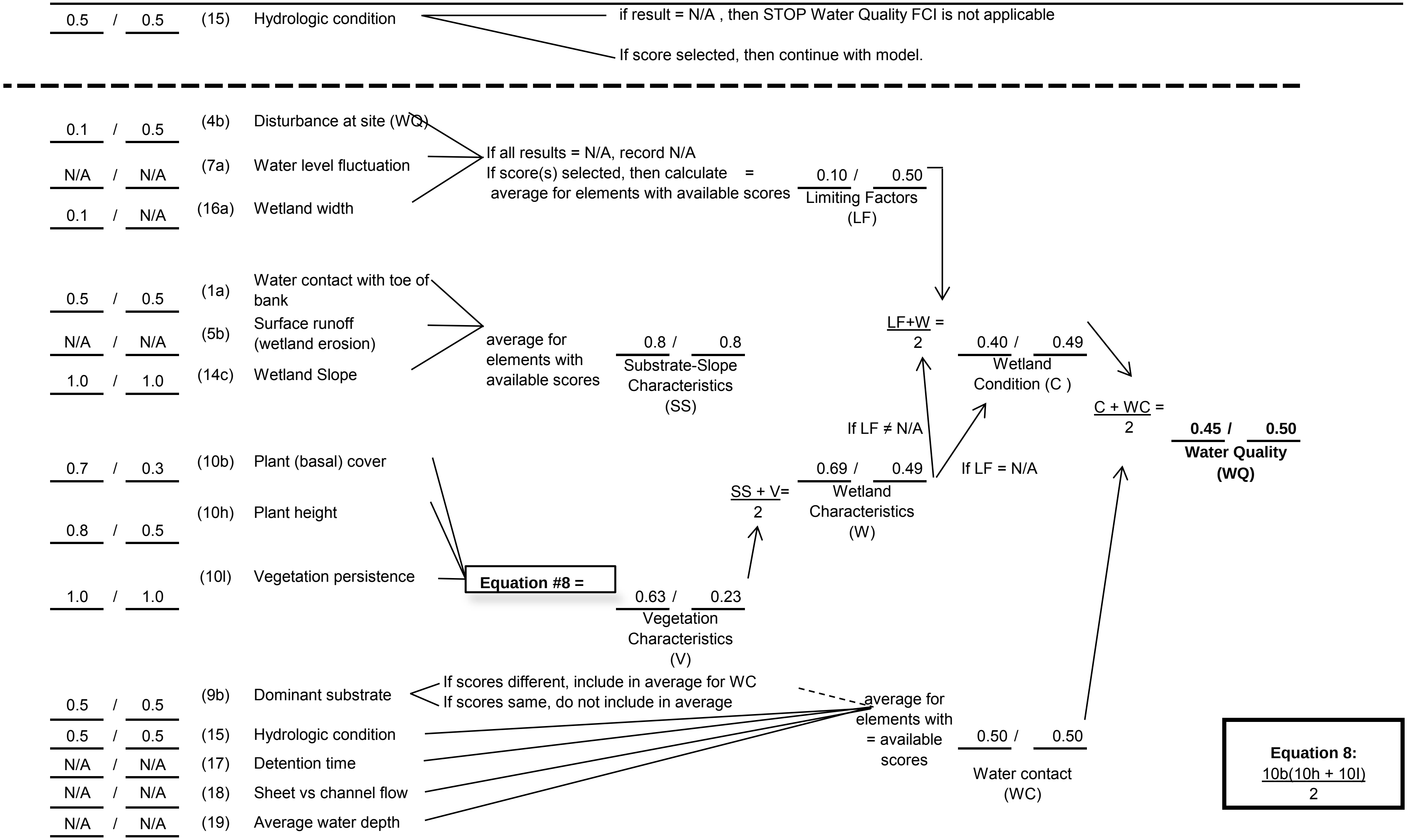
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (15) | Hydrologic condition |
| 0.1 | 0.5 | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.1 | N/A | (16a) | Wetland width |
| 0.5 | 0.5 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |
| 0.7 | 0.3 | (10b) | Plant (basal) cover |
| 0.8 | 0.5 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 0.5 | (9b) | Dominant substrate |
| 0.5 | 0.5 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |



(15) Hydrologic condition: if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

(4b), (7a), (16a): If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / 0.50 Limiting Factors (LF)

(1a), (5b), (14c): average for elements with available scores

0.8 / 0.8 Substrate-Slope Characteristics (SS)

(10b), (10h), (10l): **Equation #8 =**

0.63 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.69 / 0.49 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ =

If LF = N/A

0.40 / 0.49 Wetland Condition (C )

(9b) Dominant substrate: If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 0.50 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.45 / 0.50**

**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| 0.1 / 0.1 | (16b) | Wetland size |
| 0.5 / 0.5 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.60 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.40 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.40 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.35 / 0.48 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.29**
**Wildlife FCI**

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.4 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 1.0 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 0.3 | (10d) | Plant (basal) cover |
| 0.1 / 0.1 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.1 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.2 Food/Cover

| Selected Scores | (#) | Element | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | |
| INA / INA | (20d) | Dissolved Oxygen | |
| INA / INA | (20f) | Maximum water temperature | |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.38 / 0.37**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = N/A / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.50 / N/A Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.23 / 0.75 Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.75** **Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.27 / 0.47
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.64 / 0.74
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.37 / 0.62**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.3 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.1 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.53 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.10 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.25 / 0.49 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.17 / 0.49**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 900. Dundee Island Park/ Pulaski Park

Comparison between WAA# baseline and wetland # Alternative A Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.52 | 0.47 | 0.24 | 0.60 | 1 | 0.24 | 0.60 | 0.41 | 0.88 | 0.54 | 0.48 | ✓ |
| SS | 0.46 | 0.47 | 0.22 | 0.51 | 1 | 0.22 | 0.51 | 0.43 | 0.89 | 0.54 | 0.48 | ✓ |
| WQ | 0.45 | 0.47 | 0.21 | 0.47 | 1 | 0.21 | 0.47 | 0.45 | 0.81 | 0.54 | 0.44 | ✓ |
| WL | 0.22 | 0.47 | 0.10 | 0.24 | 1 | 0.10 | 0.24 | 0.43 | 0.35 | 0.54 | 0.19 | ✓ |
| FT | 0.38 | 0.47 | 0.18 | 0.42 | 1 | 0.18 | 0.42 | 0.43 | 0.42 | 0.54 | 0.23 | ✓ |
| UH | N/A | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 900. Dundee Island Park/ Pulaski Park

Comparison between UAA# baseline and upland # Alternative A Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 6.25 | 2.25 | 0.41 | 1 | 2.25 | 0.41 | 5.43 | 0.90 | 6.18 | 5.56 | ✓ |
| SS | 0.37 | 6.25 | 2.31 | 0.41 | 1 | 2.31 | 0.41 | 5.68 | 0.82 | 6.18 | 5.07 | ✓ |
| WL | 0.17 | 6.25 | 1.06 | 0.19 | 1 | 1.06 | 0.19 | 5.68 | 0.74 | 6.18 | 4.57 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 0.1 | 0.1 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | 0.1 | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 1.0 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.53 / 0.55

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.58 / 0.95

Vegetation influences on Rate of Erosion

average for available scores = 0.54 / 0.75

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.52 / 0.88**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

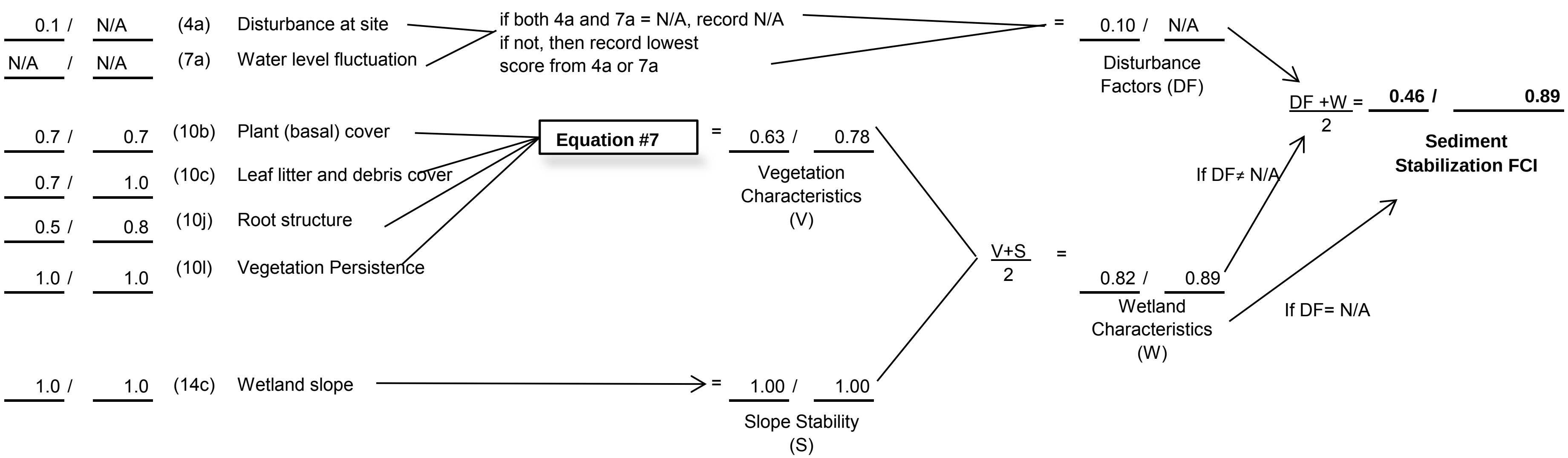
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Sediment Stabilization

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | |

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20



| | | | |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.78
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.89
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.46 /** **0.89**

**Sediment Stabilization FCI**

Equation #7:

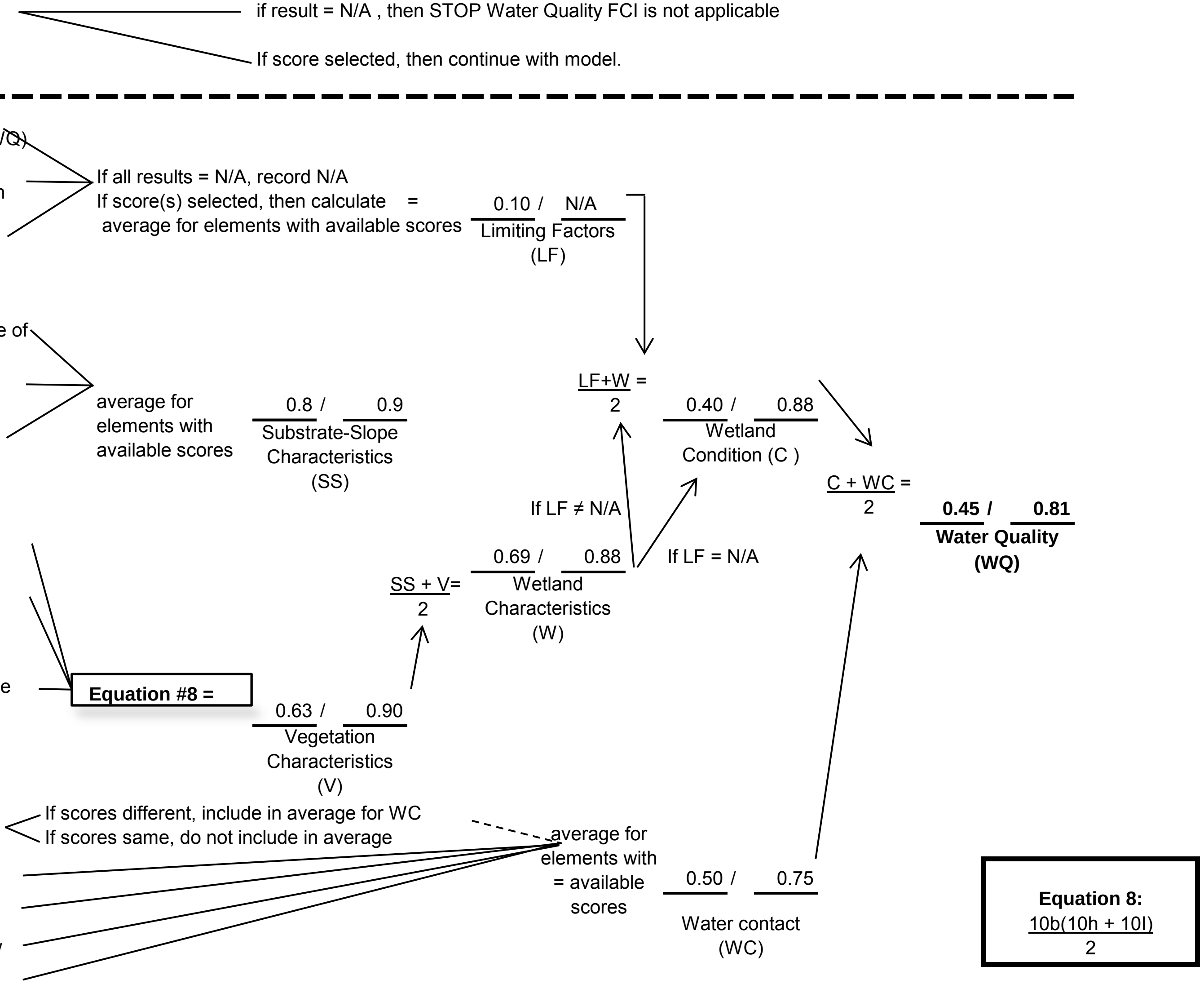
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (15) | Hydrologic condition |
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| 0.1 / N/A | (16a) | Wetland width |
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 0.8 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 0.5 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| 0.1 / 0.1 | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.40 / 0.73 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.40 Physical Features

average for available scores = 0.35 / 0.61 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.35**
**Wildlife FCI**

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20 |

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

→ if result = 0.1, STOP. There is no potential for providing tidal fish habitat

→ if result ≠ 0.1 of NA, then continue with model

---

| | | | |
|---|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.4 / N/A

Limiting Factors

| | | |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 1.0 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.1 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.3

Food/Cover

average for avaliable scores = **0.38 / 0.42**

**Fish (Tidal) FCI**

| | | |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

→ If score available, record score for WQ

→ If information not available, continue

| | | |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5

Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / 1.0 | (36) | Scientific research site |

average for elements with available scores = N/A / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.23 / 0.90

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.90**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.90**

**Shoreline Bank Erosion Control FCI**

[redacted]

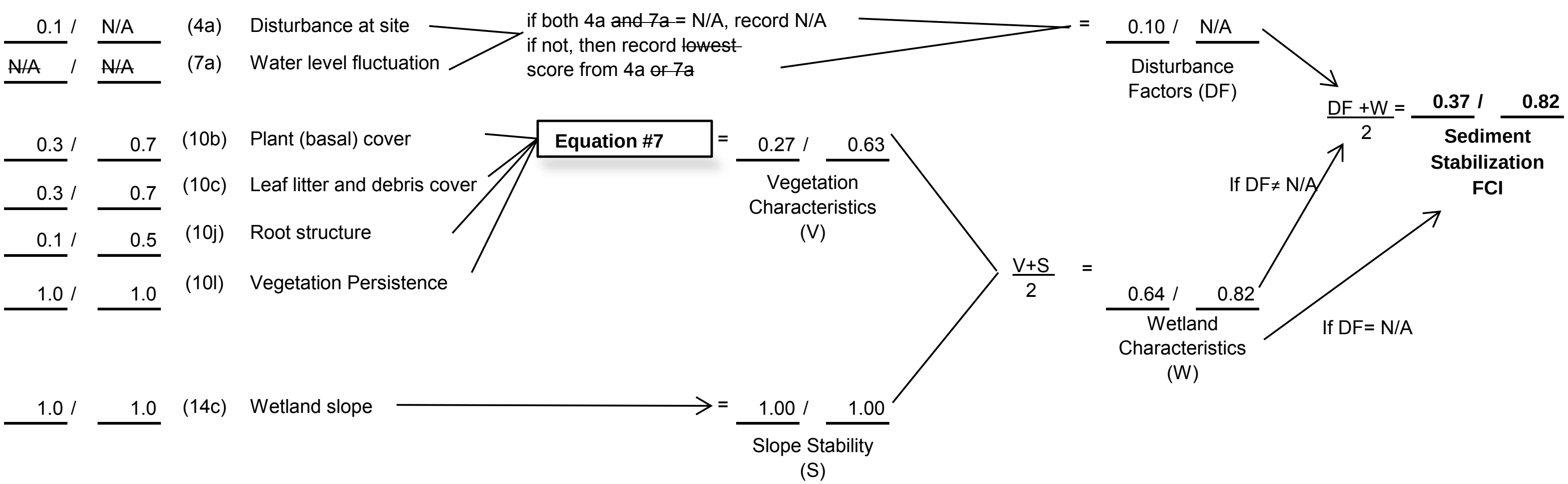
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.27 / 0.63
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.64 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.37 / 0.82**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE:  Site 900. Dundee Island Park/ Pulaski Park

Calculation of Wildlife (Upland)

Comparison: UAA baseline /  Planned Upland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.3 | 0.5 | (11a) | Layers |
| 0.3 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.2 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.1 | 0.5 | (12c) | Cover type interspersion |
| N/A | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.83 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.10 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.25 / 0.74 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.17 / 0.74**
**Wildlife FCI**

### Table A.1.
### Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 900. Dundee Island Park/ Pulaski Park

Comparison between WAA# baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.52 | 0.47 | 0.24 | 0.60 | 1 | 0.24 | 0.60 | 0.41 | 0.73 | 0.51 | 0.38 | ✓ |
| SS | 0.46 | 0.47 | 0.22 | 0.51 | 1 | 0.22 | 0.51 | 0.43 | 0.95 | 0.51 | 0.49 | ✓ |
| WQ | 0.45 | 0.47 | 0.21 | 0.47 | 1 | 0.21 | 0.47 | 0.45 | 0.81 | 0.51 | 0.42 | ✓ |
| WL | 0.22 | 0.47 | 0.10 | 0.24 | 1 | 0.10 | 0.24 | 0.43 | 0.38 | 0.51 | 0.20 | ✓ |
| FT | 0.38 | 0.47 | 0.18 | 0.42 | 1 | 0.18 | 0.42 | 0.43 | 0.44 | 0.51 | 0.23 | ✓ |
| UH | N/A | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

**Table A.1.**
**Comparison of UAA and planned upland: calculations of FCIs and FCUs**

Project Title: Site 900. Dundee Island Park/ Pulaski Park

Comparison between UAA# baseline and upland # Alternative A Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 6.25 | 2.25 | 0.41 | 1 | 2.25 | 0.41 | 5.43 | 0.70 | 6.21 | 4.34 | ✓ |
| SS | 0.37 | 6.25 | 2.31 | 0.41 | 1 | 2.31 | 0.41 | 5.68 | 0.88 | 6.21 | 5.46 | ✓ |
| WL | 0.17 | 6.25 | 1.06 | 0.19 | 1 | 1.06 | 0.19 | 5.68 | 0.77 | 6.21 | 4.78 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 0.1 | 0.1 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | 0.1 | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 1.0 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.53 / 0.55

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.58 / 0.95

Vegetation influences on Rate of Erosion

average for available scores = 0.54 / 0.75

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.52 / 0.73**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.46 / 0.95**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| 0.1 / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / N/A Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.8 / 0.9 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 0.8 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.63 / 0.90 Vegetation Characteristics (V)

SS + V= / 2

0.69 / 0.88 Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.40 / 0.88 Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 0.5 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 0.75 Water contact (WC)

C + WC = / 2

**0.45 / 0.81 Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| 0.1 / 0.1 | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.97 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.40 / 0.73 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.40 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.35 / 0.65 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.38**
**Wildlife FCI**

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50 |
|---|---|---|---|

Site Suitability For Planned Wetland:

| N/A N/A | (24) | Obstruction to fish passage |
|---|---|---|

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.4 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 1.0 / 1.0 | (9c) | Substrate suitabuility for fish |
| 0.7 / 1.0 | (10d) | Plant (basal) cover |
| 0.1 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.4 Food/Cover

average for avaliable scores = **0.38 / 0.44**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | 1.0 | (36) | Scientific research site |

average for elements with available scores = N/A / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.90

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.70**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.70**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.27 / 0.75
Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.64 / 0.88
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.37 /** **0.88**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 900. Dundee Island Park/ Pulaski Park

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.1 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.53 / 0.90 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.10 / 0.40 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.25 / 0.77 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.17 / 0.77**
**Wildlife FCI**

# Site 887- Essex County Branch Brook Park

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.82 | 53.33 | 43.73 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.66 | 53.33 | 35.20 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.66 | 53.33 | 35.20 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.32 | 53.33 | 17.07 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.36 | 53.33 | 19.20 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative A Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 154.90 | 154.90 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 154.90 | 154.90 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.41 | 154.90 | 63.51 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | 0.5 | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.0

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 0.67

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.58 / 0.6

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.6

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 / 0.82**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A Yr 2

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.50 / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.63
Vegetation Characteristics (V)

(14c) = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 /** **0.66**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.3 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / 0.5 | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.85 / 0.83 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 0.8 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.63 / 0.63 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.74 / 0.73 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.62 / 0.62 Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.1 / 0.3 | (15) | Hydrologic condition |
| INA / INA | (17) | Detention time |
| 0.1 / 0.5 | (18) | Sheet vs channel flow |
| 1.0 / 1.0 | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.43 / 0.70 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.52 / 0.66**
**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A Yr 2

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | 0.1 | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.9 | 0.9 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.3 | 0.3 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| N/A | N/A | (12d) | Undesirable species |
| 0.5 | 1.0 | (13a) | % open water |
| 0.5 | 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 | 0.1 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| 0.1 | 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A<br>If any score = 0.1, record 0.1 = N/A / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.43 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

average for available scores = 0.47 / 0.54 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.47 / 0.32**

**Wildlife FCI**

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PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative A Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (24) | Obstruction to fish passage |
| N/A / N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (1b) | Shoreline bank stability |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) |
| N/A / 0.5 | (4d) | Disturbance in channel/open water |
| 0.1 / N/A | (16c) | Fish habitat size |
| 0.5 / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (10m) | Vegetative overhang |
| 1.0 / 1.0 | (10o) | Plant biomass |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.3 / 0.3 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.48 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 0.1 | (27a) | Spawning substrate |
| N/A N/A | (27b) | Spawning structures |
| N/A N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ
If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contam |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20e) | pH |
| INA / INA | (20f) | Maximum water temperature |
| INA / INA | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.36** **Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| 1.0 / 1.0 | (32) | Historical or archaeological significance |
| 1.0 / 1.0 | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| 1.0 / 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 / 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A Yr 2

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = N/A / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 1.0 / 1.0

Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: UAA baseline / Planned Upland Alternative A Yr 2 |
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= N/A / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

(14c) = 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.0 / 1.0**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.5 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.73 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.38 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

average for available scores = 0.34 / 0.41 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.41**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title:__887. Essex County Branch Brook______

Park Comparison between WAA# baseline and ____Alternative A Year 20__

upland #

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.97 | 53.33 | 51.73 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.95 | 53.33 | 50.66 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.89 | 53.33 | 47.46 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.82 | 53.33 | 43.73 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.48 | 53.33 | 25.60 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

**Table A.1.**
**Comparison of UAA and planned upland: calculations of FCIs and FCUs**

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative A Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 154.90 | 154.90 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 154.90 | 154.90 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.77 | 154.90 | 119.27 | ✓ |

| | | |
|---|---|---|
| *FCUs | = | FCU x AREA |
| **Target FCI | = | *goal* established by decision makers |
| R | = | multiplying factor established by decision makers |
| Target FCUs | = | FCU UAA x R (i.e., planned upland goal) |
| Predicted FCI | = | FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI) |
| Minimum Area | = | Target FCUs/Predicted FCI |

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

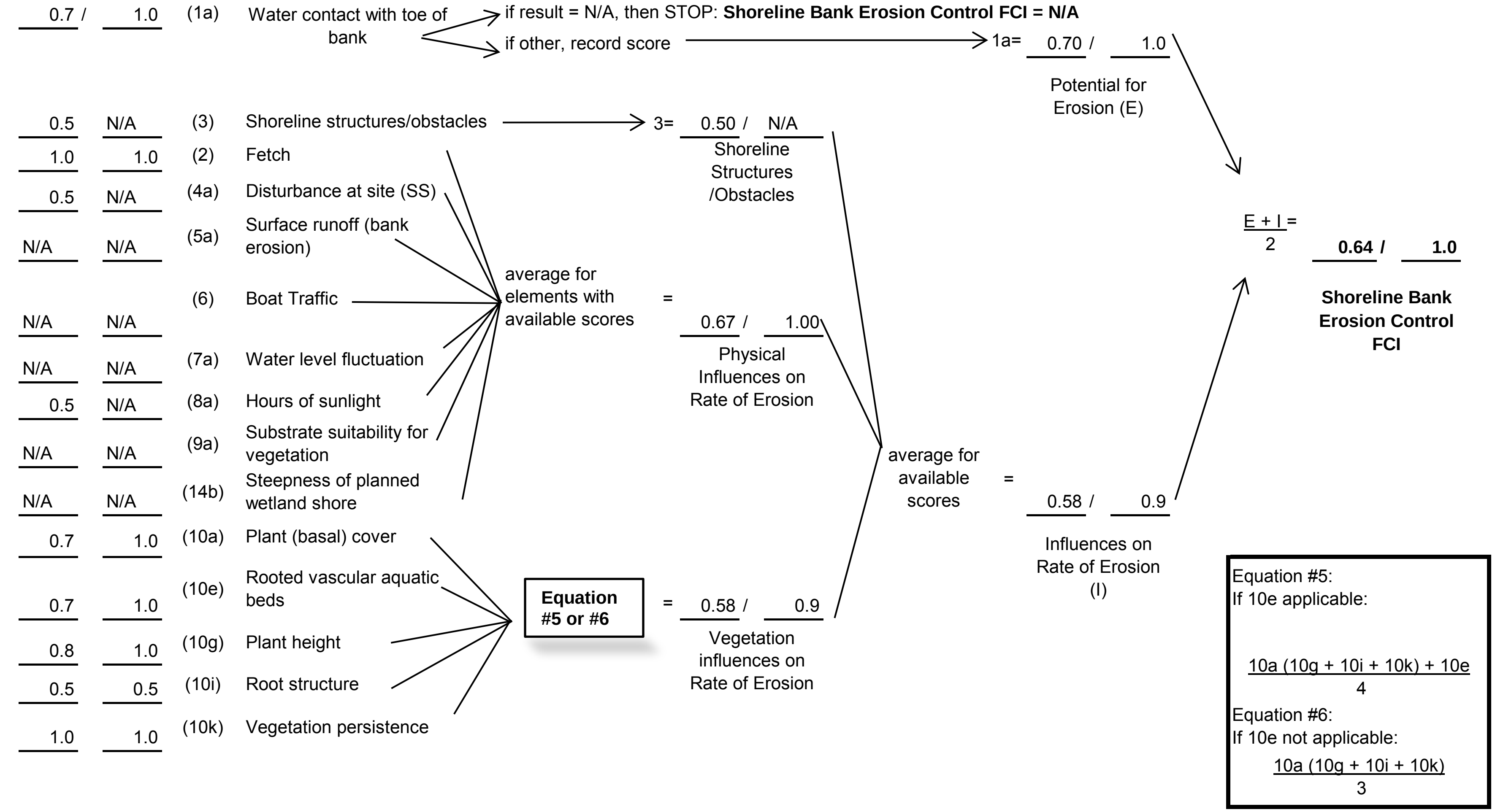
Comparison: WAA baseline / Planned Wetland Alternative A yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.0

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 1.00

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.58 / 0.9

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.9

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 /** **1.0**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / N/A Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.90 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 /** **0.95**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.85 / 1.00 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 0.8 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.63 / 0.90 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.74 / 0.95 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.62 / 0.95 Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.1 / N/A | (15) | Hydrologic condition |
| INA / INA | (17) | Detention time |
| 0.1 / 0.5 | (18) | Sheet vs channel flow |
| 1.0 / 1.0 | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.43 / 0.83 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.52 / 0.89 Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

Project Title: 887. Essex County Branch Brook Park

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.3 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.97
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.77
Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55
Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.47 / 0.82
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.47 / 0.82**
**Wildlife FCI**

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PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative A yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage |
| N/A / | N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| 0.1 / | N/A | (16c) | Fish habitat size |
| 0.5 / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (10m) | Vegetative overhang |
| 1.0 / | 1.0 | (10o) | Plant biomass |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.3 / | 0.8 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.83 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (27a) | Spawning substrate |
| N/A | N/A | (27b) | Spawning structures |
| N/A | N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 1.0 | (20c) | Nutrient/sediment/contam |
| INA / | INA | (20d) | Dissolved Oxygen |
| INA / | INA | (20e) | pH |
| INA / | INA | (20f) | Maximum water temperature |
| INA / | INA | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.48**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (29) | Endangered species |
| N/A | N/A | (30) | Rarity |
| N/A | N/A | (31) | Unique features |
| 1.0 | 1.0 | (32) | Historical or archaeological significance |
| 1.0 | 1.0 | (33) | Natural landmark |
| N/A | N/A | (34) | Connected to Wild and Scenic River |
| 1.0 | 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 1.0
Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | UAA baseline / Planned Upland Alternative A yr 20 | | |
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

= 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.0 / 1.0**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.3 | 0.7 | (11a) | Layers |
| 0.3 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.2 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| N/A | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A; If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.53 / 0.90 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.38 / 0.41 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.34 / 0.77 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.77**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.90 | 50.66 | 45.60 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.88 | 50.66 | 44.58 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.88 | 50.66 | 44.58 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.82 | 50.66 | 41.54 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.52 | 50.66 | 26.35 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative A Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 157.57 | 157.57 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 157.57 | 157.57 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.82 | 157.57 | 129.20 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | 0.5 | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 1.0 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → if other, record score → 1a= 0.70 / 1.0

Potential for Erosion (E)

(3) → 3= 0.50 / 0.5

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.67 / 1.00

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.58 / 0.9

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.8

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 /** **0.9**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

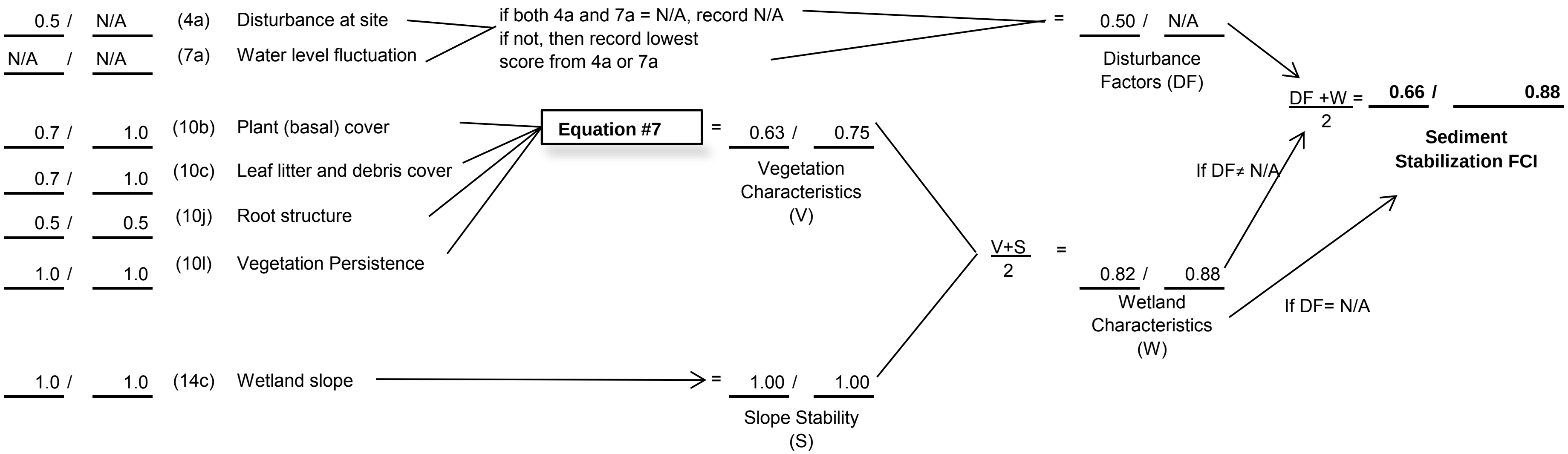
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.50 / N/A Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.75 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.88 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.66 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

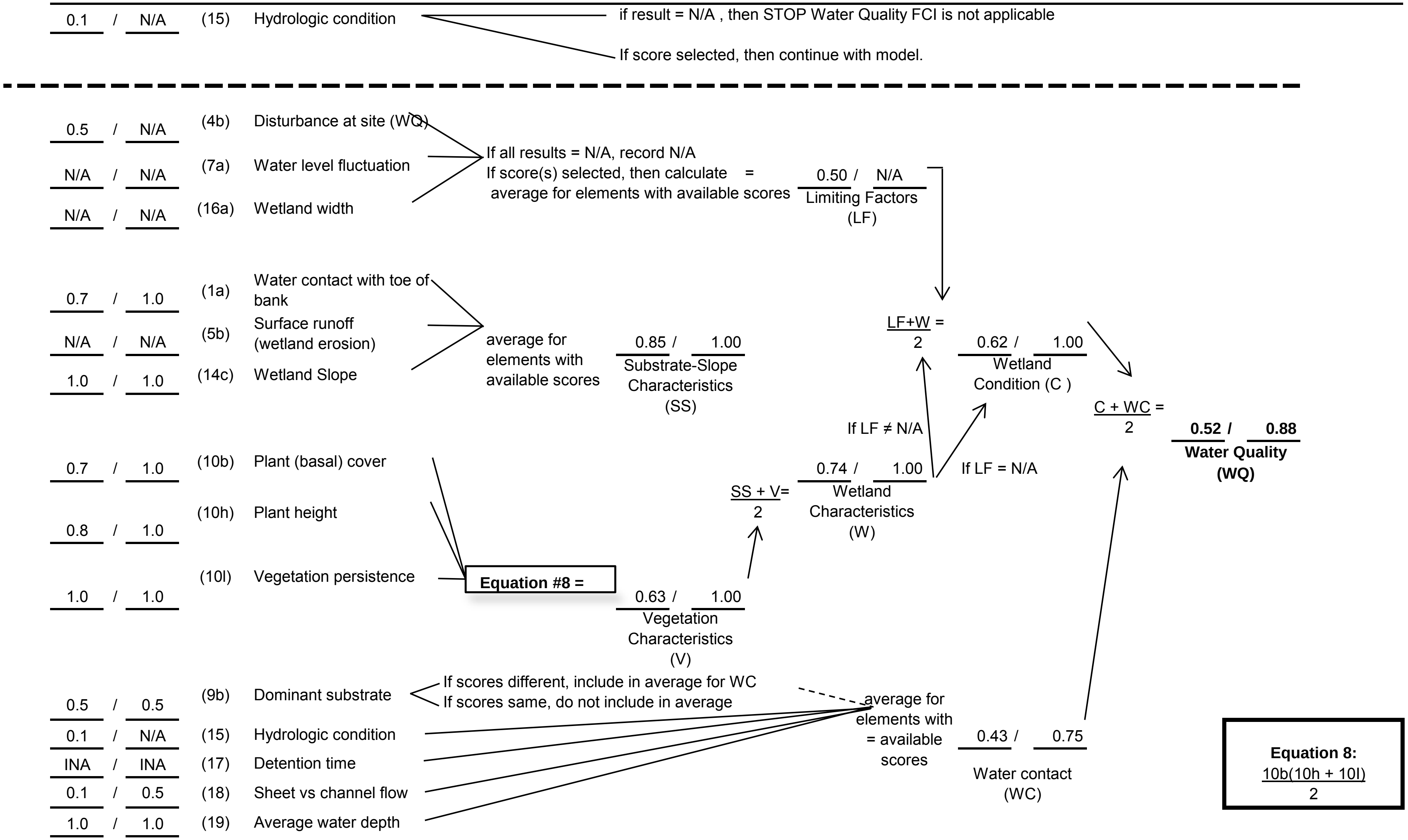
$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



0.1 / N/A (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

0.5 / N/A (4b) Disturbance at site (WQ)

N/A / N/A (7a) Water level fluctuation

N/A / N/A (16a) Wetland width

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A
Limiting Factors (LF)

0.7 / 1.0 (1a) Water contact with toe of bank

N/A / N/A (5b) Surface runoff (wetland erosion)

1.0 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.85 / 1.00
Substrate-Slope Characteristics (SS)

0.7 / 1.0 (10b) Plant (basal) cover

0.8 / 1.0 (10h) Plant height

1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

0.63 / 1.00
Vegetation Characteristics (V)

$\frac{SS + V}{2}$=

0.74 / 1.00
Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.62 / 1.00
Wetland Condition (C )

$\frac{C + WC}{2}$ =

**0.52 / 0.88**
**Water Quality (WQ)**

0.5 / 0.5 (9b) Dominant substrate

If scores different, include in average for WC
If scores same, do not include in average

0.1 / N/A (15) Hydrologic condition

INA / INA (17) Detention time

0.1 / 0.5 (18) Sheet vs channel flow

1.0 / 1.0 (19) Average water depth

average for elements with = available scores

0.43 / 0.75
Water contact (WC)

**Equation 8:**
$$\frac{10b(10h + 10l)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.3 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.97 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.77 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.47 / 0.82 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.47 / 0.82**
**Wildlife FCI**

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage |
| N/A / | N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| 0.1 / | N/A | (16c) | Fish habitat size |
| 0.5 / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 1.0 | (10m) | Vegetative overhang |
| 1.0 / | 1.0 | (10o) | Plant biomass |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.3 / | 0.8 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.95 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (27a) | Spawning substrate |
| N/A | N/A | (27b) | Spawning structures |
| N/A | N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ
If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 1.0 | (20c) | Nutrient/sediment/contam |
| INA / | INA | (20d) | Dissolved Oxygen |
| INA / | INA | (20e) | pH |
| INA / | INA | (20f) | Maximum water temperature |
| INA / | INA | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.52**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (29) | Endangered species |
| N/A | N/A | (30) | Rarity |
| N/A | N/A | (31) | Unique features |
| 1.0 | 1.0 | (32) | Historical or archaeological significance |
| 1.0 | 1.0 | (33) | Natural landmark |
| N/A | N/A | (34) | Connected to Wild and Scenic River |
| 1.0 | 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 1.0
Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**

**Shoreline Bank Erosion Control FCI**

[redacted]

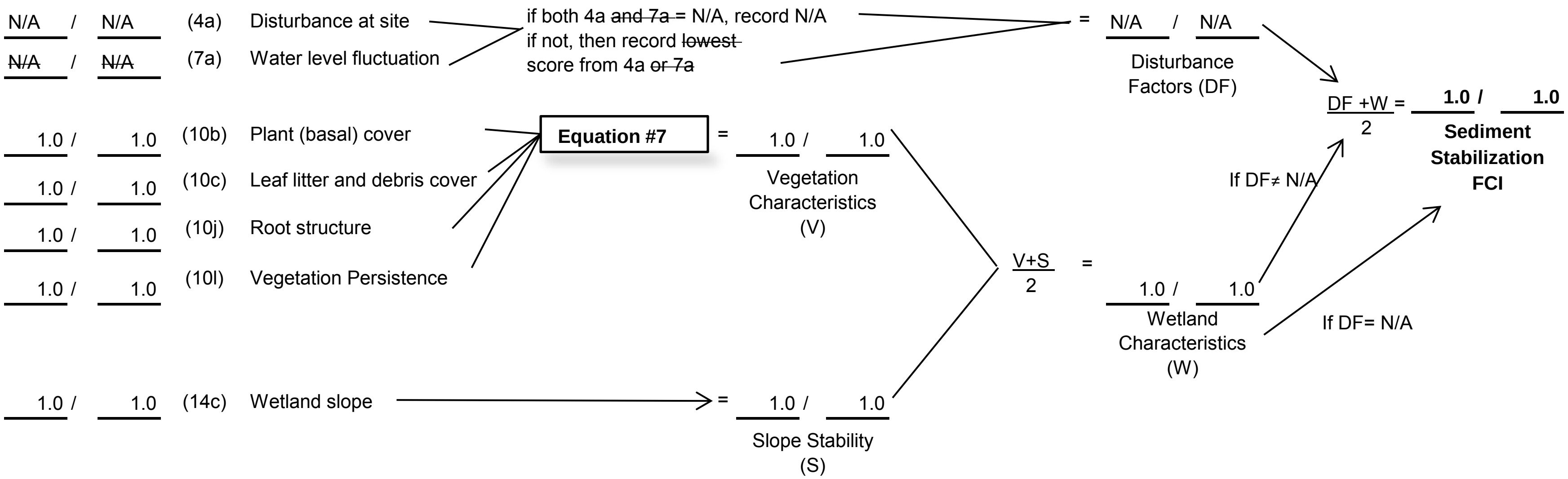
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | UAA baseline / Planned Upland Alternative A - Yr 50 |
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |



if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

= 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.0 /** **1.0**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.90 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.38 / 0.57 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.34 / 0.82 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = **0.22 / 0.82 Wildlife FCI**

If F = NA: HC = **Wildlife FCI**

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and wetland # Alternative B Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.65 | 42.88 | 27.87 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.95 | 42.88 | 40.74 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.57 | 42.88 | 24.44 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.34 | 42.88 | 14.58 | |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.40 | 42.88 | 17.15 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative B Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 165.35 | 165.35 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 165.35 | 165.35 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.44 | 165.35 | 72.75 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | 0.5 | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.5 | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → if other, record score → 1a= 0.70 / 0.7

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.67 / 0.67

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.58 / 0.5

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.6

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 /** **0.6**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 2

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A; if not, then record lowest score from 4a or 7a = 0.50 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.90 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.95 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **0.66 / 0.95**

If DF= N/A: **0.66 / 0.95**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 2

| Selected Scores | (#) | Element | |
|---|---|---|---|
| 0.1 / 0.3 | (15) | Hydrologic condition | if result = N/A , then STOP Water Quality FCI is not applicable<br>If score selected, then continue with model. |

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.85 / 0.85 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.3 | (10b) | Plant (basal) cover |
| 0.8 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.63 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.74 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ =

If LF = N/A:

0.62 / 0.54 Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.1 / 0.3 | (15) | Hydrologic condition |
| INA / INA | (17) | Detention time |
| 0.1 / 0.5 | (18) | Sheet vs channel flow |
| 1.0 / 1.0 | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.43 / 0.60 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.52 / 0.57**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / 0.1 | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.5 | (11a) | Layers |
| 0.7 / 0.3 | (11b) | Condition of Layers |
| 1.0 / N/A | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.40 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55 Physical Features

average for available scores = 0.47 / 0.58 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.47 / 0.34**
**Wildlife FCI**

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (24) | Obstruction to fish passage |
| N/A / N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat
if result ≠ 0.1 of N/A, then continue with model

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (1b) | Shoreline bank stability |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) |
| N/A / 0.5 | (4d) | Disturbance in channel/open water |
| 0.1 / N/A | (16c) | Fish habitat size |
| 0.5 / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (10m) | Vegetative overhang |
| 1.0 / 1.0 | (10o) | Plant biomass |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.3 / 0.3 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.60 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 0.1 | (27a) | Spawning substrate |
| N/A N/A | (27b) | Spawning structures |
| N/A N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ
If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contam |
| INA / #N/A | (20d) | Dissolved Oxygen |
| INA / #N/A | (20e) | pH |
| INA / #N/A | (20f) | Maximum water temperature |
| INA / #N/A | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.40**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| 1.0 / | 1.0 | (32) | Historical or archaeological significance |
| 1.0 / | 1.0 | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| 1.0 / | 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 2

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 1.0

Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4a) | Disturbance at site |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

= 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.0 / 1.0**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.53 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.38 / 0.41 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.34 / 0.44 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.44**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and Wetland # Alternative B Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.97 | 42.88 | 41.59 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 1.00 | 42.88 | 42.88 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.84 | 42.88 | 36.02 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.58 | 42.88 | 24.87 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.43 | 42.88 | 18.44 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative B Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 0.75 | 165.35 | 124.01 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 165.35 | 165.35 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.74 | 165.35 | 122.36 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.0

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.8 | (10g) | Plant height |
| 0.5 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / N/A
Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 1.00
Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.58 / 0.9
Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.9
Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 /** **1.0**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.50 / N/A Disturbance Factors (DF)

**Equation #7** = 0.63 / 1.00 Vegetation Characteristics (V)

Wetland slope → = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.66 /** **1.00**

**Sediment Stabilization FCI**

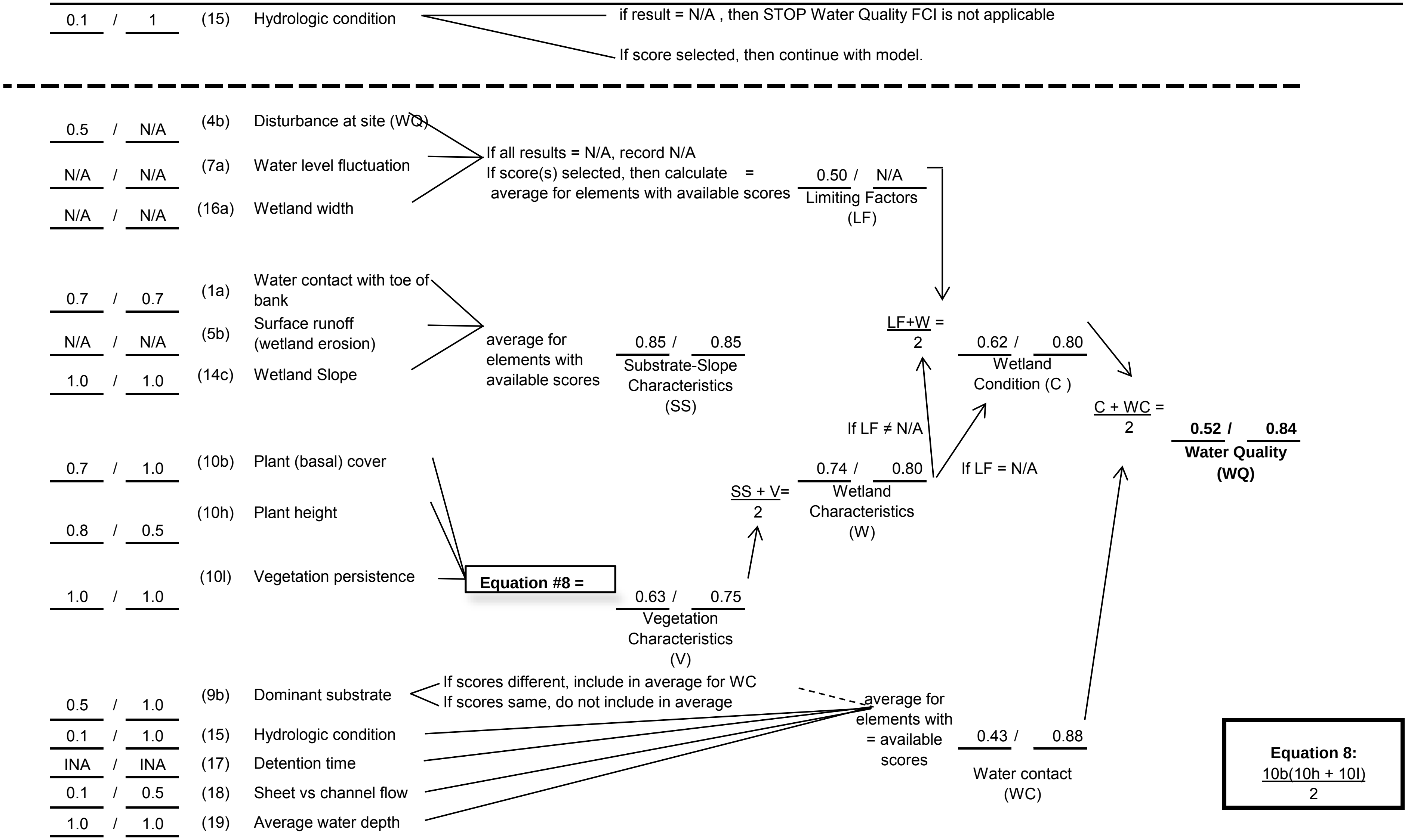
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20



| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1 | (15) | Hydrologic condition |
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.1 / 1.0 | (15) | Hydrologic condition |
| INA / INA | (17) | Detention time |
| 0.1 / 0.5 | (18) | Sheet vs channel flow |
| 1.0 / 1.0 | (19) | Average water depth |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

average for elements with available scores

0.85 / 0.85 Substrate-Slope Characteristics (SS)

**Equation #8 =**

0.63 / 0.75 Vegetation Characteristics (V)

SS + V= / 2

0.74 / 0.80 Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.62 / 0.80 Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.43 / 0.88 Water contact (WC)

C + WC = / 2

**0.52 / 0.84**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.5 | (11a) | Layers |
| 0.7 / 0.3 | (11b) | Condition of Layers |
| 1.0 / N/A | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.40 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.47 / 0.58 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.47 / 0.58**
**Wildlife FCI**

`

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage |
| N/A / | N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| 0.1 / | N/A | (16c) | Fish habitat size |
| 0.5 / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (10m) | Vegetative overhang |
| 1.0 / | 1.0 | (10o) | Plant biomass |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.3 / | 0.3 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.70 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (27a) | Spawning substrate |
| N/A | N/A | (27b) | Spawning structures |
| N/A | N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 1.0 | (20c) | Nutrient/sediment/contam |
| INA / | #N/A | (20d) | Dissolved Oxygen |
| INA / | #N/A | (20e) | pH |
| INA / | #N/A | (20f) | Maximum water temperature |
| INA / | #N/A | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.43**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| 1.0 | / | 1.0 | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| 1.0 | / | 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: UAA baseline / Planned Upland Alternative B - Yr 20 |
| | | | **Site Suitability For Planned Wetland:** |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 0.8
Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 0.8**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 0.8**

**Shoreline Bank Erosion Control FCI**

[redacted]

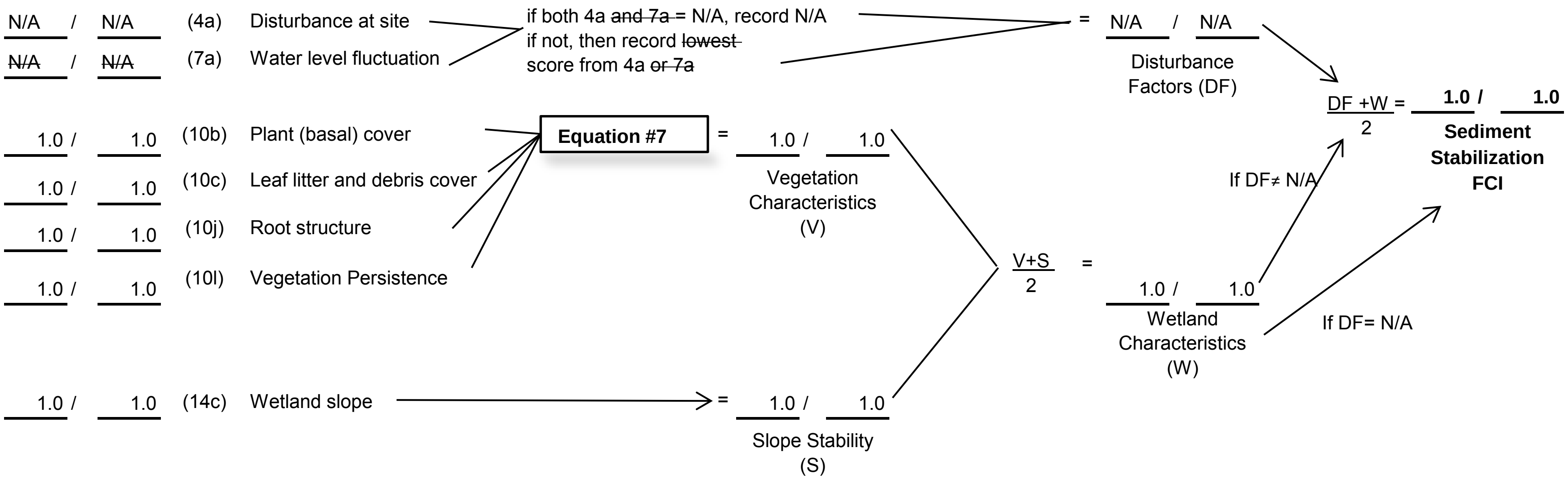
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | UAA baseline / Planned Upland Alternative B - Yr 20 |
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |



if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

= 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.0 / 1.0**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.53 / 0.80 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.38 / 0.41 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.34 / 0.74 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.22 / 0.74**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and wetland # Alternative B Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.97 | 40.74 | 39.51 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 1.00 | 40.74 | 40.74 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.76 | 40.74 | 30.96 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.58 | 40.74 | 23.63 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.43 | 40.74 | 17.52 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

| | | |
|---|---|---|
| *FCUs | = | FCU x AREA |
| **Target FCI | = | *goal* established by decision makers |
| R | = | multiplying factor established by decision makers |
| Target FCUs | = | FCUWAA x R (i.e., planned wetland *goal* ) |
| Predicted FCI | = | FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI) |
| Minimum Area | = | Target FCUs/Predicted FCI |

**Table A.1.**

**Comparison of UAA and planned upland: calculations of FCIs and FCUs**

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative B Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 0.75 | 167.49 | 125.62 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 167.49 | 167.49 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.74 | 167.49 | 123.95 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Site Suitability For Planned Wetland: | | | |
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.8 | (10g) | Plant height |
| 0.5 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(2), (14a): if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.0

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.67 / 1.00

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.58 / 0.9

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.9

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 /** **1.0**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

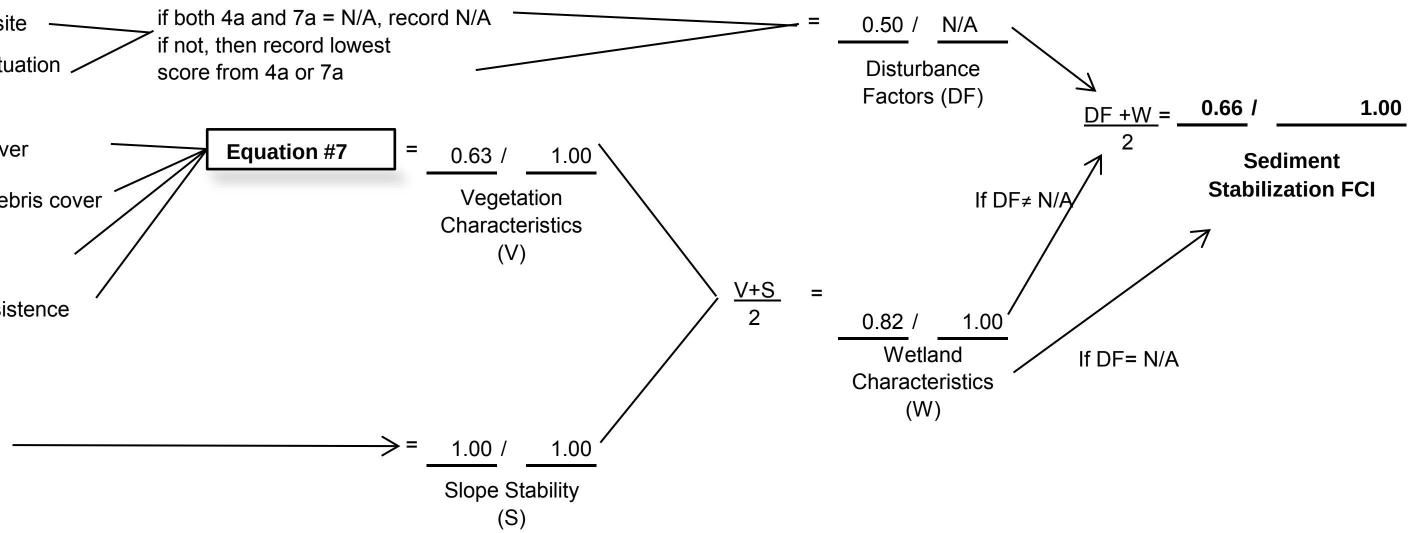
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |



4a, 7a: if both 4a and 7a = N/A, record N/A; if not, then record lowest score from 4a or 7a = 0.50 / N/A Disturbance Factors (DF)

10b, 10c, 10j, 10l: **Equation #7** = 0.63 / 1.00 Vegetation Characteristics (V)

14c: = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 1.00 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **0.66 / 1.00**

If DF= N/A: W

**Sediment Stabilization FCI**

Equation #7:

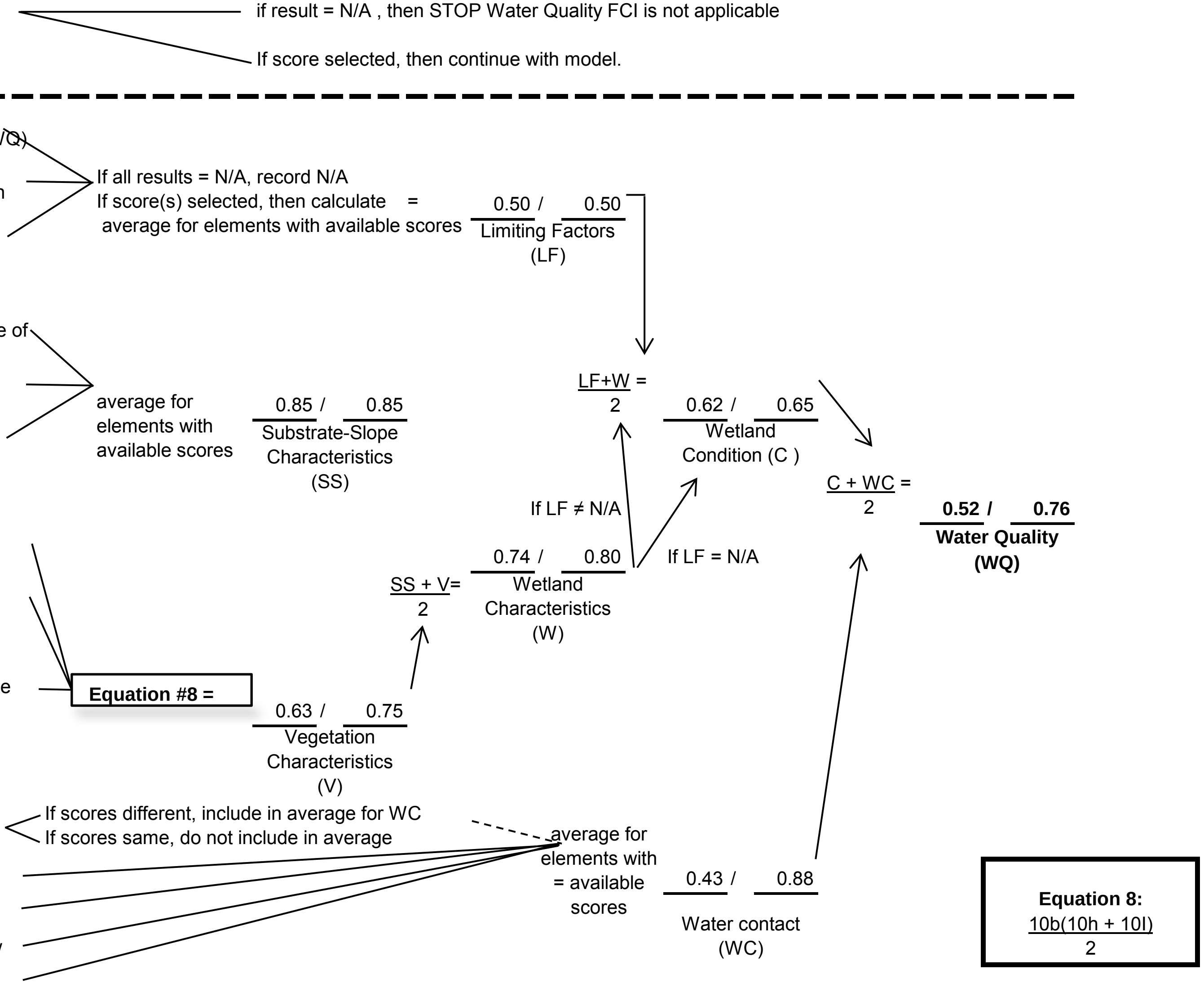
$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | 1 | (15) | Hydrologic condition |
| 0.5 | / | 0.5 | (4b) | Disturbance at site (WQ) |
| N/A | / | N/A | (7a) | Water level fluctuation |
| N/A | / | N/A | (16a) | Wetland width |
| 0.7 | / | 0.7 | (1a) | Water contact with toe of bank |
| N/A | / | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | / | 1.0 | (14c) | Wetland Slope |
| 0.7 | / | 1.0 | (10b) | Plant (basal) cover |
| 0.8 | / | 0.5 | (10h) | Plant height |
| 1.0 | / | 1.0 | (10l) | Vegetation persistence |
| 0.5 | / | 1.0 | (9b) | Dominant substrate |
| 0.1 | / | 1.0 | (15) | Hydrologic condition |
| INA | / | INA | (17) | Detention time |
| 0.1 | / | 0.5 | (18) | Sheet vs channel flow |
| 1.0 | / | 1.0 | (19) | Average water depth |



Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.9 / 0.5 | (11a) | Layers |
| 0.7 / 0.3 | (11b) | Condition of Layers |
| 1.0 / N/A | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.87 / 0.40
Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.3 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.43 / 0.38
Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.50 / 1.00
Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

average for elements with available scores = 0.10 / 0.55
Physical Features

average for available scores = 0.47 / 0.58
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.47 / 0.58**
**Wildlife FCI**

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element | |
|---|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing pond/lake habitat |
| N/A / | N/A | (28) | Refuge during drought/freeze | if result ≠ 0.1 of N/A, then continue with model |

---

| Selected Scores | | (#) | Element | | |
|---|---|---|---|---|---|
| 0.5 / | N/A | (1b) | Shoreline bank stability | average for elements with available scores | = 0.40 / N/A Limiting Factors |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) | | |
| N/A / | N/A | (4d) | Disturbance in channel/open water | | |
| 0.1 / | N/A | (16c) | Fish habitat size | | |
| 0.5 / | N/A | (24) | Obstruction to fish passage | | |
| 0.1 / | 0.5 | (10m) | Vegetative overhang | average for elements with avaliable scores | = 0.48 / 0.70 Food/Cover |
| 1.0 / | 1.0 | (10o) | Plant biomass | | |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge | | |
| 0.3 / | 0.3 | (22b) | Available fish cover/attractors | | |
| 0.1 | 0.1 | (27a) | Spawning substrate | average for elements with available scores | = 0.10 / 0.10 Reproduction |
| N/A | N/A | (27b) | Spawning structures | | |
| N/A | N/A | (27c) | Drawdown | | |
| 0.5 / | 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue | |
| 0.1 / | 1.0 | (20c) | Nutrient/sediment/contam | average for elements with available scores | = 0.50 / 0.50 Water Quality (WQ) |
| INA / | #N/A | (20d) | Dissolved Oxygen | | |
| INA / | #N/A | (20e) | pH | | |
| INA / | #N/A | (20f) | Maximum water temperature | | |
| INA / | #N/A | (20g) | Turbidity | | |

average for avaliable scores = **0.37 / 0.43**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| 1.0 | / | 1.0 | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| 1.0 | / | 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 0.8

Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 0.8**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 0.8**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

Calculation of Sediment Stabilization (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| | | | |
|---|---|---|---|
| N/A / N/A | (4a) | Disturbance at site | |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation | |
| 1.0 / 1.0 | (10b) | Plant (basal) cover | |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover | |
| 1.0 / 1.0 | (10j) | Root structure | |
| 1.0 / 1.0 | (10l) | Vegetation Persistence | |
| 1.0 / 1.0 | (14c) | Wetland slope | |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

= 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.0 / 1.0**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.38 / 0.41 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.34 / 0.74 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.74**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and Wetland # Alternative C Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.66 | 35.90 | 23.69 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.66 | 35.90 | 23.69 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.58 | 35.90 | 20.82 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.47 | 35.90 | 16.87 | |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.39 | 35.90 | 14.00 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

| | | |
|---|---|---|
| *FCUs | = | FCU x AREA |
| **Target FCI | = | *goal* established by decision makers |
| R | = | multiplying factor established by decision makers |
| Target FCUs | = | FCUWAA x R (i.e., planned wetland *goal* ) |
| Predicted FCI | = | FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI) |
| Minimum Area | = | Target FCUs/Predicted FCI |

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative C Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 172.33 | 172.33 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 172.33 | 172.33 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.38 | 172.33 | 65.49 | ✓ |

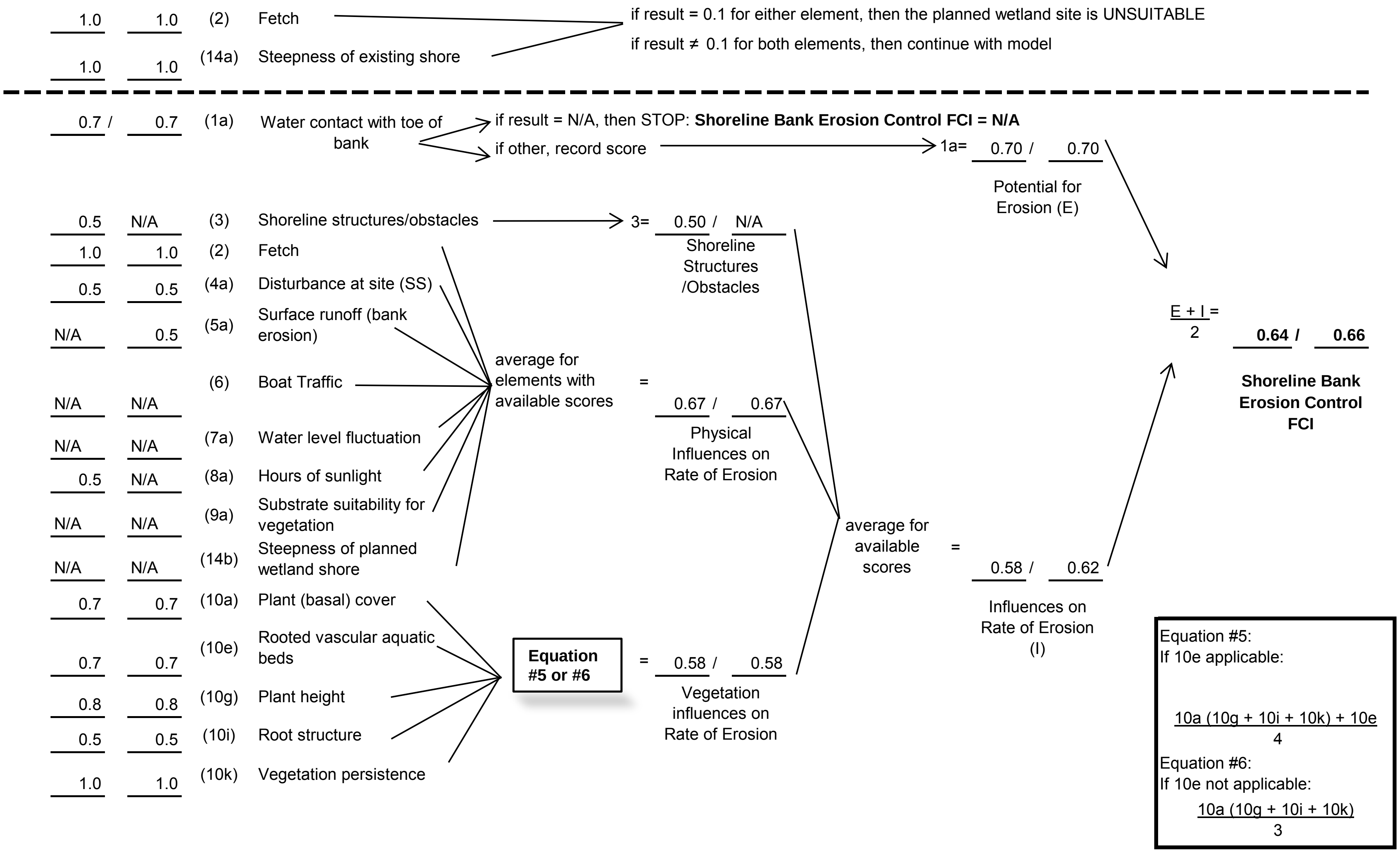
*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2



Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| | | | |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | 0.5 | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.8 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 0.67

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.58 / 0.58

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.62

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 / 0.66**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$

Equation #6:
If 10e not applicable:

$\frac{10a\ (10g + 10i + 10k)}{3}$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.50 / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.63
Vegetation Characteristics (V)

(14c) = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.82
Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF + W}{2}$ = **0.66 /** **0.66**

If DF= N/A

**Sediment Stabilization FCI**

Equation #7:

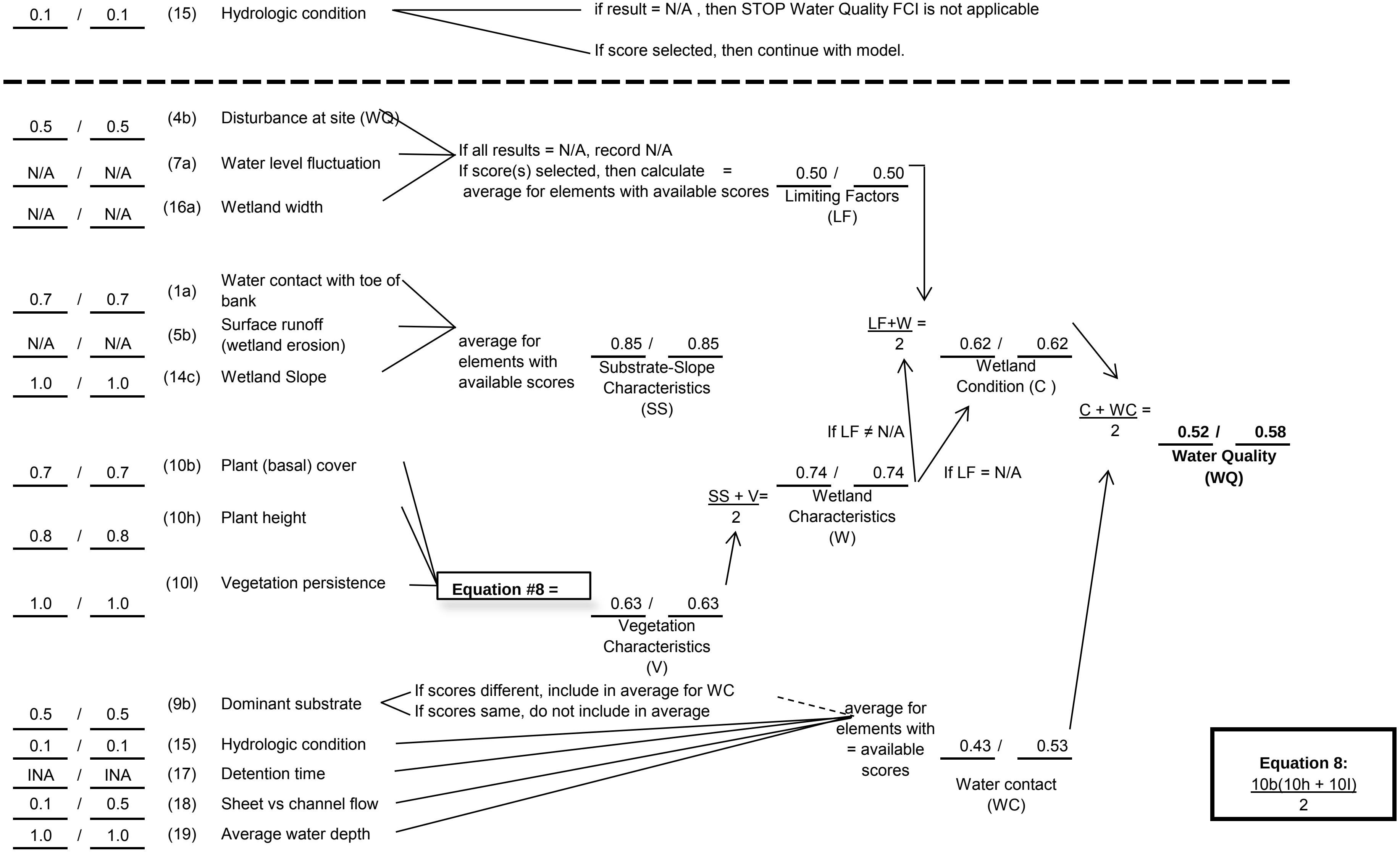
$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2



| | | | |
|---|---|---|---|
| 0.1 / 0.1 | (15) | Hydrologic condition | if result = N/A , then STOP Water Quality FCI is not applicable<br>If score selected, then continue with model. |
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) | |
| N/A / N/A | (7a) | Water level fluctuation | |
| N/A / N/A | (16a) | Wetland width | |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank | |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) | |
| 1.0 / 1.0 | (14c) | Wetland Slope | |
| 0.7 / 0.7 | (10b) | Plant (basal) cover | |
| 0.8 / 0.8 | (10h) | Plant height | |
| 1.0 / 1.0 | (10l) | Vegetation persistence | |
| 0.5 / 0.5 | (9b) | Dominant substrate | If scores different, include in average for WC<br>If scores same, do not include in average |
| 0.1 / 0.1 | (15) | Hydrologic condition | |
| INA / INA | (17) | Detention time | |
| 0.1 / 0.5 | (18) | Sheet vs channel flow | |
| 1.0 / 1.0 | (19) | Average water depth | |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50
Limiting Factors (LF)

average for elements with available scores

0.85 / 0.85
Substrate-Slope Characteristics (SS)

Equation #8 =

0.63 / 0.63
Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.74 / 0.74
Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.62 / 0.62
Wetland Condition (C )

average for elements with = available scores

0.43 / 0.53
Water contact (WC)

$\frac{C + WC}{2}$ =

**0.52 / 0.58**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

Project Title: 887. Essex County Branch Brook Park

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.42 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

average for available scores = 0.47 / 0.47 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.47 / 0.47**
**Wildlife FCI**

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage |
| N/A / | N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (1b) | Shoreline bank stability |
| 0.5 / | 0.5 | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| 0.1 / | N/A | (16c) | Fish habitat size |
| 0.5 / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (10m) | Vegetative overhang |
| 1.0 / | 1.0 | (10o) | Plant biomass |
| 0.5 / | 0.5 | (21b) | Shape of wetland/water edge |
| 0.3 / | 0.3 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.58 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (27a) | Spawning substrate |
| N/A | N/A | (27b) | Spawning structures |
| N/A | N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (20c) | Nutrient/sediment/contam |
| INA / | #N/A | (20d) | Dissolved Oxygen |
| INA / | #N/A | (20e) | pH |
| INA / | #N/A | (20f) | Maximum water temperature |
| INA / | #N/A | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.39**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| 1.0 / 1.0 | (32) | Historical or archaeological significance |
| 1.0 / 1.0 | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| 1.0 / 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 / 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2 |

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 1.0

Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$\frac{10a\ (10g + 10i + 10k)}{3}$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | WAA baseline / Planned Wetland Alternative C - Yr 2 |
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

4a, 7a: if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= N/A / N/A
Disturbance Factors (DF)

10b, 10c, 10j, 10l: **Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

14c: = 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.0 / 1.0**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 2

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.3 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.53 / 0.67
Vegetation Strata

average for elements with available scores = 0.38 / 0.38
Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

average for elements with available scores = 0.10 / 0.10
Physical Features

average for available scores = 0.34 / 0.38
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.22 / 0.38**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and wetland # Alternative C Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.66 | 35.90 | 23.69 | ✓ |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.84 | 35.90 | 30.16 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.61 | 35.90 | 21.90 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.69 | 35.90 | 24.77 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.39 | 35.90 | 14.00 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative C Year 20

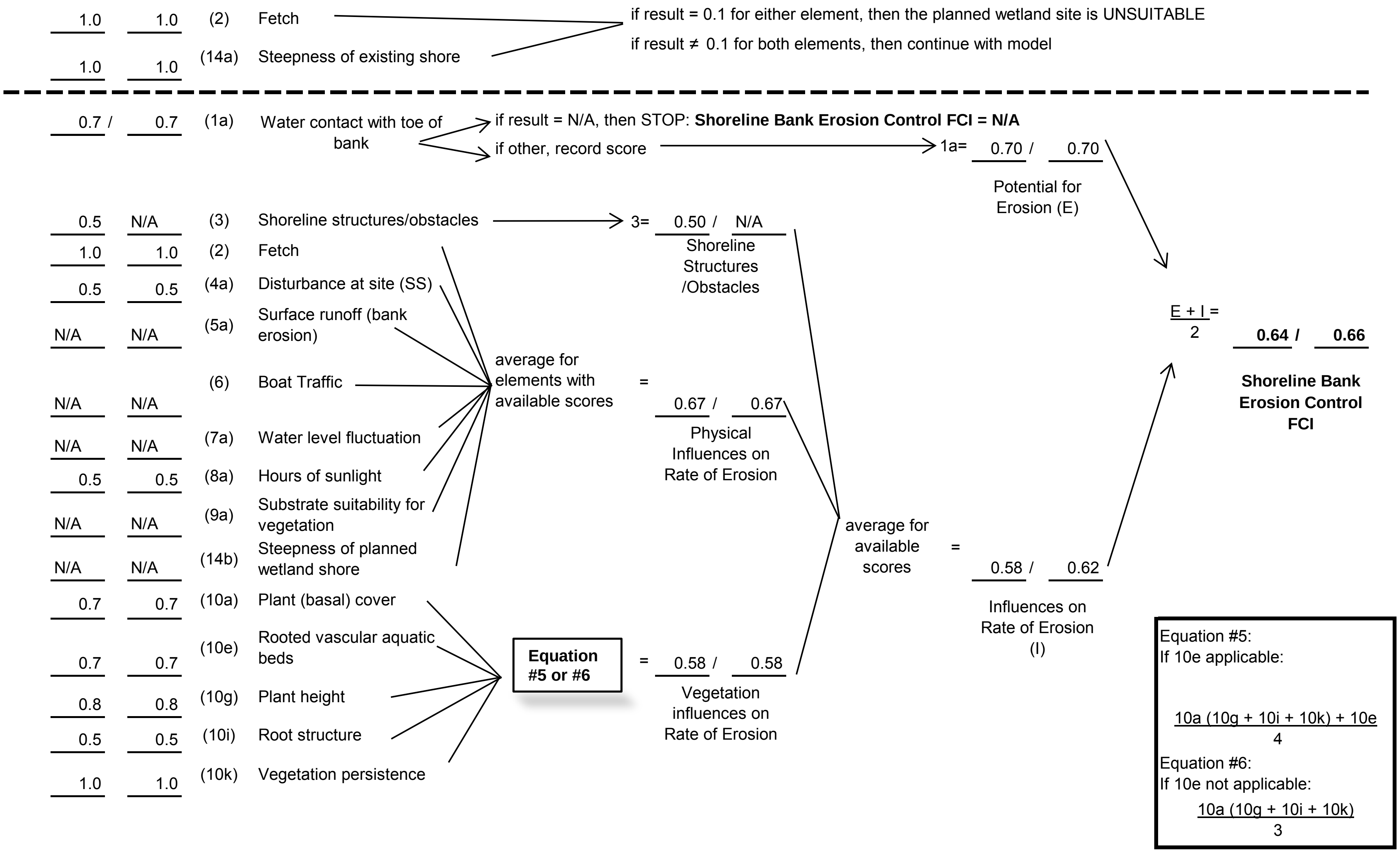
| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 172.33 | 172.33 | |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 172.33 | 172.33 | |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.70 | 172.33 | 120.63 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20



Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.8 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 0.67

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.58 / 0.58

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.62

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 / 0.66**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.50 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.68 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF + W}{2}$ = **0.66 /** **0.84** **Sediment Stabilization FCI**

If DF= N/A: W → **Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.3 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.85 / 0.85 Substrate-Slope Characteristics (SS)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 0.7 | (10b) | Plant (basal) cover |
| 0.8 | 0.8 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.63 / 0.63 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.74 / 0.74 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.62 / 0.62 Wetland Condition (C )

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (9b) | Dominant substrate |
| 0.1 | 0.3 | (15) | Hydrologic condition |
| INA | INA | (17) | Detention time |
| 0.1 | 0.5 | (18) | Sheet vs channel flow |
| 1.0 | 1.0 | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.43 / 0.60 Water contact (WC)

$\frac{C + WC}{2}$

**0.52 / 0.61**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.3 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.60 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55 Physical Features

average for available scores = 0.47 / 0.69 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA

**0.47 / 0.69**
**Wildlife FCI**

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage |
| N/A / | N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| 0.1 / | N/A | (16c) | Fish habitat size |
| 0.5 / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (10m) | Vegetative overhang |
| 1.0 / | 1.0 | (10o) | Plant biomass |
| 0.5 / | 0.5 | (21b) | Shape of wetland/water edge |
| 0.3 / | 0.3 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.58 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (27a) | Spawning substrate |
| N/A | N/A | (27b) | Spawning structures |
| N/A | N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |
| 0.1 / | 0.5 | (20c) | Nutrient/sediment/contam |
| INA / | #N/A | (20d) | Dissolved Oxygen |
| INA / | #N/A | (20e) | pH |
| INA / | #N/A | (20f) | Maximum water temperature |
| INA / | #N/A | (20g) | Turbidity |

If score available, record score for WQ
If information not available, continue

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.39**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| 1.0 / 1.0 | (32) | Historical or archaeological significance |
| 1.0 / 1.0 | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| 1.0 / 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 / 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

Calculation of Upland Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3): 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = N/A / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 1.0 / 1.0

Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization (Upland)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4a) | Disturbance at site |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

Wetland slope = 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.0 / 1.0**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.5 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.73 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.38 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.34 / 0.70 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.70**
**Wildlife FCI**

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: 887. Essex County Branch Brook Park

Comparison between WAA# baseline and wetland # Alternative C Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.64 | 35.80 | 22.94 | 0.74 | 1 | 22.94 | 0.74 | 31.13 | 0.66 | 34.11 | 22.51 | |
| SS | 0.66 | 35.80 | 23.54 | 0.72 | 1 | 23.54 | 0.72 | 32.55 | 0.84 | 34.11 | 28.65 | ✓ |
| WQ | 0.52 | 35.80 | 18.71 | 0.55 | 1 | 18.71 | 0.55 | 34.10 | 0.60 | 34.11 | 20.46 | ✓ |
| WL | 0.47 | 35.80 | 16.99 | 0.52 | 1 | 16.99 | 0.52 | 32.55 | 0.69 | 34.11 | 23.53 | ✓ |
| FP | 0.37 | 35.80 | 13.25 | 0.41 | 1 | 13.25 | 0.41 | 32.55 | 0.39 | 34.11 | 13.30 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

### Table A.1.
### Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: 887. Essex County Branch Brook Park

Comparison between UAA# baseline and upland # Alternative C Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 174.13 | 174.13 | ✓ |
| SS | 1.00 | 172.43 | 172.43 | 1.00 | 1 | 172.43 | 1.00 | 172.43 | 1.00 | 174.13 | 174.13 | ✓ |
| WL | 0.22 | 172.43 | 37.93 | 0.24 | 1 | 37.93 | 0.24 | 156.75 | 0.73 | 174.13 | 127.11 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

Project Title: 887. Essex County Branch Brook Park

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| 0.5 | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.8 | 0.8 | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.67 / 0.67

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.58 / 0.58

Vegetation influences on Rate of Erosion

average for available scores = 0.58 / 0.62

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.64 / 0.66**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.50 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.68 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.66 / 0.84**

**Sediment Stabilization FCI**

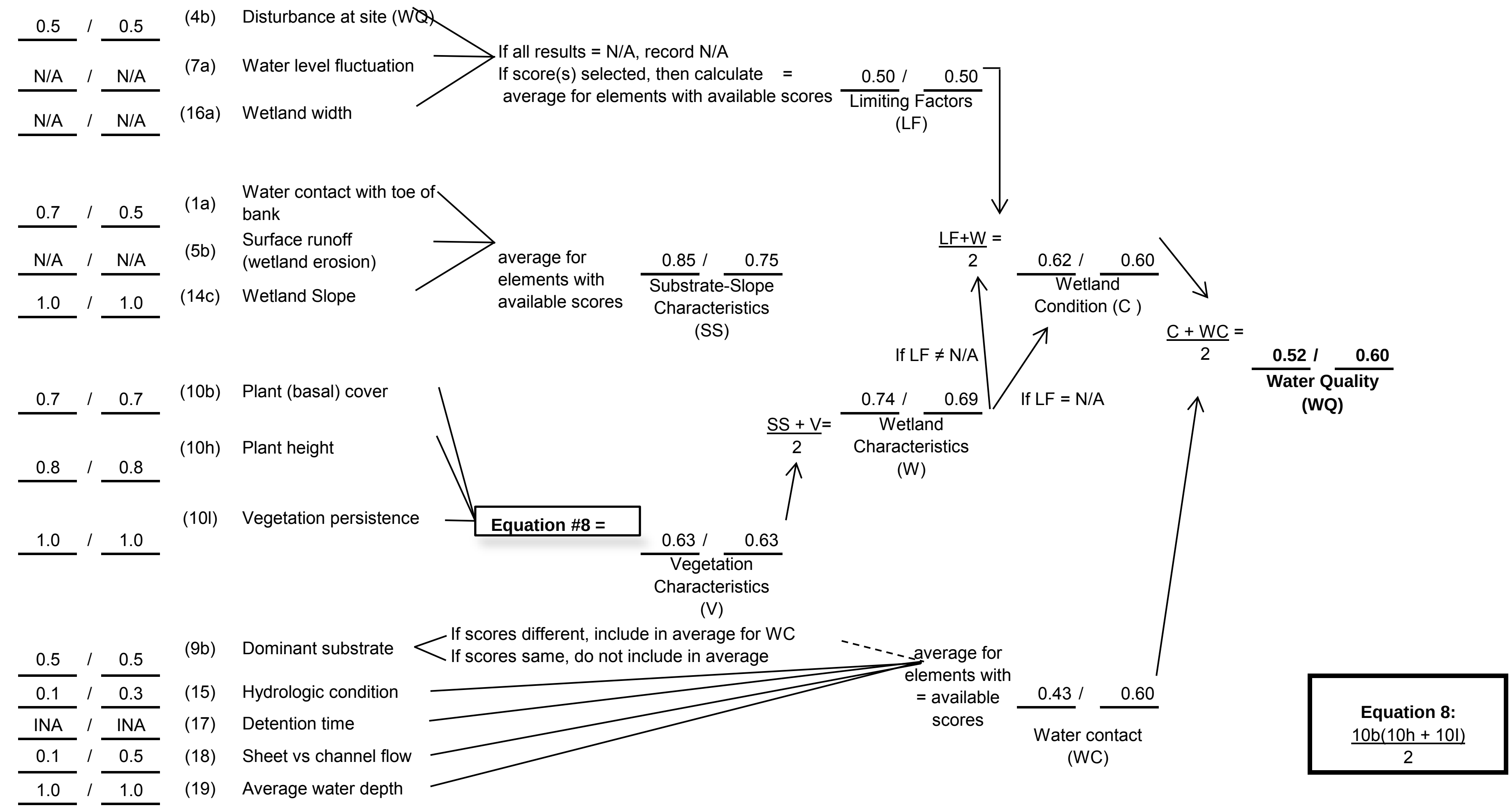
Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

Calculation of Water Quality

| Selected Scores | | (#) | Element | |
|---|---|---|---|---|
| | | | Comparison: | WAA baseline / Planned Wetland Alternative C - Yr 50 |
| 0.1 | 0.3 | (15) | Hydrologic condition | if result = N/A , then STOP Water Quality FCI is not applicable<br>If score selected, then continue with model. |



| | | | |
|---|---|---|---|
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) | If all results = N/A, record N/A<br>If score(s) selected, then calculate = average for elements with available scores |
| N/A / N/A | (7a) | Water level fluctuation | |
| N/A / N/A | (16a) | Wetland width | |
| 0.7 / 0.5 | (1a) | Water contact with toe of bank | average for elements with available scores |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) | |
| 1.0 / 1.0 | (14c) | Wetland Slope | |
| 0.7 / 0.7 | (10b) | Plant (basal) cover | Equation #8 = |
| 0.8 / 0.8 | (10h) | Plant height | |
| 1.0 / 1.0 | (10l) | Vegetation persistence | |
| 0.5 / 0.5 | (9b) | Dominant substrate | If scores different, include in average for WC<br>If scores same, do not include in average |
| 0.1 / 0.3 | (15) | Hydrologic condition | average for elements with = available scores |
| INA / INA | (17) | Detention time | |
| 0.1 / 0.5 | (18) | Sheet vs channel flow | |
| 1.0 / 1.0 | (19) | Average water depth | |

0.50 / 0.50 Limiting Factors (LF)

0.85 / 0.75 Substrate-Slope Characteristics (SS)

0.63 / 0.63 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ = 0.74 / 0.69 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ = 0.62 / 0.60 Wetland Condition (C )

If LF = N/A

0.43 / 0.60 Water contact (WC)

$\frac{C + WC}{2}$ = **0.52 / 0.60 Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.3 / 0.3 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = N/A / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.87
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.43 / 0.60
Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 0.75
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55
Physical Features

average for available scores = 0.47 / 0.69
Habitat Complexity (HC)

If F ≠ NA: (F + HC) / 2 =

If F = NA:

**0.47 / 0.69**
**Wildlife FCI**

PROJECT TITLE: 887. Essex County Branch Brook Park

Calclation of Fish (Non-tidal Pond/Lake)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (24) | Obstruction to fish passage |
| N/A / | N/A | (28) | Refuge during drought/freeze |

if result = 0.1, STOP. There is no potential for providing pond/lake habitat

if result ≠ 0.1 of N/A, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | N/A | (1b) | Shoreline bank stability |
| 0.5 / | N/A | (4a) | Disturbance at site (SS) |
| N/A / | N/A | (4d) | Disturbance in channel/open water |
| 0.1 / | N/A | (16c) | Fish habitat size |
| 0.5 / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.40 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (10m) | Vegetative overhang |
| 1.0 / | 1.0 | (10o) | Plant biomass |
| 0.5 / | 0.5 | (21b) | Shape of wetland/water edge |
| 0.3 / | 0.3 | (22b) | Available fish cover/attractors |

average for elements with avaliable scores = 0.48 / 0.58 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (27a) | Spawning substrate |
| N/A | N/A | (27b) | Spawning structures |
| N/A | N/A | (27c) | Drawdown |

average for elements with available scores = 0.10 / 0.10 Reproduction

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (20c) | Nutrient/sediment/contam |
| INA / | #N/A | (20d) | Dissolved Oxygen |
| INA / | #N/A | (20e) | pH |
| INA / | #N/A | (20f) | Maximum water temperature |
| INA / | #N/A | (20g) | Turbidity |

average for elements with available scores = 0.50 / 0.50 Water Quality (WQ)

average for avaliable scores = **0.37 / 0.39**

**Fish (Non-Tidal Stream/River)**

Project Title: 887. Essex County Branch Brook Park

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| 1.0 | / | 1.0 | (32) | Historical or archaeological significance |
| 1.0 | / | 1.0 | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| 1.0 | / | 1.0 | (35) | Park, sanctuary, etc. |
| 1.0 | / | 1.0 | (36) | Scientific research site |

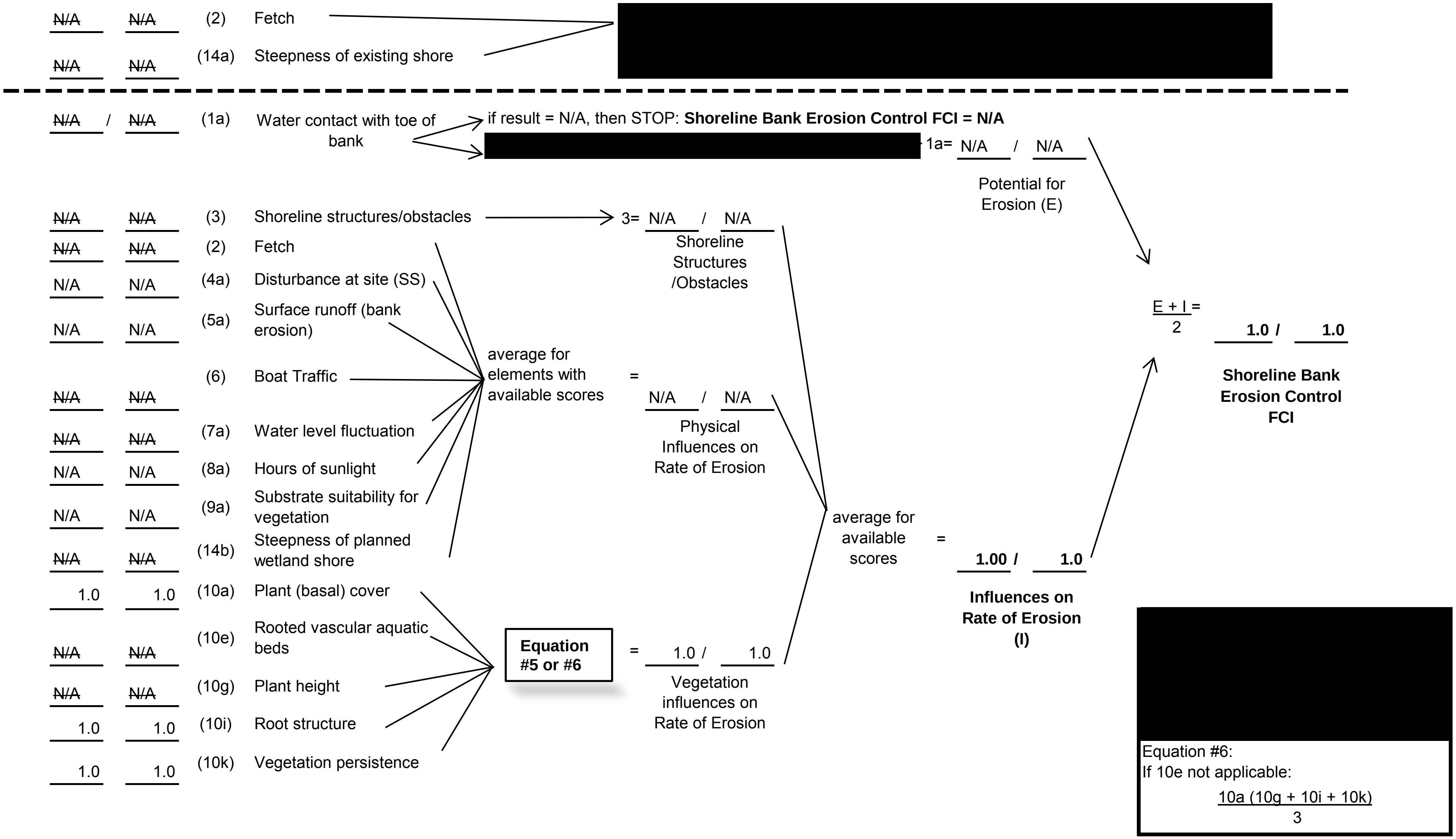
average for elements with available scores = 1.0 / 1.0

**Uniqueness/ Heritage FCI**

Project Title: 887. Essex County Branch Brook Park

Calculation of Upland Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50



| Selected Scores | | (#) | Element |
|---|---|---|---|
| **Site Suitability For Planned Wetland:** | | | |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| N/A | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

[redacted]

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = N/A / N/A
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 1.0 / 1.0
Vegetation influences on Rate of Erosion

average for available scores = **1.00 / 1.0**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **1.0 / 1.0**
**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:
$\frac{10a\ (10g + 10i + 10k)}{3}$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | WAA baseline / Planned Wetland Alternative C - Yr 50 |
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.0 / 1.0
Vegetation Characteristics (V)

= 1.0 / 1.0
Slope Stability (S)

$\frac{V+S}{2}$ = 1.0 / 1.0
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.0 / 1.0**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

Project Title: 887. Essex County Branch Brook Park

## Calculation of Wildlife (Upland)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.53 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.38 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.34 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.22 / 0.73**
**Wildlife FCI**

# Site 865 - Kearny Point

### Table A.1.
### Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.53 | 57.89 | 30.68 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 0.60 | 57.89 | 34.73 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.76 | 57.89 | 44.00 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.46 | 57.89 | 26.63 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.43 | 57.89 | 24.89 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative A Year 2 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.39 | 7.43 | 2.90 | |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.59 | 7.43 | 4.38 | |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.56 | 7.43 | 4.16 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Shoreline Bank Erosion Control

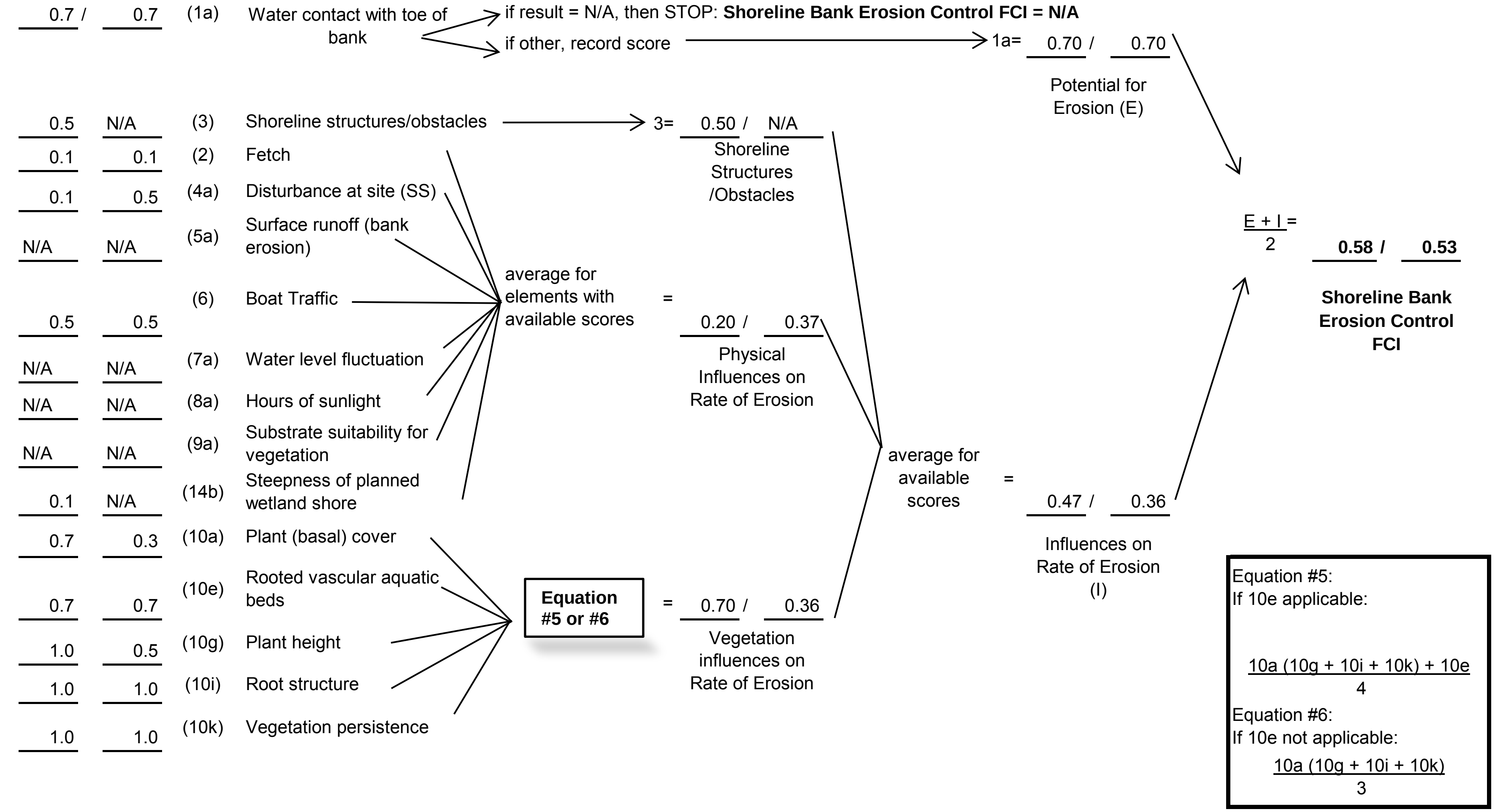
Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.3 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 0.5 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.20 / 0.37

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.70 / 0.36

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.36

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 / 0.53**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

### Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.75 / 0.41 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 0.70 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF + W}{2}$ = **0.49 / 0.60** **Sediment Stabilization FCI**

If DF= N/A: W = **Sediment Stabilization FCI**

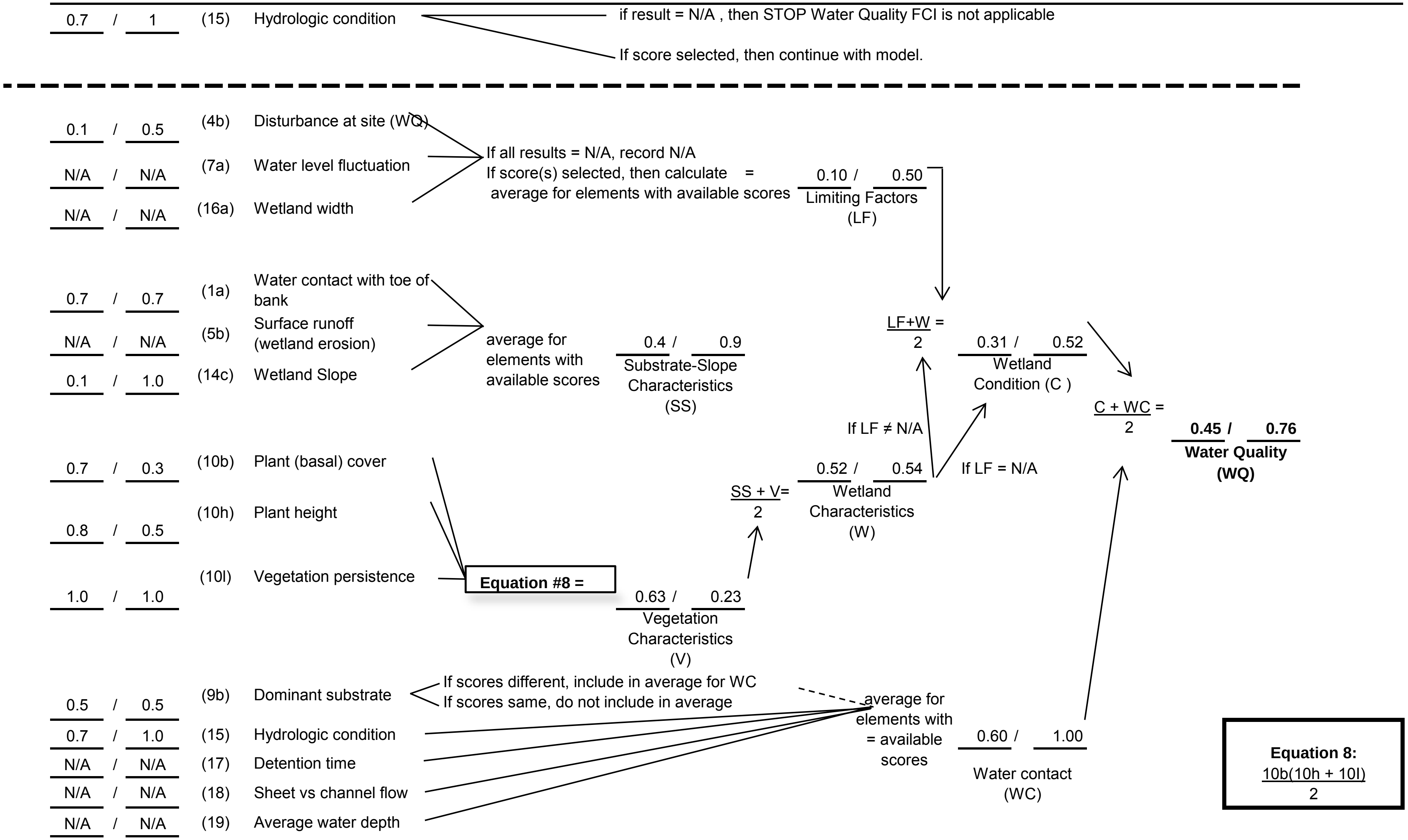
Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 1 | (15) | Hydrologic condition |
| 0.1 | 0.5 | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |
| 0.7 | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 | 1.0 | (14c) | Wetland Slope |
| 0.7 | 0.3 | (10b) | Plant (basal) cover |
| 0.8 | 0.5 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 0.5 | (9b) | Dominant substrate |
| 0.7 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

(15) Hydrologic condition: if result = N/A , then STOP Water Quality FCI is not applicable. If score selected, then continue with model.

(4b), (7a), (16a): If all results = N/A, record N/A. If score(s) selected, then calculate = average for elements with available scores: 0.10 / 0.50 Limiting Factors (LF)

(1a), (5b), (14c): average for elements with available scores: 0.4 / 0.9 Substrate-Slope Characteristics (SS)

(10b), (10h), (10l): Equation #8 = 0.63 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ = 0.52 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ =

If LF = N/A

0.31 / 0.52 Wetland Condition (C )

(9b) Dominant substrate: If scores different, include in average for WC. If scores same, do not include in average.

(15), (17), (18), (19): average for elements with = available scores: 0.60 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ = **0.45 / 0.76 Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.9 | 0.9 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.87 / 0.87 Vegetation Strata

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.2 | 0.2 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |

average for elements with available scores = 0.32 / 0.41 Vegetation Cover Types

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 1.0 | (13a) | % open water |
| 0.5 | 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| 0.1 | 1.0 | (23) | Islands |

average for elements with available scores = 0.4 / 1.0 Physical Features

average for available scores = 0.52 / 0.82 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.31 / 0.46**
**Wildlife FCI**

`

PROJECT TITLE: Site 865 - Kearny Point

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 / 0.5 | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 0.5 | (9c) | Substrate suitability for fish |
| 0.7 / 0.3 | (10d) | Plant (basal) cover |
| 0.3 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.3 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.34 / 0.43**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| 1.0 | / | 1.0 | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / 0.50
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.17 / 0.27
Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.39**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.39**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.8 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.12 / 0.38
Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.69
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 /** **0.59**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.5 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.73 / 0.73 Vegetation Strata

average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

average for elements with available scores = 0.55 / 0.55 Physical Features

average for available scores = 0.53 / 0.56 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.56**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative A Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.68 | 57.89 | 39.37 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 1.00 | 57.89 | 57.89 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.96 | 57.89 | 55.57 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.94 | 57.89 | 54.42 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.69 | 57.89 | 39.94 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative A Year 20 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.70 | 7.43 | 5.20 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.95 | 7.43 | 7.06 | |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.73 | 7.43 | 5.42 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.20 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.70 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$$\frac{E + I}{2} =$$ **0.58 / 0.68**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.3 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.75 / 1.00 Vegetation Characteristics (V)

(14c) = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.49 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

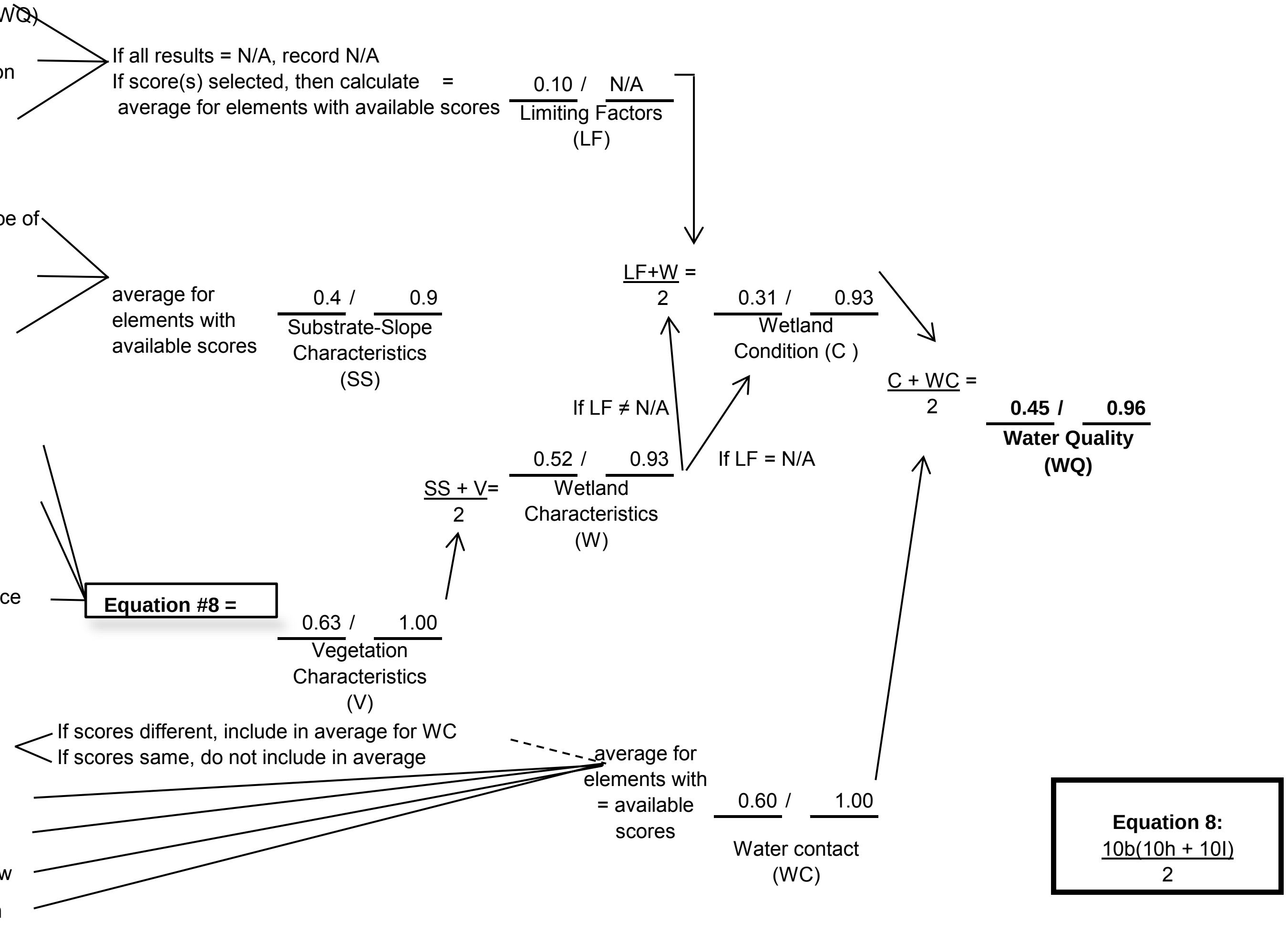
| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / N/A
Limiting Factors (LF)

average for elements with available scores

0.4 / 0.9
Substrate-Slope Characteristics (SS)

Equation #8 =

0.63 / 1.00
Vegetation Characteristics (V)

SS + V= / 2

0.52 / 0.93
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.31 / 0.93
Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00
Water contact (WC)

C + WC = / 2

**0.45 / 0.96**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.9 | 1.0 | (11a) | Layers |
| 0.7 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.2 | (12a) | Cover types |
| 0.5 | 1.0 | (12b) | Ratio of cover types |
| 0.5 | 1.0 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| 0.5 | 1.0 | (13a) | % open water |
| 0.5 | 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| 0.1 | 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 1.00 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.74 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.4 / 1.0 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.52 / 0.94 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.94**
**Wildlife FCI**

`

PROJECT TITLE: Site 865 - Kearny Point

Calclation of Fish (Tidal)

Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 1.0 | (10d) | Plant (basal) cover |
| 0.3 / 1.0 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.9 Food/Cover

average for avaliable scores = **0.34 / 0.69**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| 1.0 / 1.0 | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

---

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / 0.50
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.17 / 0.90
Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.70**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.70**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4a) | Disturbance at site |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.3 / 1.0 | (10c) | Leaf litter and debris cover |
| 0.1 / 0.8 | (10j) | Root structure |
| 0.1 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.12 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 / 0.95**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.53 / 0.73 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.31 / 0.73**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.68 | 55.00 | 37.40 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 1.00 | 55.00 | 55.00 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.96 | 55.00 | 52.80 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.94 | 55.00 | 51.70 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.69 | 55.00 | 37.95 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

| | | |
|---|---|---|
| *FCUs | = | FCU x AREA |
| **Target FCI | = | *goal* established by decision makers |
| R | = | multiplying factor established by decision makers |
| Target FCUs | = | FCUWAA x R (i.e., planned wetland *goal*) |
| Predicted FCI | = | FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI) |
| Minimum Area | = | Target FCUs/Predicted FCI |

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative A Year 50 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.70 | 10.32 | 7.23 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.95 | 10.32 | 9.81 | |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.73 | 10.32 | 7.54 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.20 / 0.30

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.70 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 / 0.68**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

4a, 7a: if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / N/A Disturbance Factors (DF)

10b, 10c, 10j, 10l: **Equation #7** = 0.75 / 1.00 Vegetation Characteristics (V)

14c → = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **0.49 / 1.00** **Sediment Stabilization FCI**

If DF= N/A: W → **Sediment Stabilization FCI**

Equation #7:

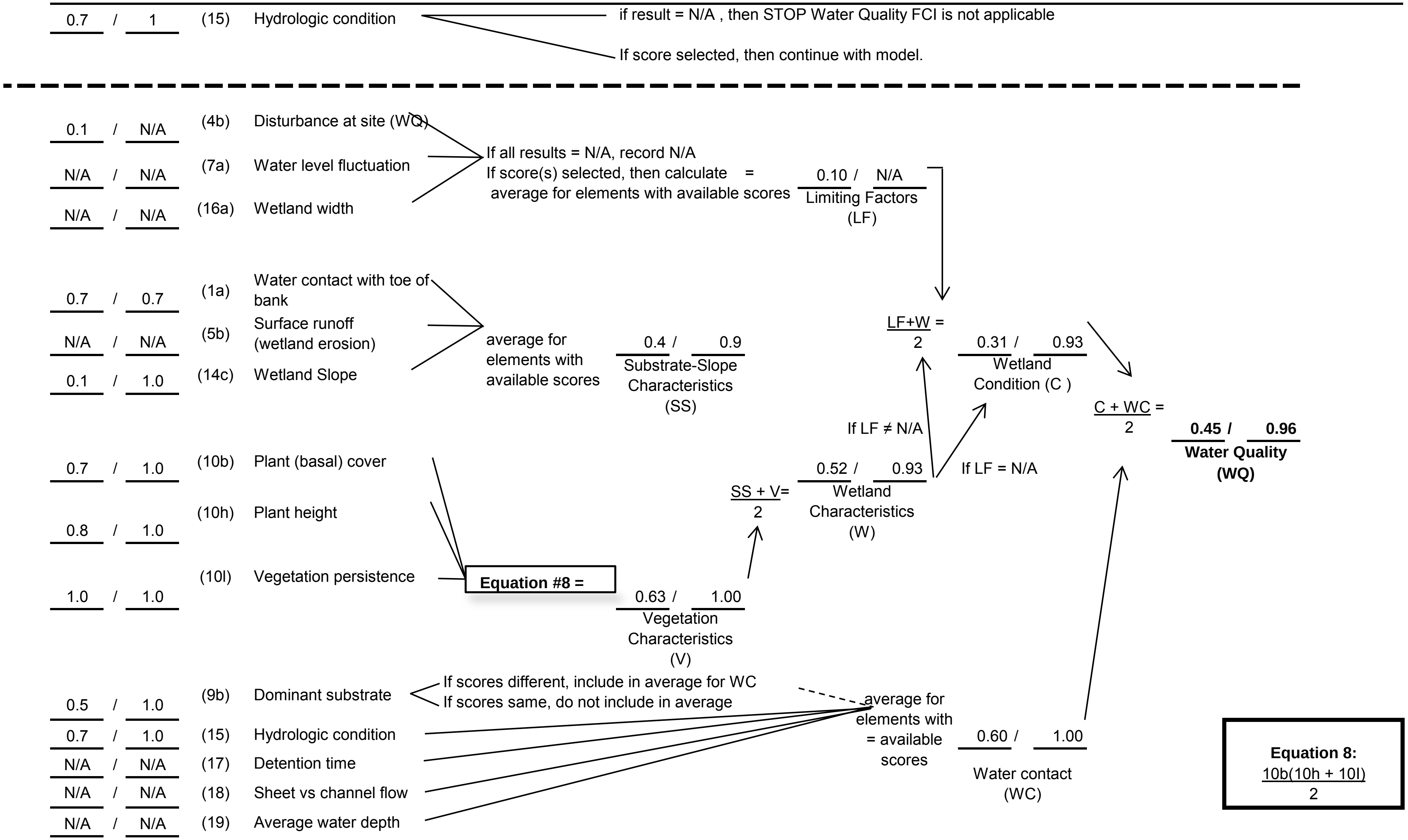
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



0.7 / 1 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A

If score(s) selected, then calculate = average for elements with available scores

0.10 / N/A Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.4 / 0.9 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.63 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}=$

0.52 / 0.93 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}=$

If LF = N/A

0.31 / 0.93 Wetland Condition (C )

$\frac{C + WC}{2}=$

**0.45 / 0.96 Water Quality (WQ)**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC

If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00 Water contact (WC)

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.9 | 1.0 | (11a) | Layers |
| 0.7 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.2 | (12a) | Cover types |
| 0.5 | 1.0 | (12b) | Ratio of cover types |
| 0.5 | 1.0 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| 0.5 | 1.0 | (13a) | % open water |
| 0.5 | 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| 0.1 | 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 1.00 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.74 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.4 / 1.0 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.52 / 0.94 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.94**
**Wildlife FCI**

`

PROJECT TITLE: Site 865 - Kearny Point

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (1b) | Shoreline bank stability |
| 0.1 | / | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / N/A

Limiting Factors

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.2 | / | 1.0 | (9c) | Substrate suitability for fish |
| 0.7 | / | 1.0 | (10d) | Plant (basal) cover |
| 0.3 | / | 1.0 | (10f) | Rooted vascular aquatic beds |
| 0.5 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.9

Food/Cover

average for avaliable scores = **0.34 / 0.69**

**Fish (Tidal) FCI**

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5

Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (29) | Endangered species |
| N/A | N/A | (30) | Rarity |
| 1.0 | 1.0 | (31) | Unique features |
| N/A | N/A | (32) | Historical or archaeological significance |
| N/A | N/A | (33) | Natural landmark |
| N/A | N/A | (34) | Connected to Wild and Scenic River |
| N/A | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | 0.5 | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.10 / 0.50

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.17 / 0.90

Vegetation influences on Rate of Erosion

Shoreline Structures /Obstacles, Physical Influences on Rate of Erosion, Vegetation influences on Rate of Erosion → average for available scores = **0.13 /** **0.70**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 /** **0.70**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| | | | |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.8 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.12 / 0.90
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.95
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 / 0.95**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.53 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.73**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative B Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.52 | 54.04 | 28.10 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 0.60 | 54.04 | 32.42 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.76 | 54.04 | 41.07 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.32 | 54.04 | 17.29 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.43 | 54.04 | 23.24 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative B Year 2.

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.36 | 11.28 | 4.06 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.58 | 11.28 | 6.54 | |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.56 | 11.28 | 6.32 | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland *goal* )

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.3 | (10a) | Plant (basal) cover |
| 0.7 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 0.5 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.20 / 0.37

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.70 / 0.31

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.34

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 /** **0.52**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50 Disturbance Factors (DF)

**Equation #7** = 0.75 / 0.41 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 0.70 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.49 / 0.60**

**Sediment Stabilization FCI**

Equation #7:

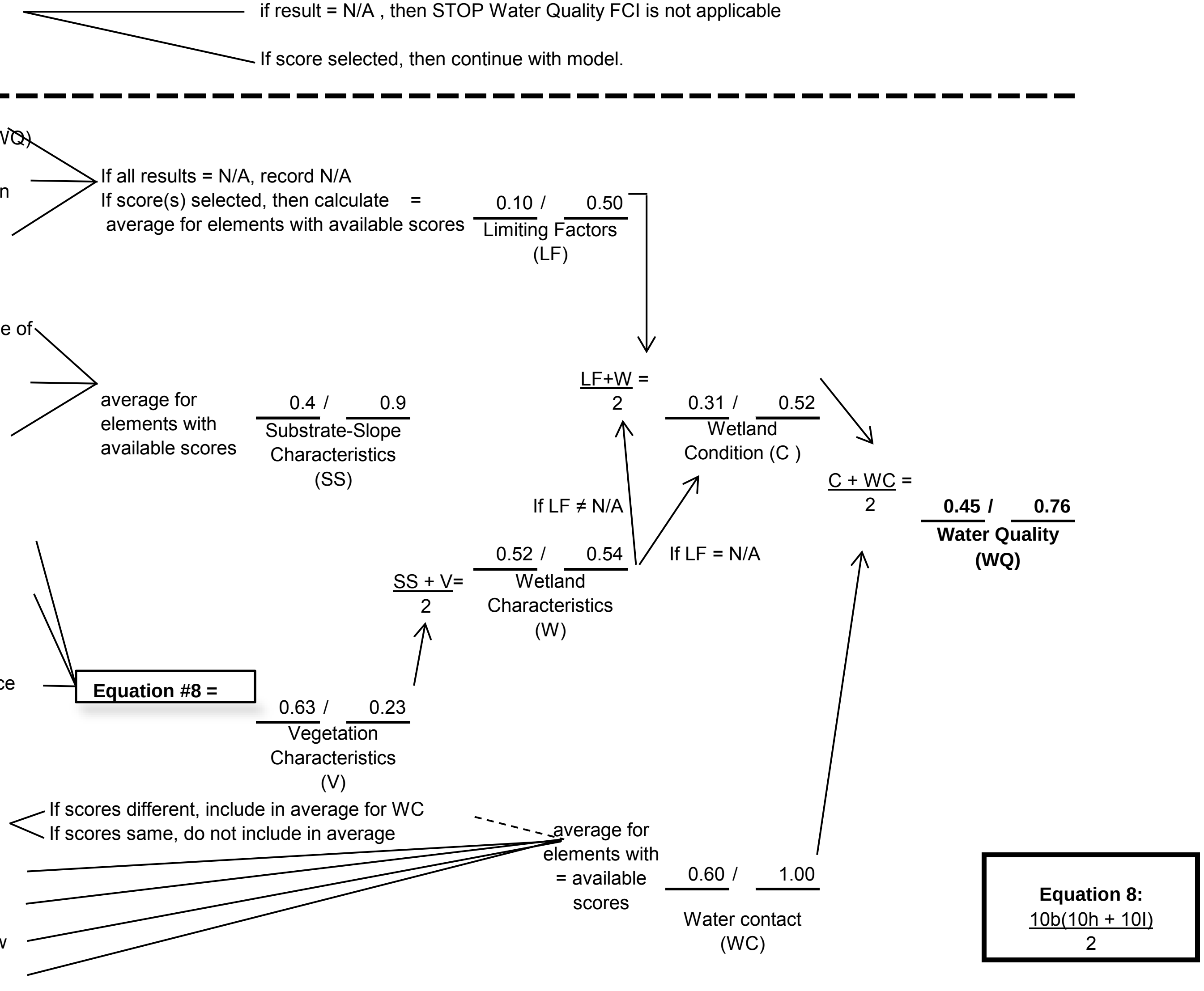
$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |
| 0.1 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 0.3 | (10b) | Plant (basal) cover |
| 0.8 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / 0.50 Limiting Factors (LF)

average for elements with available scores

0.4 / 0.9 Substrate-Slope Characteristics (SS)

**Equation #8 =**

0.63 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.52 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.31 / 0.52 Wetland Condition (C )

$\frac{C + WC}{2}$ =

**0.45 / 0.76 Water Quality (WQ)**

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00 Water contact (WC)

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.87 / 0.87 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.32 / 0.41 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.50 / 0.50 Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

average for elements with available scores = 0.40 / 0.40 Physical Features

average for available scores = 0.52 / 0.54 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.31 / 0.32**
**Wildlife FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 / 0.5 | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 0.5 | (9c) | Substrate suitability for fish |
| 0.7 / 0.3 | (10d) | Plant (basal) cover |
| 0.3 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.3 Food/Cover

average for avaliable scores = **0.34 / 0.43**

**Fish (Tidal) FCI**

**x= 0.2**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| 1.0 | / | 1.0 | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.17 / 0.23

Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.36**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.36**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~ = 0.10 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.12 / 0.33 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.67 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF + W}{2}$ = **0.33 / 0.58** **Sediment Stabilization FCI**

If DF= N/A

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.5 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.73 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.53 / 0.56 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.56**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative B Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.68 | 54.04 | 36.75 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 1.00 | 54.04 | 54.04 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.89 | 54.04 | 48.10 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.81 | 54.04 | 43.77 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.65 | 54.04 | 35.13 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative B Year 20.

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.63 | 11.28 | 7.11 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.69 | 11.28 | 7.78 | |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.73 | 11.28 | 8.23 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Shoreline Bank Erosion Control

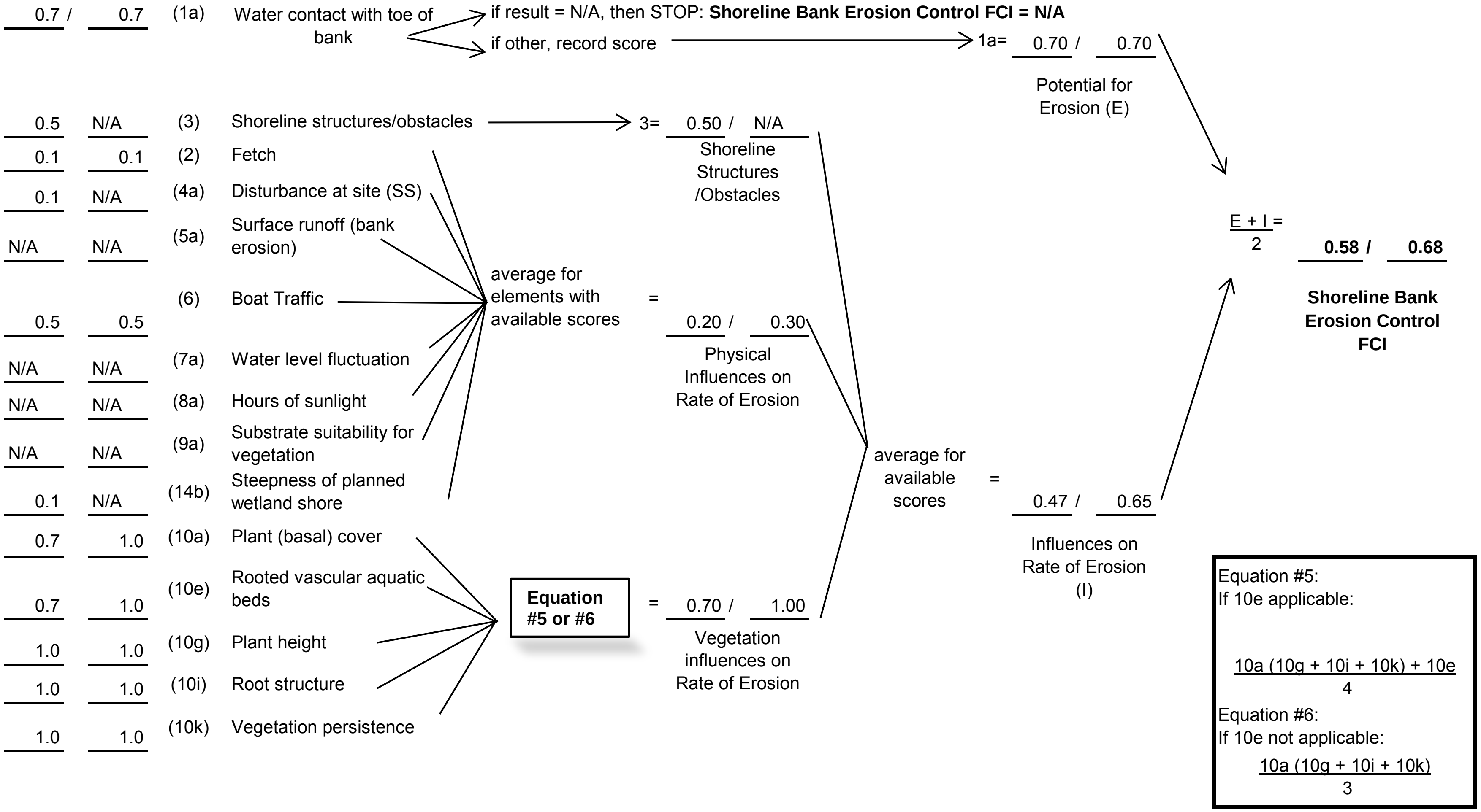
Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.20 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.70 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 / 0.68**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.75 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.49 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

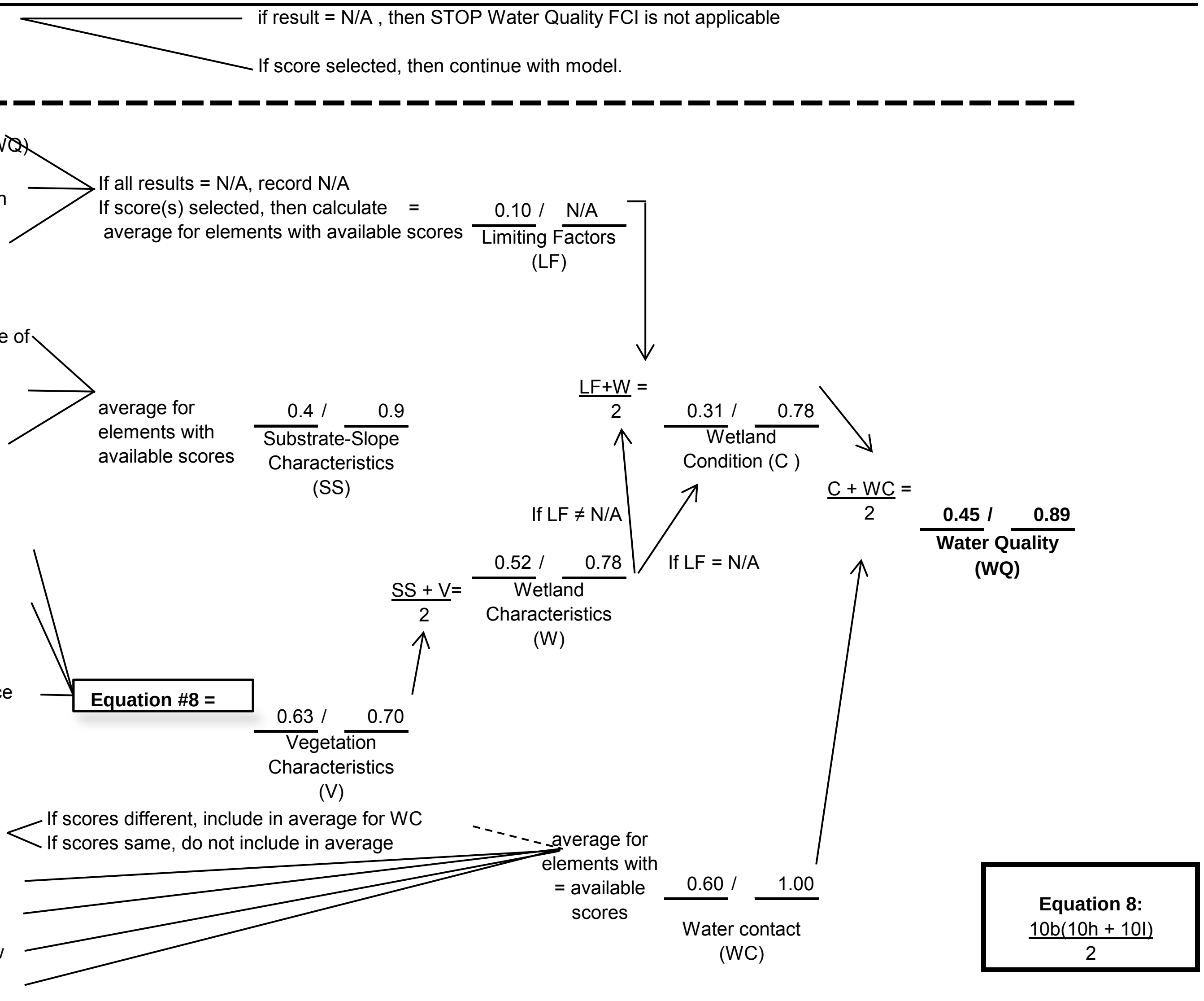
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.9 | 0.9 | (11a) | Layers |
| 0.7 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.2 | (12a) | Cover types |
| 0.5 | 1.0 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| 0.5 | 1.0 | (13a) | % open water |
| 0.5 | 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| 0.1 | 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.87 / 0.97 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.32 / 0.57 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.40 / 0.70 Physical Features

average for available scores = 0.52 / 0.81 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.81**
**Wildlife FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (1b) | Shoreline bank stability |
| 0.1 / | N/A | (4a) | Disturbance at site (SS) |
| 0.5 / | N/A | (4d) | Disturbance in channel/open water |
| N/A / | N/A | (7b) | Most permanent hydroperiod |
| N/A / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / N/A Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.2 / | 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / | 0.7 | (10d) | Plant (basal) cover |
| 0.3 / | 1.0 | (10f) | Rooted vascular aquatic beds |
| 0.5 / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.8 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / | INA | (20d) | Dissolved Oxygen |
| INA / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.34 / 0.65**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| 1.0 / 1.0 | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.17 / 0.63

Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.8 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.12 / 0.78
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.89
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 / 0.89**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

| Selected Scores | (#) | Element |
|---|---|---|
| Comparison: | | UAA baseline / Planned Upland Alternative B - Yr 20 |
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.73 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.53 / 0.73 Habitat Complexity (HC)

If F ≠ NA

$$\frac{F + HC}{2} =$$

If F = NA

**0.31 / 0.73**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative B Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.68 | 51.34 | 34.91 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 1.00 | 51.34 | 51.34 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.96 | 51.34 | 49.28 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.82 | 51.34 | 42.10 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.65 | 51.34 | 33.37 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative B Year 50 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.90 | 13.98 | 12.58 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.95 | 13.98 | 13.28 | ✓ |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.87 | 13.98 | 12.16 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.20 / 0.30

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.70 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 / 0.68**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / N/A

Disturbance Factors (DF)

**Equation #7** = 0.75 / 1.00

Vegetation Characteristics (V)

= 1.00 / 1.00

Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00

Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.49 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

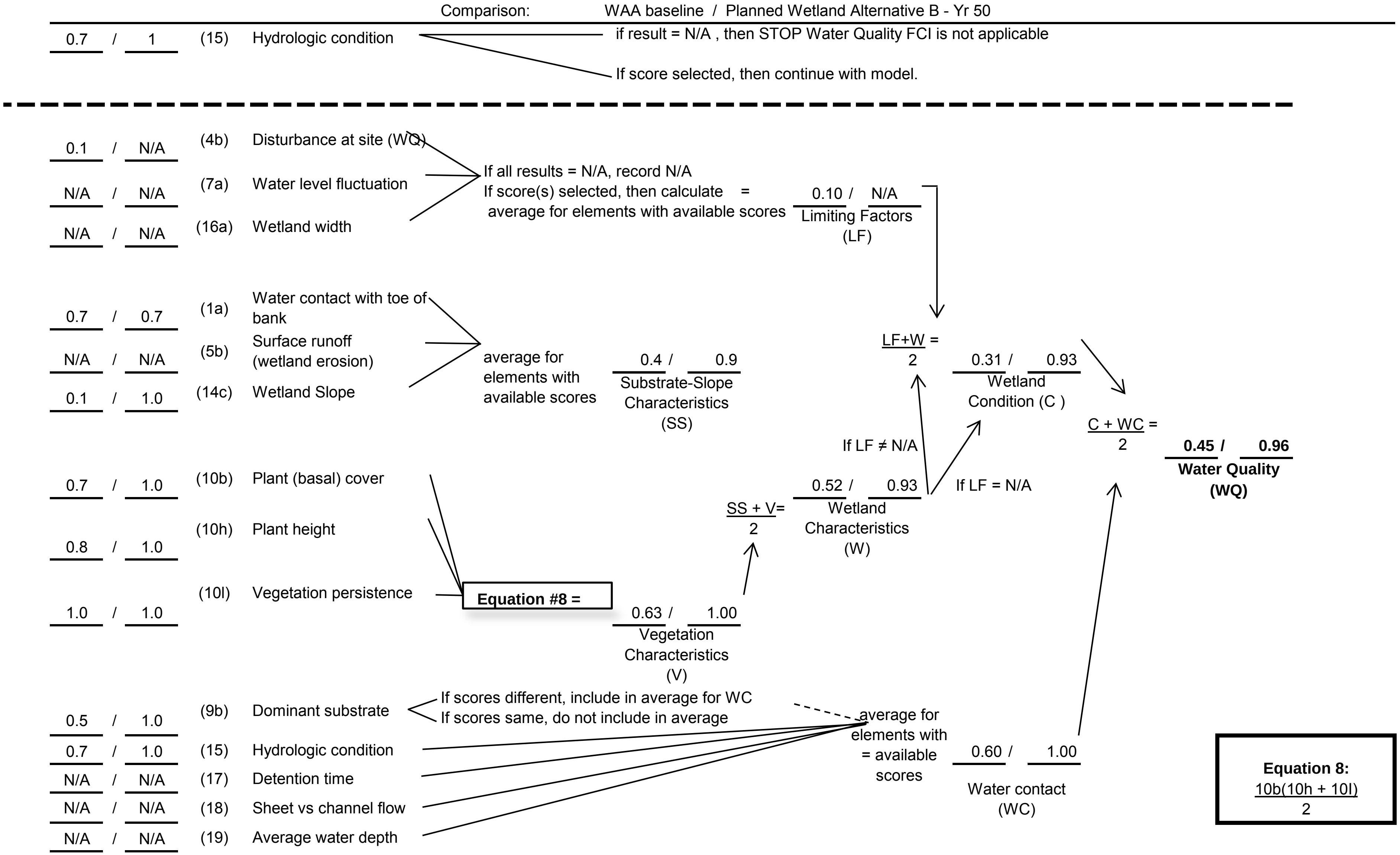
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50



0.7 / 1 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

0.1 / N/A (4b) Disturbance at site (WQ)

N/A / N/A (7a) Water level fluctuation

N/A / N/A (16a) Wetland width

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / N/A Limiting Factors (LF)

0.7 / 0.7 (1a) Water contact with toe of bank

N/A / N/A (5b) Surface runoff (wetland erosion)

0.1 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.4 / 0.9 Substrate-Slope Characteristics (SS)

0.7 / 1.0 (10b) Plant (basal) cover

0.8 / 1.0 (10h) Plant height

1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

0.63 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.52 / 0.93 Wetland Characteristics (W)

If LF ≠ N/A

If LF = N/A

$\frac{LF+W}{2}$ =

0.31 / 0.93 Wetland Condition (C )

$\frac{C + WC}{2}$ =

**0.45 / 0.96 Water Quality (WQ)**

0.5 / 1.0 (9b) Dominant substrate

If scores different, include in average for WC
If scores same, do not include in average

0.7 / 1.0 (15) Hydrologic condition

N/A / N/A (17) Detention time

N/A / N/A (18) Sheet vs channel flow

N/A / N/A (19) Average water depth

average for elements with = available scores

0.60 / 1.00 Water contact (WC)

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 1.0 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 1.00 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.57 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.40 / 0.70 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.52 / 0.82 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.82**
**Wildlife FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.3 / 1.0 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.8 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.34 / 0.65**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| 1.0 / | 1.0 | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.17 / 0.90

Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.90**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.90**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$\frac{10a\ (10g + 10i + 10k)}{3}$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.8 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~ = 0.10 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.12 / 0.90 Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.95 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **0.33 /** **0.95** **Sediment Stabilization FCI**

If DF= N/A: W = **Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.73 / 0.90 Vegetation Strata

average for elements with available scores = 0.30 / 0.72 Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.53 / 0.87 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ = **0.31 / 0.87 Wildlife FCI**

If F = NA

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative C Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.52 | 51.77 | 26.92 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 0.64 | 51.77 | 33.13 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.62 | 51.77 | 32.10 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.32 | 51.77 | 16.57 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.41 | 51.77 | 21.23 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

### Table A.1.
### Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative C Year 2 .

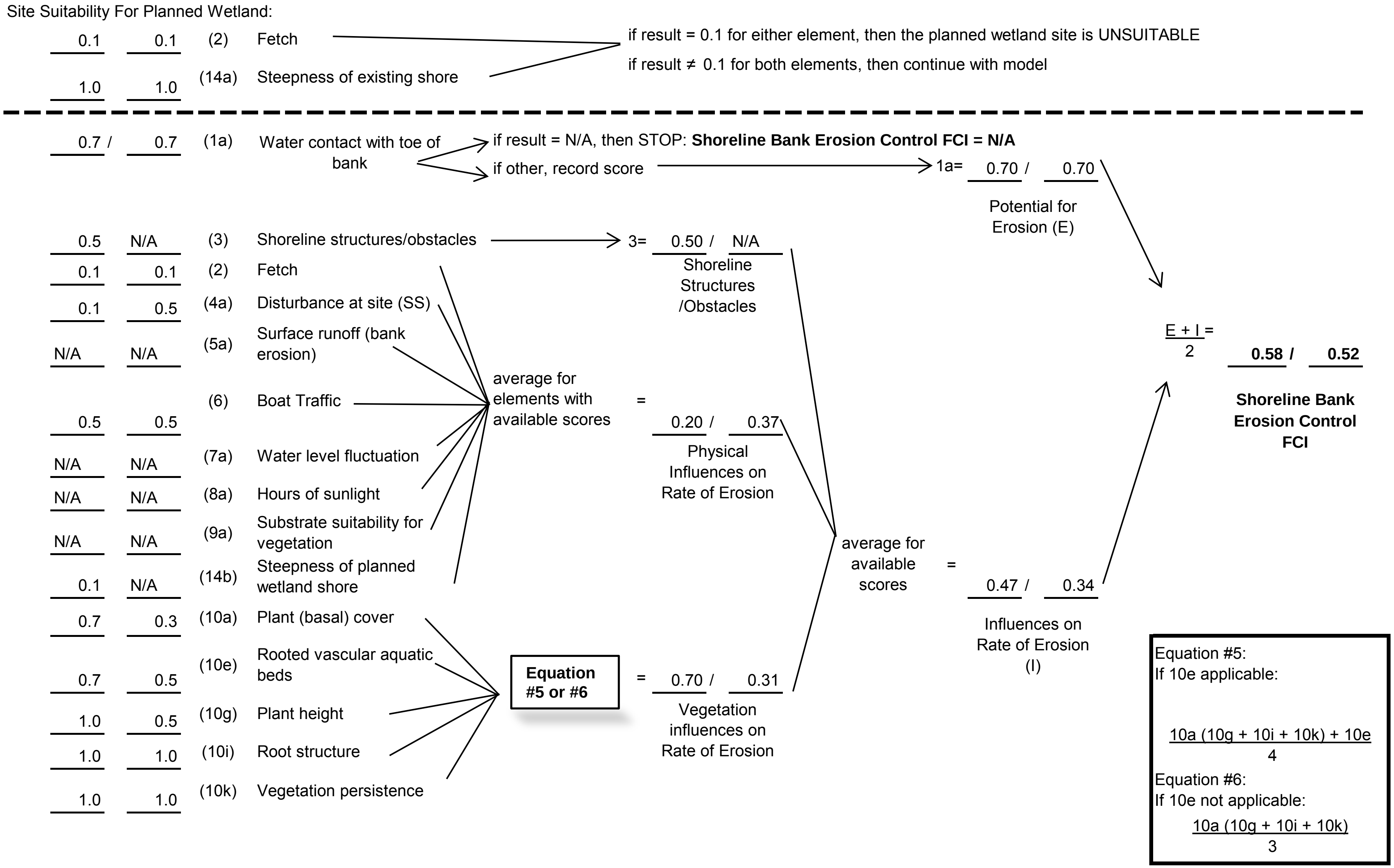
| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.36 | 13.55 | 4.88 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.67 | 13.55 | 9.08 | |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.56 | 13.55 | 7.59 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1



Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.3 | (10a) | Plant (basal) cover |
| 0.7 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 0.5 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.20 / 0.37

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.70 / 0.31

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.34

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 /** **0.52**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.75 / 0.55
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 0.77
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.49 /** **0.64**

**Sediment Stabilization FCI**

Equation #7:

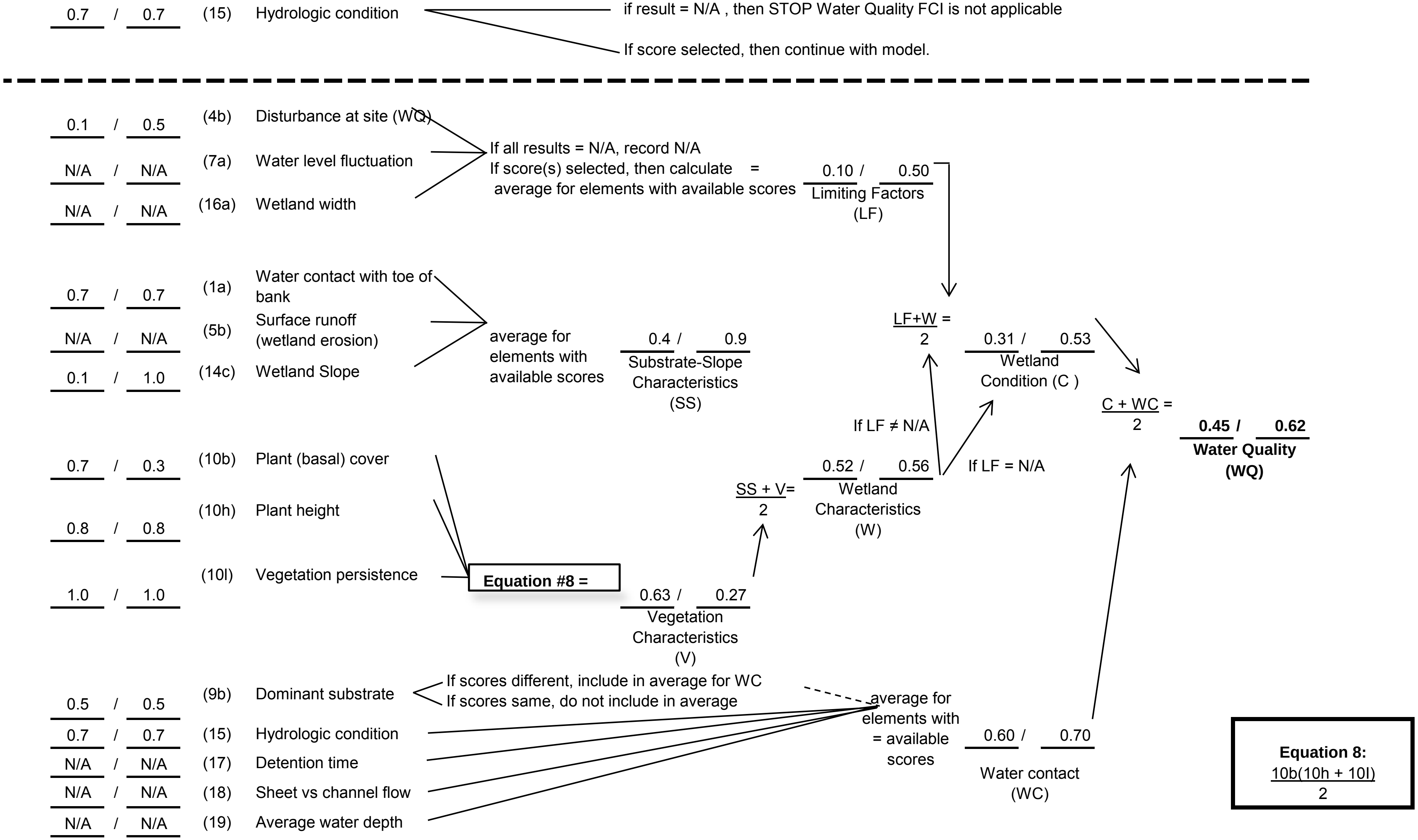
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Water Quality

Selected Scores | (#) | Element

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1



0.7 / 0.7 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

0.1 / 0.5 (4b) Disturbance at site (WQ)

N/A / N/A (7a) Water level fluctuation

N/A / N/A (16a) Wetland width

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / 0.50 Limiting Factors (LF)

0.7 / 0.7 (1a) Water contact with toe of bank

N/A / N/A (5b) Surface runoff (wetland erosion)

0.1 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.4 / 0.9 Substrate-Slope Characteristics (SS)

0.7 / 0.3 (10b) Plant (basal) cover

0.8 / 0.8 (10h) Plant height

1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

0.63 / 0.27 Vegetation Characteristics (V)

SS + V= / 2

0.52 / 0.56 Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.31 / 0.53 Wetland Condition (C )

C + WC = / 2

**0.45 / 0.62**

**Water Quality (WQ)**

0.5 / 0.5 (9b) Dominant substrate

If scores different, include in average for WC
If scores same, do not include in average

0.7 / 0.7 (15) Hydrologic condition

N/A / N/A (17) Detention time

N/A / N/A (18) Sheet vs channel flow

N/A / N/A (19) Average water depth

average for elements with = available scores

0.60 / 0.70 Water contact (WC)

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.41 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.4 / 0.4 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.52 / 0.54 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.32**
**Wildlife FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 / 0.5 | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 0.5 | (9c) | Substrate suitability for fish |
| 0.7 / 0.3 | (10d) | Plant (basal) cover |
| 0.3 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.2 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.34 / 0.41**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| 1.0 | / | 1.0 | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.10 / 0.50

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.17 / 0.23

Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.36**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.36**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | UAA baseline / Planned Upland Alternative C - Yr 1 |
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.3 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~ = 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.12 / 0.33
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.67
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 / 0.67**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.5 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.73 / 0.73 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.53 / 0.56 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.56**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative C Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.60 | 51.77 | 31.06 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 1.00 | 51.77 | 51.77 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.89 | 51.77 | 46.08 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.71 | 51.77 | 36.76 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.59 | 51.77 | 30.54 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative C Year 20 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.53 | 13.55 | 7.18 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.82 | 13.55 | 11.11 | ✓ |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.73 | 13.55 | 9.89 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Shoreline Bank Erosion Control

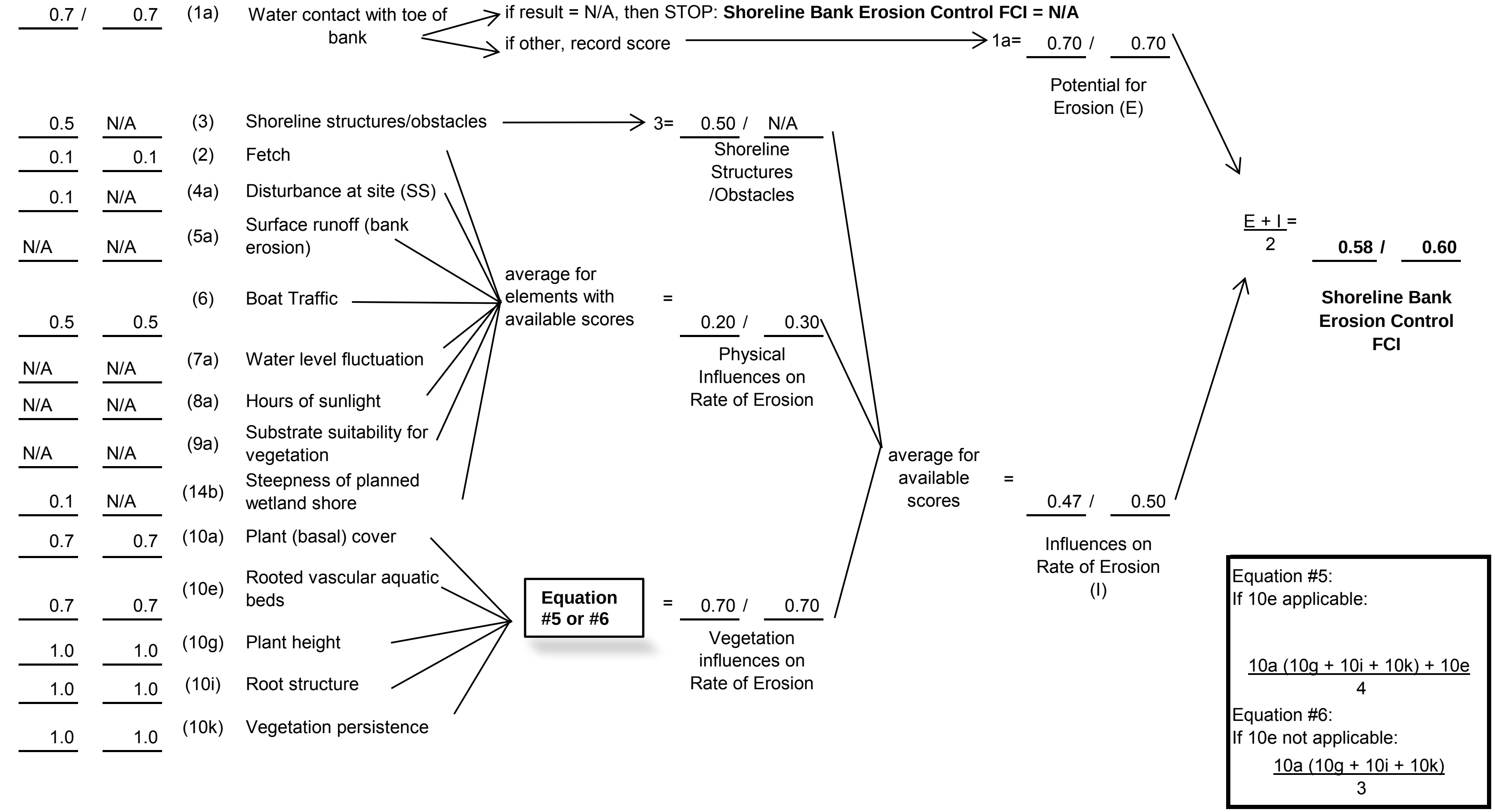
Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.20 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.70 / 0.70

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.50

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 / 0.60**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / N/A Disturbance Factors (DF)

**Equation #7** = 0.75 / 1.00 Vegetation Characteristics (V)

Wetland slope = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.49 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

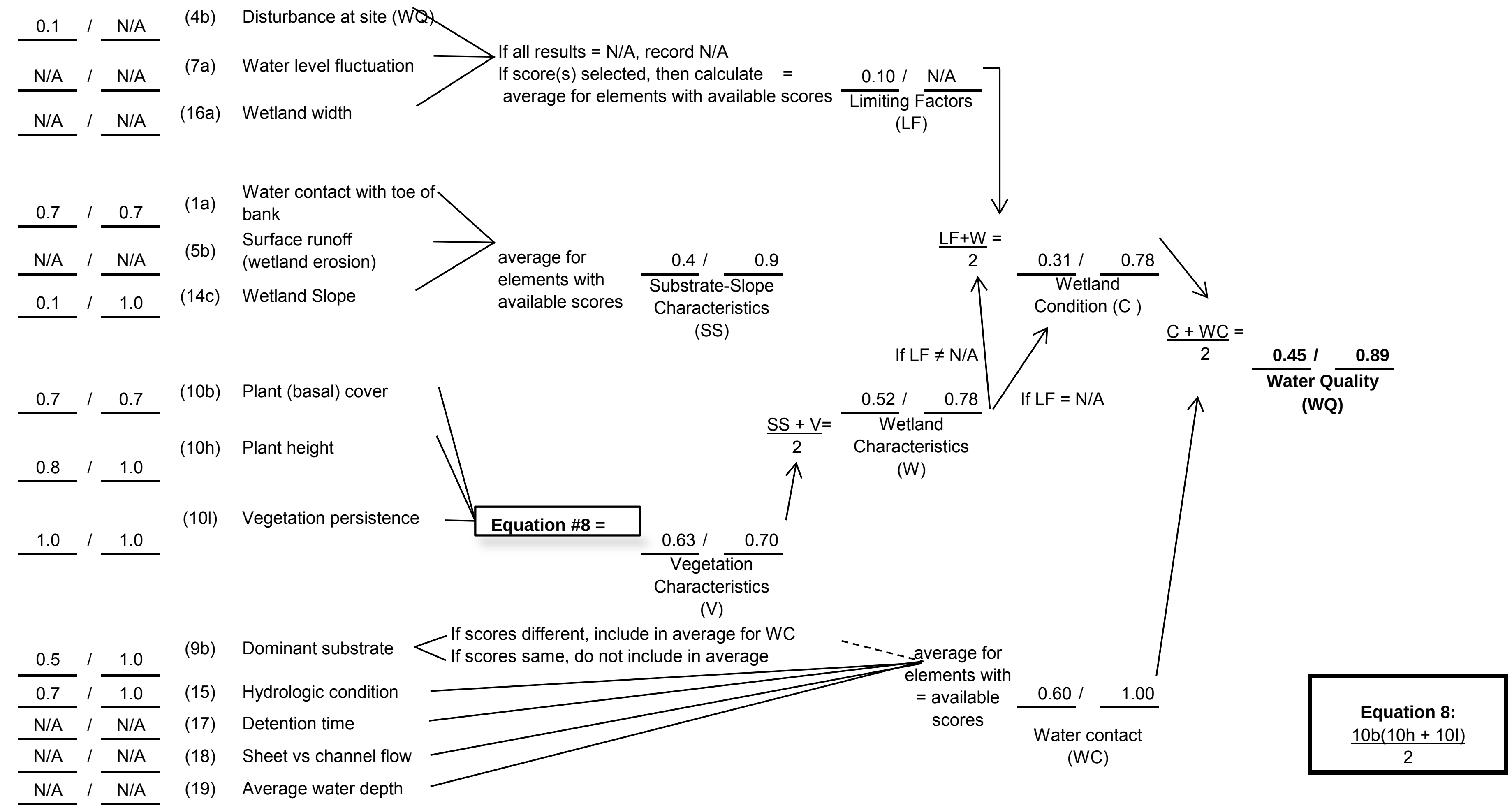
## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.10 / N/A
Limiting Factors
(LF)

average for elements with available scores

0.4 / 0.9
Substrate-Slope Characteristics
(SS)

Equation #8 =

0.63 / 0.70
Vegetation Characteristics
(V)

$\frac{SS + V}{2}$ =

0.52 / 0.78
Wetland Characteristics
(W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.31 / 0.78
Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00

Water contact
(WC)

$\frac{C + WC}{2}$ =

**0.45 / 0.89**
**Water Quality**
**(WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element | | |
|---|---|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat | If 4c, 16b and 20a = N/A, record N/A<br>If any score = 0.1, record 0.1 | = 0.10 / N/A<br>Features Which Reduce Habitat Value (F) |
| 0.1 / N/A | (20a) | Gross contamination | | |
| N/A / N/A | (16b) | Wetland size | | |
| 0.9 / 1.0 | (11a) | Layers | average for elements with available scores | = 0.87 / 0.90<br>Vegetation Strata |
| 0.7 / 0.7 | (11b) | Condition of Layers | | |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees | | |
| 0.2 / 0.2 | (12a) | Cover types | average for elements with available scores | = 0.32 / 0.74<br>Vegetation Cover Types |
| 0.5 / 1.0 | (12b) | Ratio of cover types | | |
| 0.5 / 1.0 | (12c) | Cover type interspersion | | |
| 0.1 / N/A | (12d) | Undesirable species | | |
| 0.5 / 0.5 | (13a) | % open water | average for elements with available scores | = 0.50 / 0.50<br>Vegetation/ Water Proportions |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion | | |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge | average for elements with available scores | = 0.4 / 0.7<br>Physical Features |
| 1.0 / 1.0 | (22a) | Wildlife attractors | | |
| 0.1 / 0.1 | (23) | Islands | | |

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.52 / 0.71 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.71**
**Wildlife FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calclation of Fish (Tidal)

Selected Scores (#) Element Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 0.5 | (9c) | Substrate suitability for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.7 Food/Cover

average for avaliable scores = **0.34 / 0.59**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| 1.0 / | 1.0 | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted]

1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.17 / 0.53

Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.53**

**Influences on Rate of Erosion (I)**

E + I = **0.13 / 0.53**
2

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | UAA baseline / Planned Upland Alternative C - Yr 20 | | |
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.12 / 0.63
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 / 0.82**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.7 | (11a) | Layers |
| 0.7 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.73 / 0.80
Vegetation Strata

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |

average for elements with available scores = 0.30 / 0.38
Vegetation Cover Types

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.55 / 1.00
Physical Features

average for available scores = 0.53 / 0.73
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.31 / 0.73**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between WAA# Baseline and wetland # Alternative C Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.58 | 34.70 | 20.13 | 0.67 | 1 | 20.13 | 0.67 | 30.17 | 0.60 | 49.18 | 29.51 | ✓ |
| SS | 0.49 | 34.70 | 17.00 | 0.54 | 1 | 17.00 | 0.54 | 31.55 | 1.00 | 49.18 | 49.18 | ✓ |
| WQ | 0.45 | 34.70 | 15.62 | 0.47 | 1 | 15.62 | 0.47 | 33.05 | 0.89 | 49.18 | 43.77 | ✓ |
| WL | 0.31 | 34.70 | 10.76 | 0.34 | 1 | 10.76 | 0.34 | 31.55 | 0.71 | 49.18 | 34.92 | ✓ |
| FT | 0.34 | 34.70 | 11.80 | 0.37 | 1 | 11.80 | 0.37 | 31.55 | 0.63 | 49.18 | 30.98 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 865 - Kearny Point

Comparison between UAA # Baseline and upland # Alternative C Year 50 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.13 | 30.62 | 3.98 | 0.15 | 1 | 3.98 | 0.15 | 26.63 | 0.75 | 16.14 | 12.10 | ✓ |
| SS | 0.33 | 30.62 | 10.10 | 0.36 | 1 | 10.10 | 0.36 | 27.84 | 0.82 | 16.14 | 13.23 | ✓ |
| WL | 0.31 | 30.62 | 9.49 | 0.34 | 1 | 9.49 | 0.34 | 27.84 | 0.73 | 16.14 | 11.78 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Shoreline Bank Erosion Control

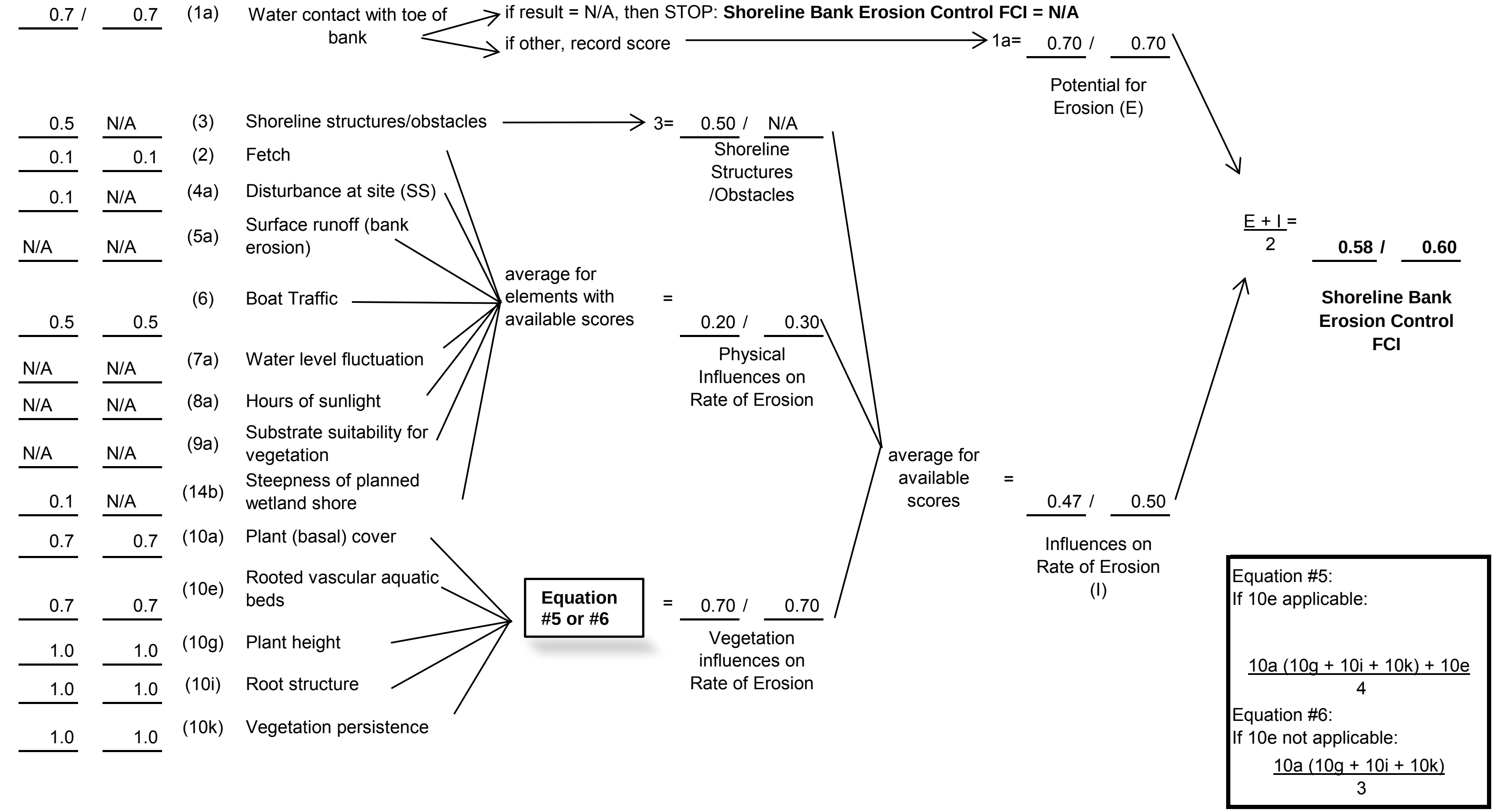
Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| 0.1 | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.20 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.70 / 0.70

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.50

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.58 / 0.60**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

4a, 7a: if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / N/A Disturbance Factors (DF)

10b, 10c, 10j, 10l: **Equation #7** = 0.75 / 1.00 Vegetation Characteristics (V)

14c: = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.49 / 1.00**

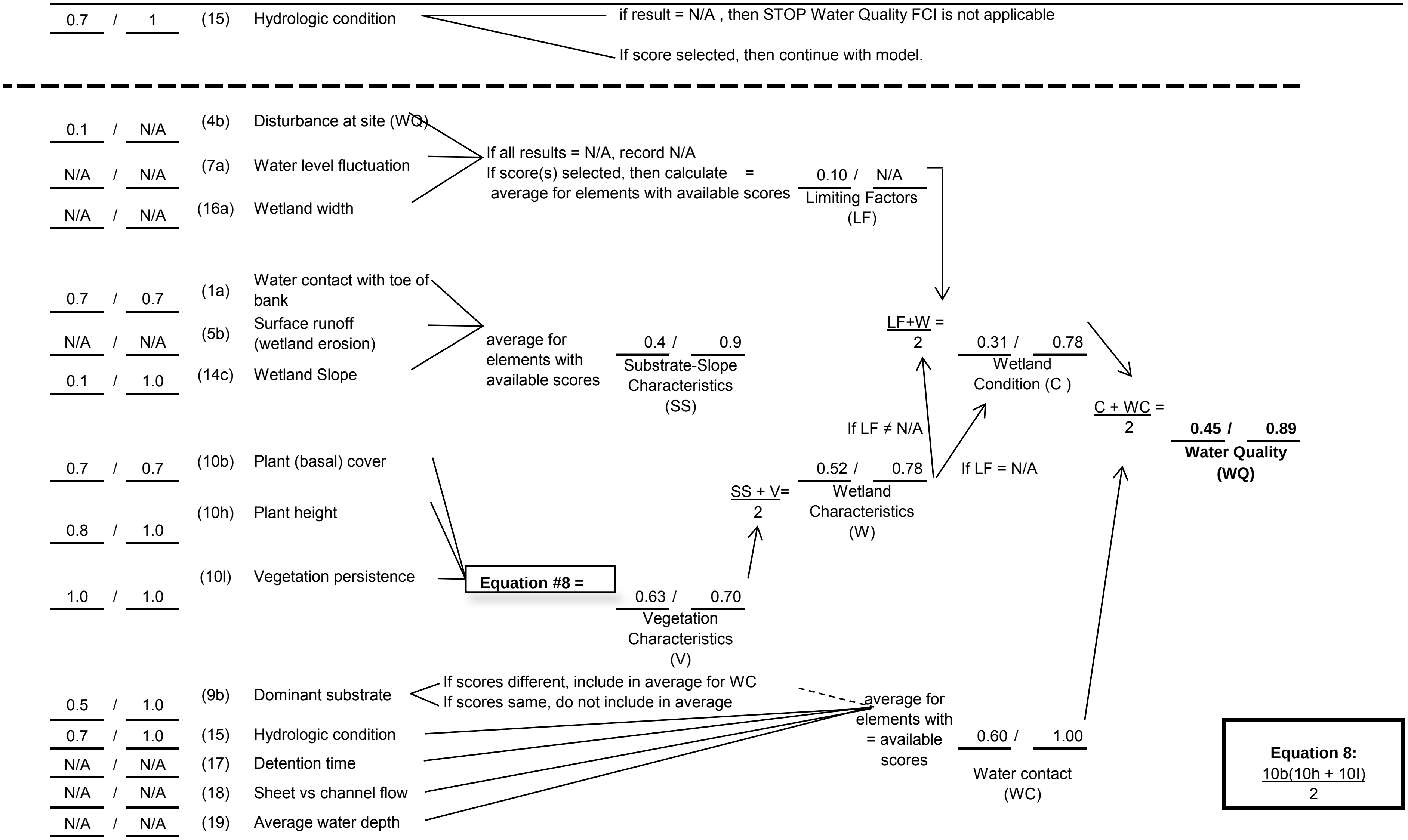
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Water Quality



| Selected Scores | (#) | Element |
|---|---|---|
| Comparison: | | WAA baseline / Planned Wetland Alternative C - Yr 50 |
| 0.7 / 1 | (15) | Hydrologic condition |
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 0.1 / 1.0 | (14c) | Wetland Slope |
| 0.7 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

(15) Hydrologic condition: if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

(4b), (7a), (16a): If all results = N/A, record N/A

If score(s) selected, then calculate = average for elements with available scores

0.10 / N/A Limiting Factors (LF)

(1a), (5b), (14c): average for elements with available scores

0.4 / 0.9 Substrate-Slope Characteristics (SS)

(10b), (10h), (10l): Equation #8 =

0.63 / 0.70 Vegetation Characteristics (V)

SS + V= / 2

0.52 / 0.78 Wetland Characteristics (W)

If LF ≠ N/A: LF+W = / 2

If LF = N/A

0.31 / 0.78 Wetland Condition (C )

(9b) Dominant substrate: If scores different, include in average for WC

If scores same, do not include in average

(9b), (15), (17), (18), (19): average for elements with = available scores

0.60 / 1.00 Water contact (WC)

C + WC = / 2

**0.45 / 0.89**

**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.9 / 1.0 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.2 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.87 / 0.90 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.32 / 0.74 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.50 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.4 / 0.7 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.52 / 0.71 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.71**
**Wildlife FCI**

`

PROJECT TITLE: Site 865 - Kearny Point

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.1 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.3 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.2 / 0.5 | (9c) | Substrate suitability for fish |
| 0.7 / 1.0 | (10d) | Plant (basal) cover |
| 0.3 / 1.0 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.2 / 0.8 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.34 / 0.63**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 865 - Kearny Point

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| 1.0 / | 1.0 | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | 1.0 | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted]

1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.1 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.17 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.13 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.13 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.1 / | 0.5 | (10j) | Root structure |
| 0.1 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~ score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.12 / 0.63
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.56 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.33 / 0.82**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 865 - Kearny Point

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.73 / 0.80 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.53 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.31 / 0.73**
**Wildlife FCI**

# Site 866 - Oak Island Yards

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.60 | 11.44 | 6.86 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.67 | 11.44 | 7.66 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.78 | 11.44 | 8.92 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.37 | 11.44 | 4.23 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.53 | 11.44 | 6.06 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative A Year 2 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.51 | 2.61 | 1.33 | |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.82 | 2.61 | 2.14 | |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.33 | 2.61 | 0.86 | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUUAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

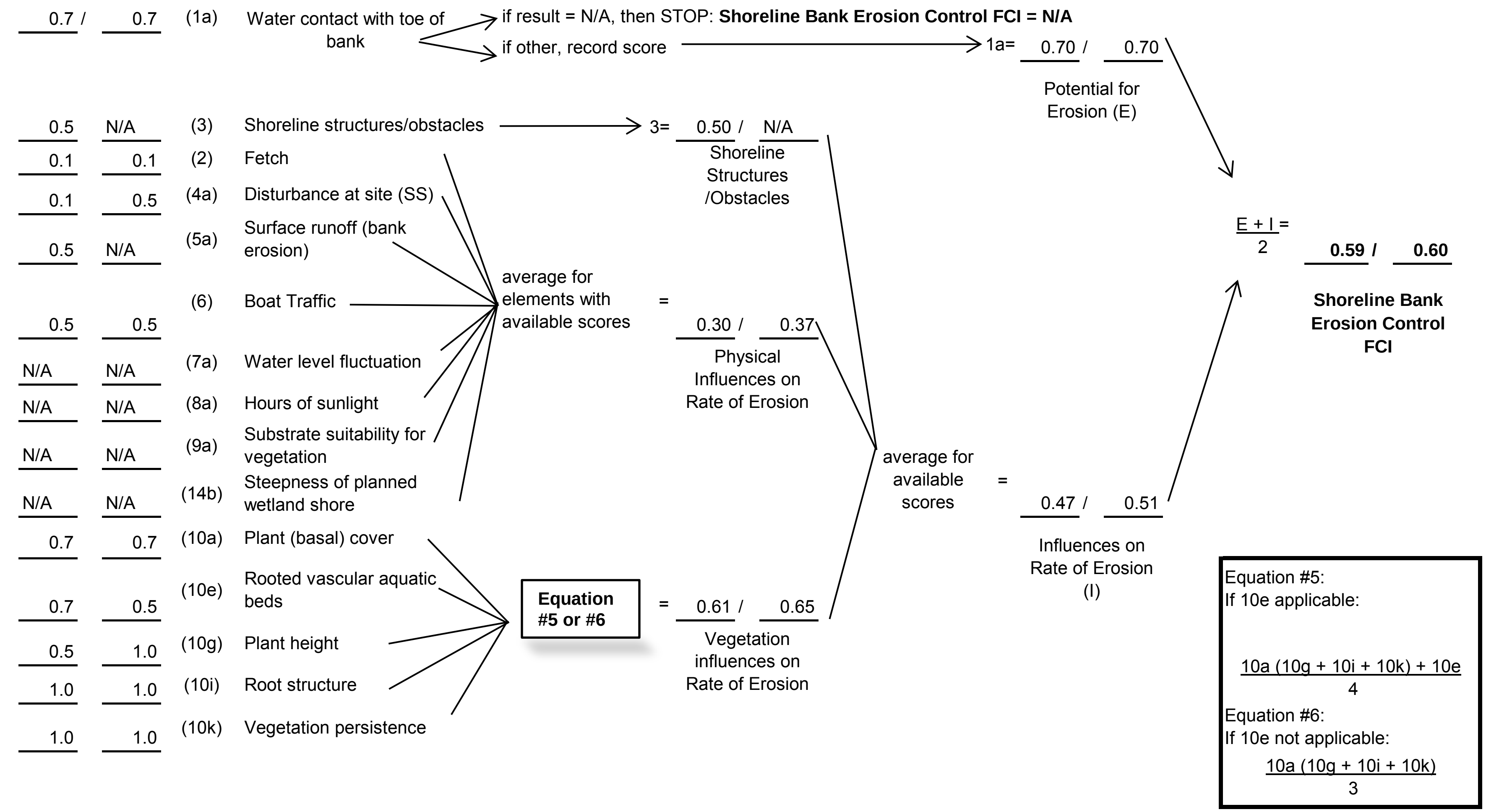
Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| | | | |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| 0.7 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.30 / 0.37

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.61 / 0.65

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.51

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 / 0.60**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Sediment Stabilization

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1 |
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.8 / | 0.8 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50 Disturbance Factors (DF)

**Equation #7** = 0.74 / 0.68 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 0.84 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.48 /** **0.67**

**Sediment Stabilization FCI**

Equation #7:

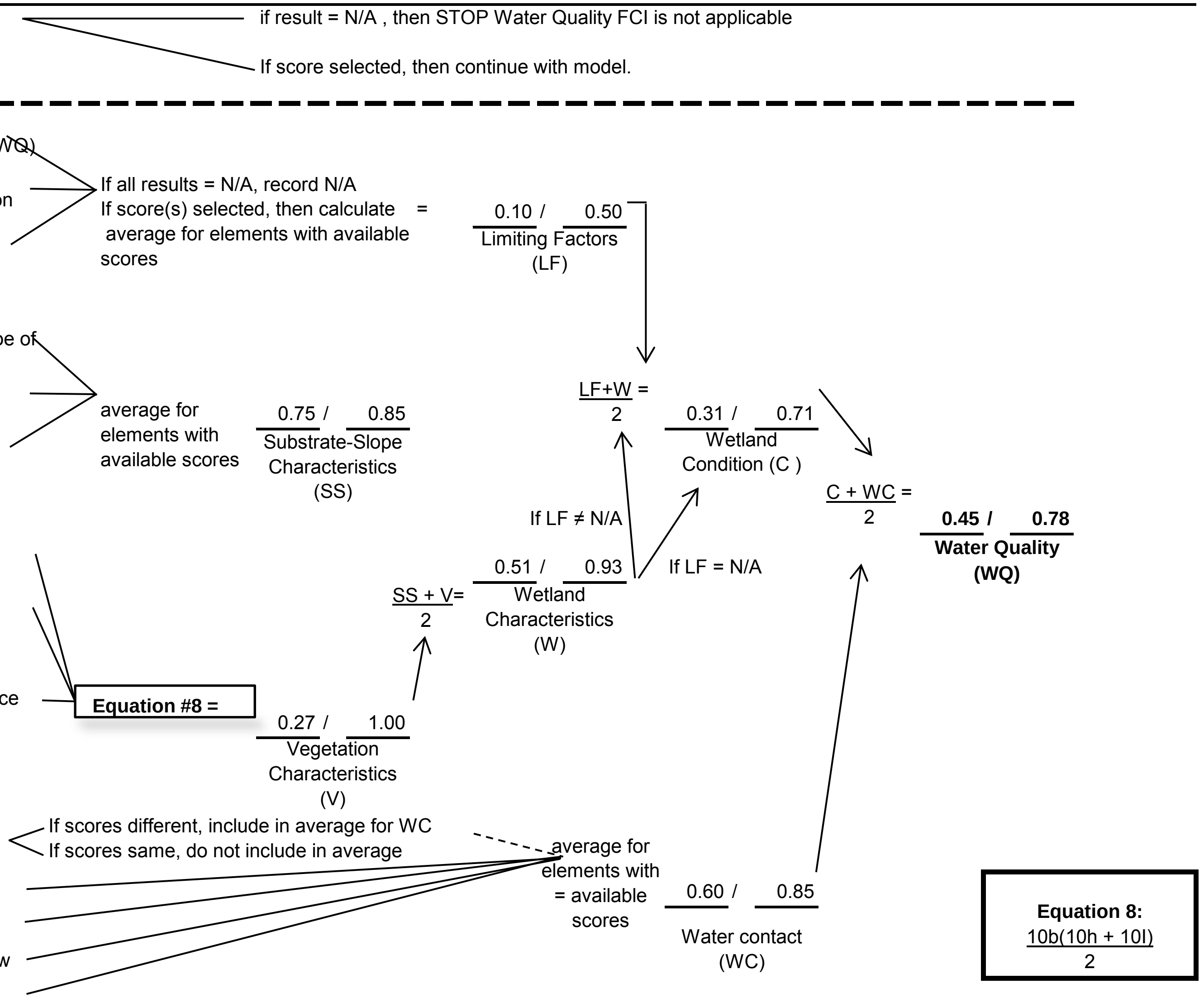
$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.7 | (15) | Hydrologic condition |
| 0.1 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 0.7 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.3 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.80 / 0.67 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.33 / 0.42 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.75 / 0.50 Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

average for elements with available scores = 0.6 / 1.0 Physical Features

average for available scores = 0.61 / 0.65 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA

**0.35 / 0.37**
**Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element | |
|---|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (1b) | Shoreline bank stability |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (4d) | Disturbance in channel/open water |
| N/A | N/A | (7b) | Most permanent hydroperiod |
| N/A | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | 0.5 | (9c) | Substrate suitability for fish |
| 0.7 | 0.3 | (10d) | Plant (basal) cover |
| 0.7 | 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.6 Food/Cover

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | INA | (20d) | Dissolved Oxygen |
| INA | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.44 / 0.53**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / 0.50
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.53 / 0.53
Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.51**
**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 / 0.51**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$\frac{10a\ (10g + 10i + 10k)}{3}$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.63
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.46 / 0.82**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.3 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.83 / 0.77 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.55 / 0.55 Physical Features

average for available scores = 0.56 / 0.57 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.33 / 0.33**
**Wildlife FCI**

### Table A.1.
### Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative A Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.83 | 11.46 | 9.51 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 1.00 | 11.46 | 11.46 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 1.00 | 11.46 | 11.46 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.89 | 11.46 | 10.20 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.75 | 11.46 | 8.60 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative A Year 20 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.75 | 2.59 | 1.94 | ✓ |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.84 | 2.59 | 2.18 | |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.76 | 2.59 | 1.97 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUUAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

(3) → 3= 0.50 / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.30 / 0.30

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.61 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 / 0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.74 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.48 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

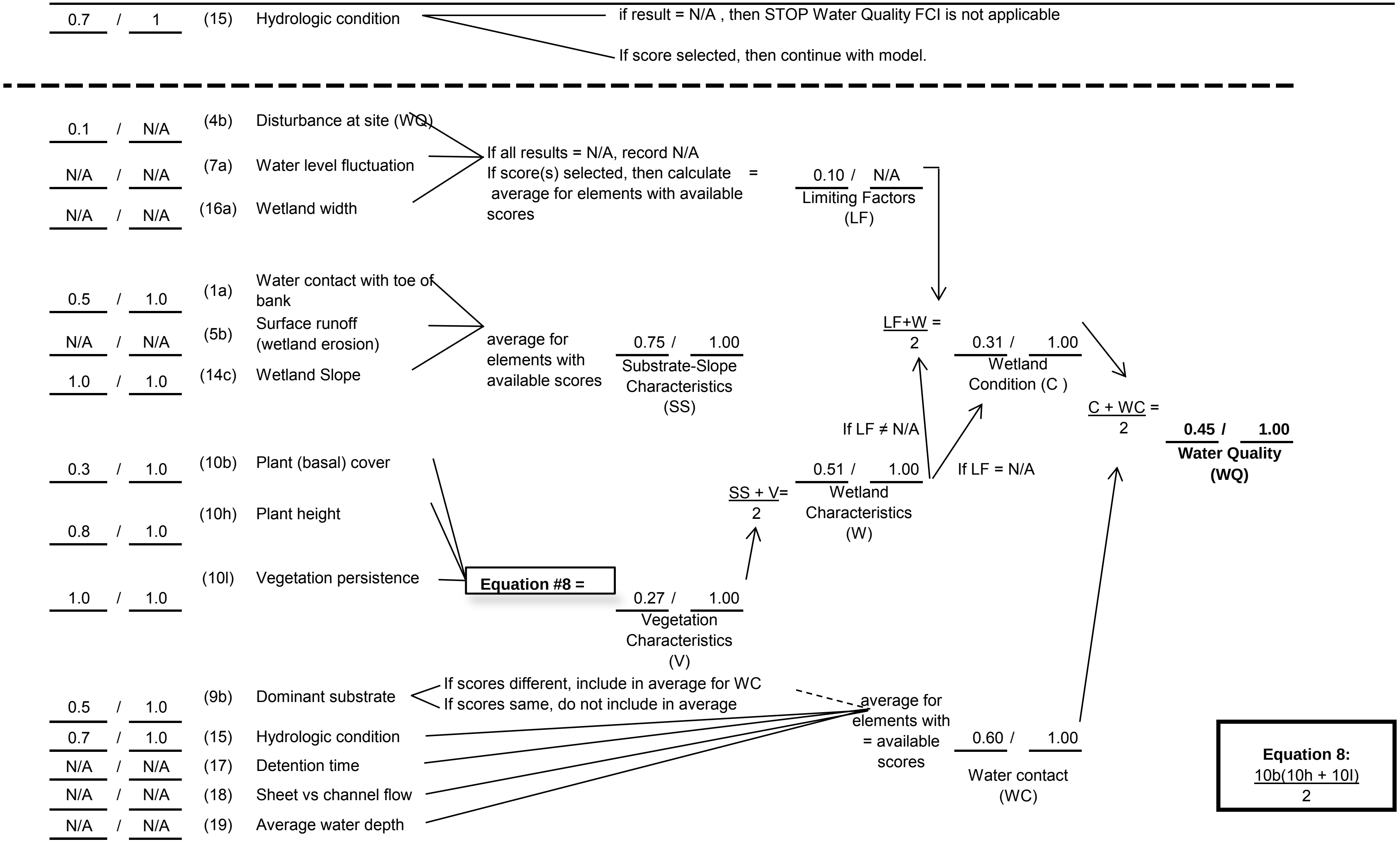
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 0.3 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



Hydrologic condition: if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =

0.10 / N/A
Limiting Factors (LF)

average for elements with available scores

0.75 / 1.00
Substrate-Slope Characteristics (SS)

**Equation #8 =**

0.27 / 1.00
Vegetation Characteristics (V)

SS + V= / 2

0.51 / 1.00
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.31 / 1.00
Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00
Water contact (WC)

C + WC = / 2

**0.45 / 1.00**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.7 | 0.9 | (11a) | Layers |
| 0.7 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 | 0.3 | (12a) | Cover types |
| 0.5 | 1.0 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| 1.0 | 1.0 | (13a) | % open water |
| 0.5 | 1.0 | (13b) | Vegetation/water interspersion |
| 1.0 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| 0.1 | 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.97 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.33 / 0.59 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 1.00 Vegetation/Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 1.0 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.61 / 0.89 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.35 / 0.89 Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calclation of Fish (Tidal)

| Selected Scores | | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20 |
|---|---|---|---|---|

Site Suitability For Planned Wetland:

| | | | | |
|---|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| | | | | | |
|---|---|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability | average for elements with available scores | = 0.5 / N/A | Limiting Factors |
| 0.5 / N/A | (4a) | Disturbance at site (SS) | | | |
| N/A / N/A | (4d) | Disturbance in channel/open water | | | |
| N/A / N/A | (7b) | Most permanent hydroperiod | | | |
| N/A / N/A | (24) | Obstruction to fish passage | | | |

| | | | | | |
|---|---|---|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod | **Equation #9** | = 0.3 / 1.0 | Food/Cover |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish | | | |
| 0.7 / 1.0 | (10d) | Plant (basal) cover | | | |
| 0.7 / 1.0 | (10f) | Rooted vascular aquatic beds | | | |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge | | | |
| 0.5 / 1.0 | (22b) | Available fish cover/attractors | | | |

average for avaliable scores = **0.44 / 0.75**

**Fish (Tidal) FCI**

**x= 0.2**

| | | | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |

| | | | | | |
|---|---|---|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | average for elements with available scores | = 0.5 / 0.5 | Water Quality (WQ) |
| INA / INA | (20d) | Dissolved Oxygen | | | |
| INA / INA | (20f) | Maximum water temperature | | | |

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 866. Oak Island Yards

Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements  with available scores  =  1.00 /  1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.53 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.31 /** **0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 /** **0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4a) | Disturbance at site |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / 0.7 | (10b) | Plant (basal) cover |
| 0.7 / 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / 0.5 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~ score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.68
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.46 /** **0.84**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.83 / 0.90
Vegetation Strata

average for elements with available scores = 0.30 / 0.38
Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

average for elements with available scores = 0.55 / 1.00
Physical Features

average for available scores = 0.56 / 0.76
Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ =

**0.33 / 0.76**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.83 | 10.89 | 9.04 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 1.00 | 10.89 | 10.89 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.82 | 10.89 | 8.93 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.90 | 10.89 | 9.80 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.75 | 10.89 | 8.17 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative A Year 50 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.75 | 3.16 | 2.37 | ✓ |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.84 | 3.16 | 2.66 | ✓ |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.76 | 3.16 | 2.40 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUUAA x R (i.e., planned upland goal)

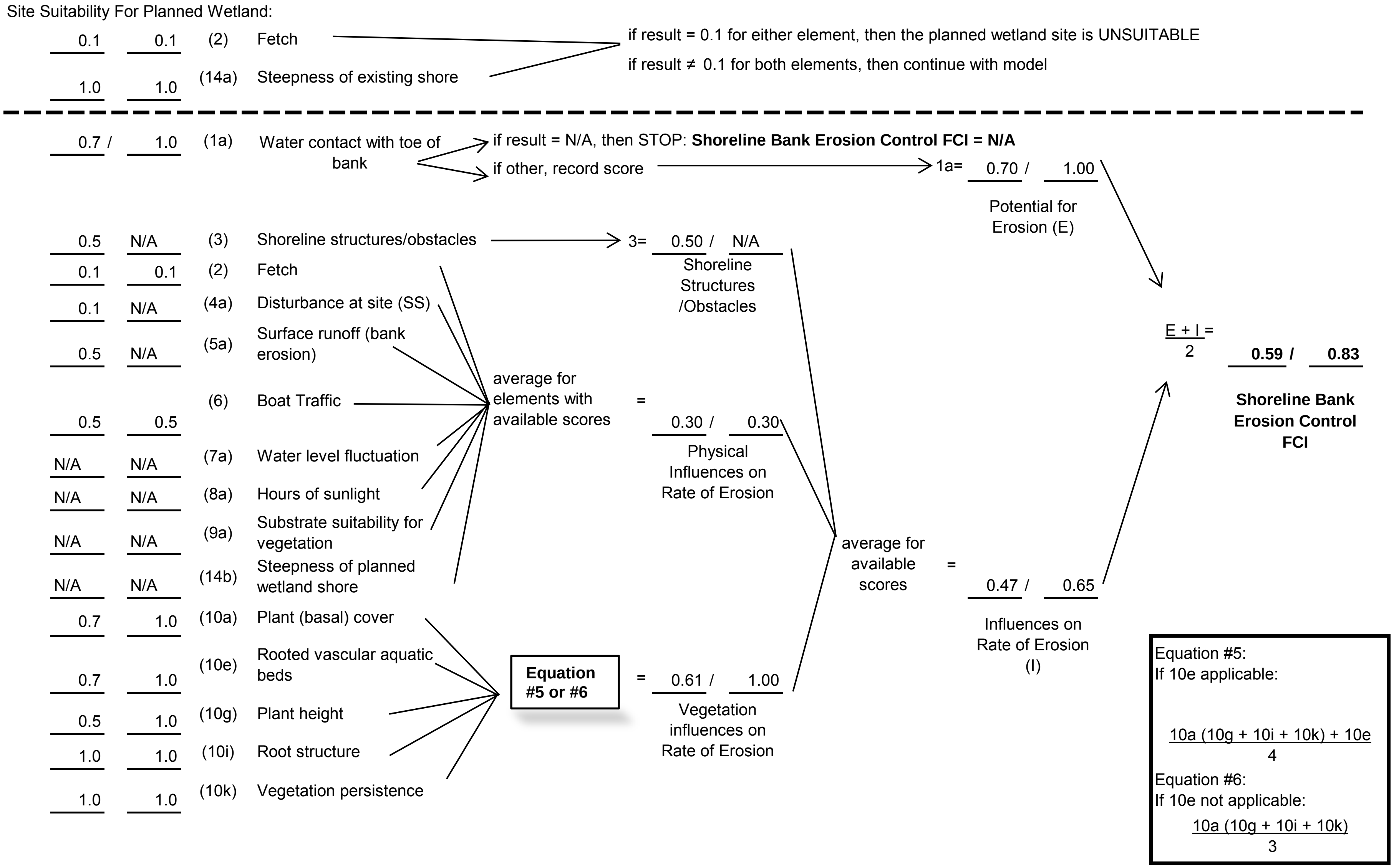
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | **Site Suitability For Planned Wetland:** |
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.30 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.61 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 / 0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

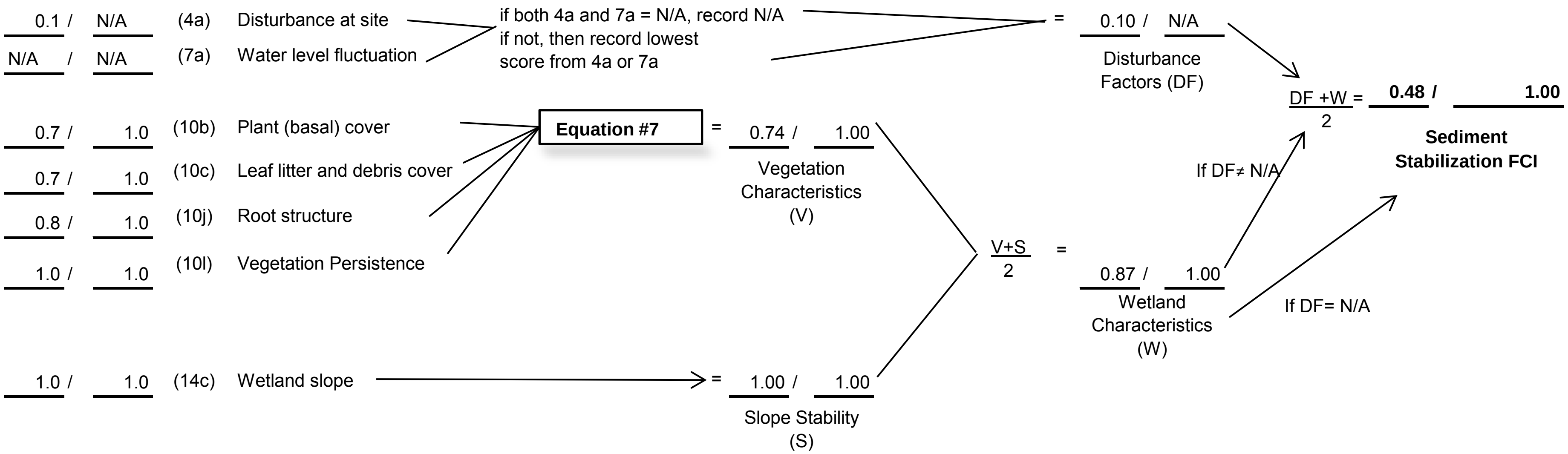
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Sediment Stabilization

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



0.1 / N/A (4a) Disturbance at site

N/A / N/A (7a) Water level fluctuation

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / N/A
Disturbance Factors (DF)

0.7 / 1.0 (10b) Plant (basal) cover

0.7 / 1.0 (10c) Leaf litter and debris cover

0.8 / 1.0 (10j) Root structure

1.0 / 1.0 (10l) Vegetation Persistence

**Equation #7** = 0.74 / 1.00
Vegetation Characteristics (V)

1.0 / 1.0 (14c) Wetland slope = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.48 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

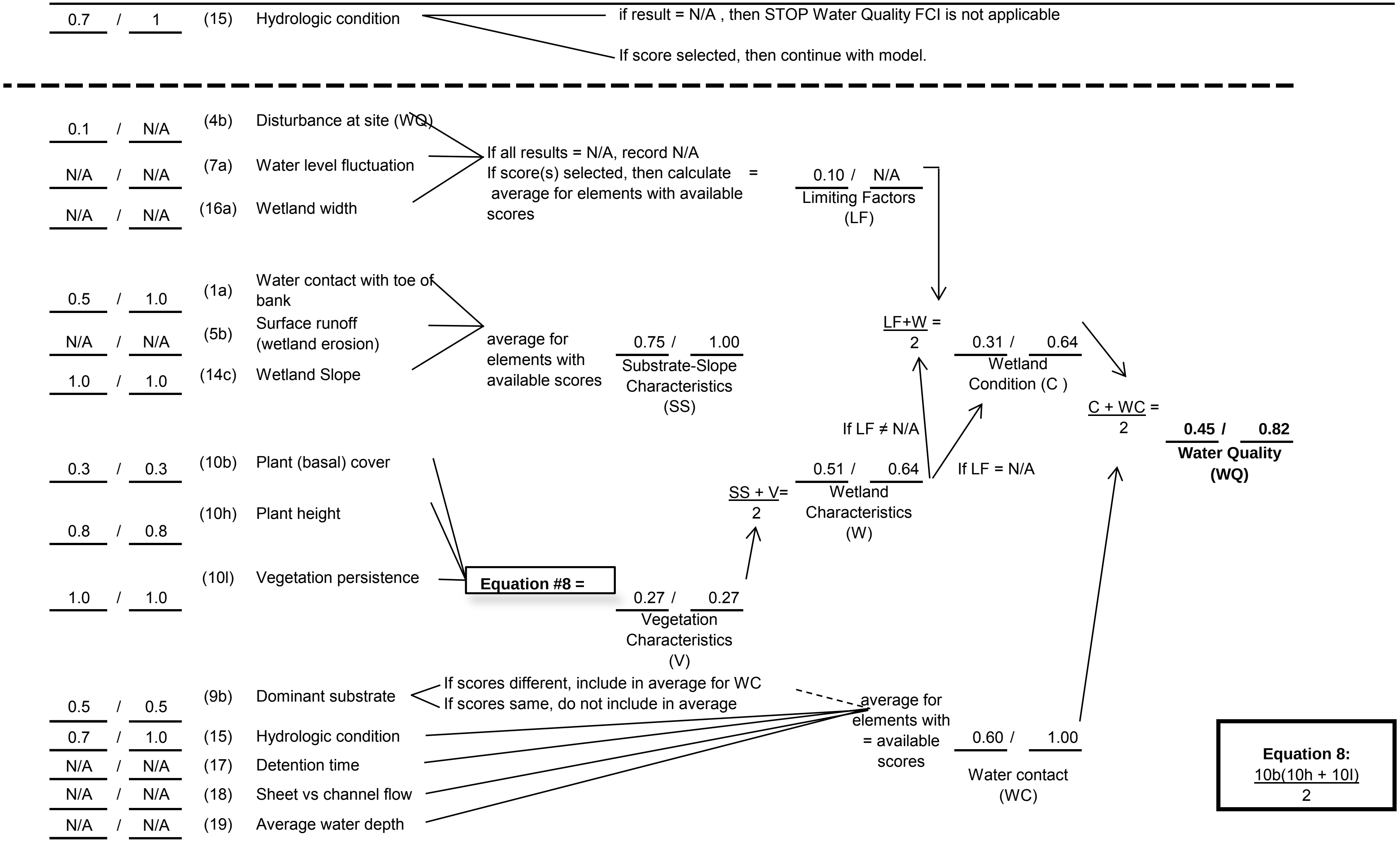
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



0.7 / 1 (15) Hydrologic condition
if result = N/A , then STOP Water Quality FCI is not applicable
If score selected, then continue with model.

0.1 / N/A (4b) Disturbance at site (WQ)
N/A / N/A (7a) Water level fluctuation
N/A / N/A (16a) Wetland width

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =

0.10 / N/A Limiting Factors (LF)

0.5 / 1.0 (1a) Water contact with toe of bank
N/A / N/A (5b) Surface runoff (wetland erosion)
1.0 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.75 / 1.00 Substrate-Slope Characteristics (SS)

0.3 / 0.3 (10b) Plant (basal) cover
0.8 / 0.8 (10h) Plant height
1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

0.27 / 0.27 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.51 / 0.64 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.31 / 0.64 Wetland Condition (C )

0.5 / 0.5 (9b) Dominant substrate
If scores different, include in average for WC
If scores same, do not include in average
0.7 / 1.0 (15) Hydrologic condition
N/A / N/A (17) Detention time
N/A / N/A (18) Sheet vs channel flow
N/A / N/A (19) Average water depth

average for elements with = available scores

0.60 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.45 / 0.82**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 1.0 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 1.0 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 1.00 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.33 / 0.59 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 1.00 Vegetation/Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 1.0 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.61 / 0.90 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.35 / 0.90 Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 1.0 | (10d) | Plant (basal) cover |
| 0.7 / 1.0 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 1.0 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 1.0 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.44 / 0.75**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.53 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.68
Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.46 / 0.84**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.83 / 0.90 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.56 / 0.76 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = 0.33 / 0.76 **Wildlife FCI**

If F = NA: 0.33 / 0.76 **Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative B Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.56 | 11.40 | 6.38 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.70 | 11.40 | 7.98 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.65 | 11.40 | 7.41 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.35 | 11.40 | 3.99 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.57 | 11.40 | 6.50 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

**Table A.1.**
**Comparison of UAA and planned upland: calculations of FCIs and FCUs**

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative B Yea r 2 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.51 | 2.65 | 1.35 | |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.66 | 2.65 | 1.75 | |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.53 | 2.65 | 1.41 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUUAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

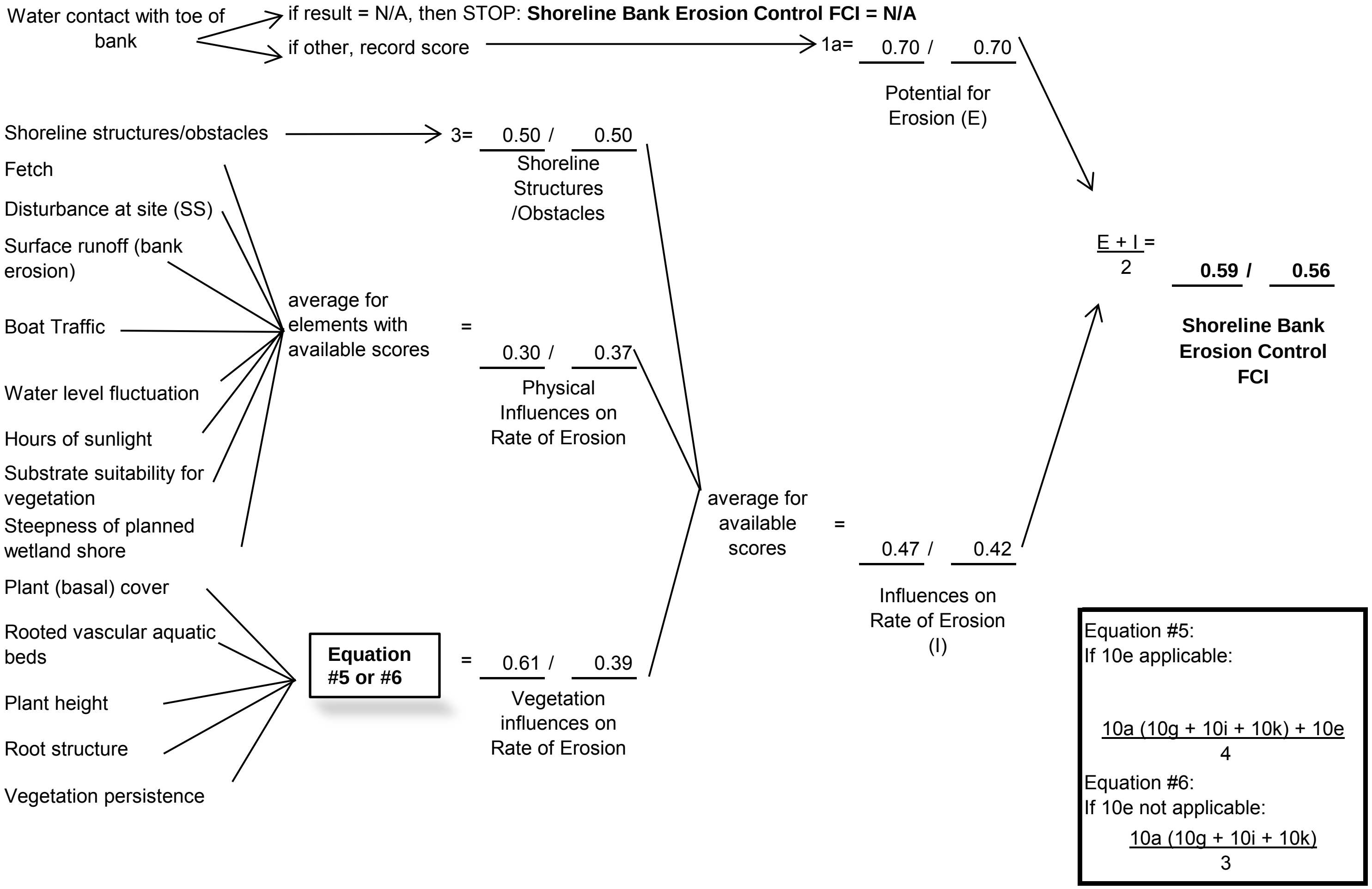
| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 7.0 | (1a) | Water contact with toe of bank |
| 0.5 | 0.5 | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.3 | (10a) | Plant (basal) cover |
| 0.7 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 0.8 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |



if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= 0.50 / 0.50

Shoreline Structures /Obstacles

average for elements with available scores = 0.30 / 0.37

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.61 / 0.39

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.42

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 / 0.56**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50 Disturbance Factors (DF)

**Equation #7** = 0.74 / 0.81 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 0.90 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.48 / 0.70**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 0.7 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.5 | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =

0.10 / 0.50 Limiting Factors (LF)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.75 / 0.75 Substrate-Slope Characteristics (SS)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.3 | 0.7 | (10b) | Plant (basal) cover |
| 0.8 | 0.8 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.27 / 0.63 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ = 0.51 / 0.69 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ =

If LF = N/A

0.31 / 0.60 Wetland Condition (C )

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (9b) | Dominant substrate |
| 0.7 | 0.7 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 0.70 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.45 / 0.65**
**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.3 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 1.0 / 1.0 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.33 / 0.42 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 0.6 Physical Features

average for available scores = 0.61 / 0.60 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA

**0.35 / 0.35**
**Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitabuility for fish |
| 0.7 / 0.3 | (10d) | Plant (basal) cover |
| 0.7 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.7 Food/Cover

average for avaliable scores = **0.44 / 0.57**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1\text{-}x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.10 / 0.50

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.53 / 0.53

Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.51**

**Influences on Rate of Erosion (I)**

E + I = / 2 **0.31 / 0.51**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

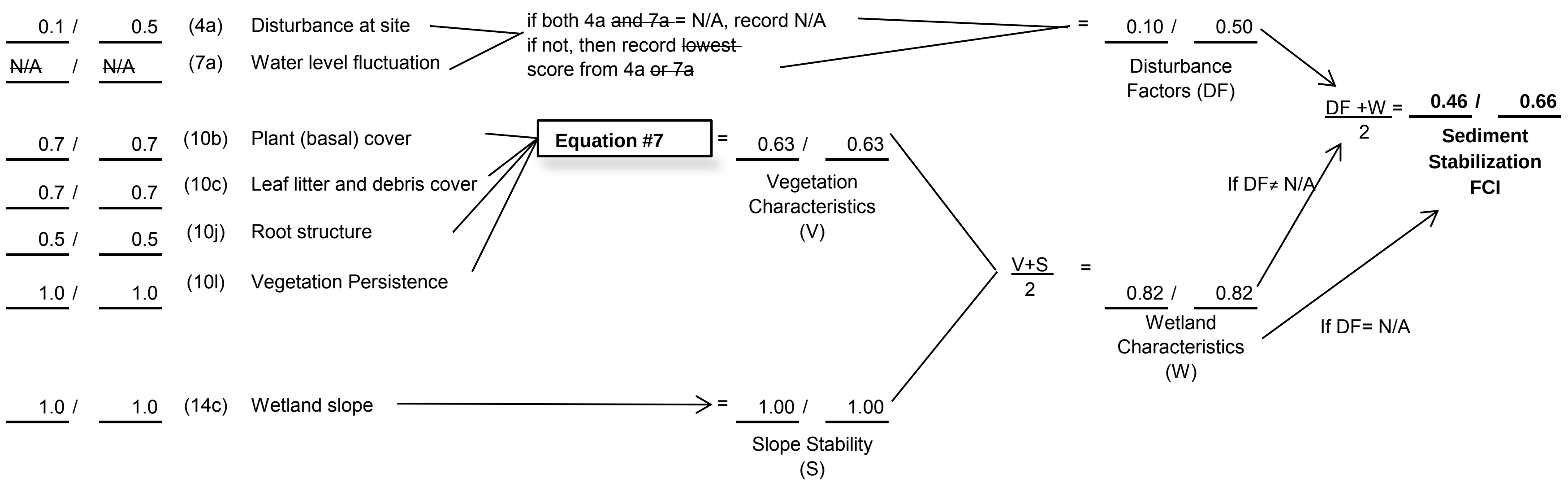
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1



| | | | |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.63
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.46 /** **0.66**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.3 | (11a) | Layers |
| 1.0 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.83 / 0.67
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38
Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 0.55
Physical Features

average for available scores = 0.56 / 0.53
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.33 / 0.53**
**Wildlife FCI**

### Table A.1.
### Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative B Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.83 | 11.43 | 9.49 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.75 | 11.43 | 8.57 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.96 | 11.43 | 10.97 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.71 | 11.43 | 8.12 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.65 | 11.43 | 7.43 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative B Year 20 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.75 | 2.62 | 1.97 | ✓ |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.84 | 2.62 | 2.20 | |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.79 | 2.62 | 2.07 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUUAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

Shoreline structures/obstacles → 3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.30 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.61 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 /** **0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | WAA baseline / Planned Wetland Alternative B - Yr 20 |
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.74 / 1.00
Vegetation Characteristics (V)

(14c) = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.48 /** **0.75**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE:  Site 866. Oak Island Yards

## Calculation of Water Quality

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

0.7 / 1 (15) Hydrologic condition
if result = N/A , then STOP Water Quality FCI is not applicable
If score selected, then continue with model.

---

| | | | |
|---|---|---|---|
| 0.1 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =

0.10 / N/A
Limiting Factors (LF)

| | | | |
|---|---|---|---|
| 0.5 | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.75 / 0.85
Substrate-Slope Characteristics (SS)

| | | | |
|---|---|---|---|
| 0.3 | 1.0 | (10b) | Plant (basal) cover |
| 0.8 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.27 / 1.00
Vegetation Characteristics (V)

SS + V= / 2

0.51 / 0.93
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.31 / 0.93
Wetland Condition (C )

C + WC = / 2

**0.45 / 0.96**
**Water Quality (WQ)**

| | | | |
|---|---|---|---|
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.7 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00
Water contact (WC)

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.9 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 1.0 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.80 / 0.87
Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.33 / 0.42
Vegetation Cover Types

(13a)–(13b): average for elements with available scores = 0.75 / 1.00
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 0.6
Physical Features

average for available scores = 0.61 / 0.71
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ = **0.35 / 0.71**

If F = NA

**Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calclation of Fish (Tidal)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| | | | | |
|---|---|---|---|---|
| N/A | / | N/A | (1b) | Shoreline bank stability |
| 0.5 | / | N/A | (4a) | Disturbance at site (SS) |
| N/A | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A

Limiting Factors

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 1.0 | (9c) | Substrate suitability for fish |
| 0.7 | / | 0.7 | (10d) | Plant (basal) cover |
| 0.7 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.8

Food/Cover

average for avaliable scores = **0.44 /** **0.65**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1\text{-}x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | | | |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5

Water Quality (WQ)

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.53 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:

If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.68
Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84
Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF + W}{2}$ = **0.46 / 0.84**

If DF= N/A: **0.84**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.83 / 0.83 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.30 / 0.55 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.56 / 0.79 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ = **0.33 / 0.79** **Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative B Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.83 | 10.86 | 9.01 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.75 | 10.86 | 8.14 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.96 | 10.86 | 10.42 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.72 | 10.86 | 7.82 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.69 | 10.86 | 7.49 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

### Table A.1.
### Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative B Year 50 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.75 | 3.19 | 2.39 | ✓ |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.84 | 3.19 | 2.68 | ✓ |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.82 | 3.19 | 2.62 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUUAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= 0.50 / N/A Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.30 / 0.30 Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.61 / 1.00 Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65 Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 / 0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.74 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.48 /** **0.75**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores = 0.10 / N/A Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores: 0.75 / 0.85 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.3 / 1.0 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =** 0.27 / 1.00 Vegetation Characteristics (V)

SS + V= / 2: 0.51 / 0.93 Wetland Characteristics (W)

If LF ≠ N/A: LF+W = / 2: 0.31 / 0.93 Wetland Condition (C )

If LF = N/A

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores: 0.60 / 1.00 Water contact (WC)

C + WC = / 2: **0.45 / 0.96 Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 1.0 | (11a) | Layers |
| 0.7 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 1.0 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.90 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.33 / 0.42 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.61 / 0.72 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = **0.35 / 0.72** **Wildlife FCI**

If F = NA: HC = **Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | (#) | Element | | | |
|---|---|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability | average for elements with available scores | = 0.5 / N/A | Limiting Factors |
| 0.5 / N/A | (4a) | Disturbance at site (SS) | | | |
| N/A / N/A | (4d) | Disturbance in channel/open water | | | |
| N/A / N/A | (7b) | Most permanent hydroperiod | | | |
| N/A / N/A | (24) | Obstruction to fish passage | | | |
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod | **Equation #9** | = 0.3 / 0.9 | Food/Cover |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish | | | |
| 0.7 / 1.0 | (10d) | Plant (basal) cover | | | |
| 0.7 / 1.0 | (10f) | Rooted vascular aquatic beds | | | |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge | | | |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors | | | |
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue | | |
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | average for elements with available scores | = 0.5 / 0.5 | Water Quality (WQ) |
| INA / INA | (20d) | Dissolved Oxygen | | | |
| INA / INA | (20f) | Maximum water temperature | | | |

average for avaliable scores = **0.44 / 0.69**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 866. Oak Island Yards

Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / N/A | (36) | Scientific research site |

average for elements  with available scores  = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Upland Erosion Control

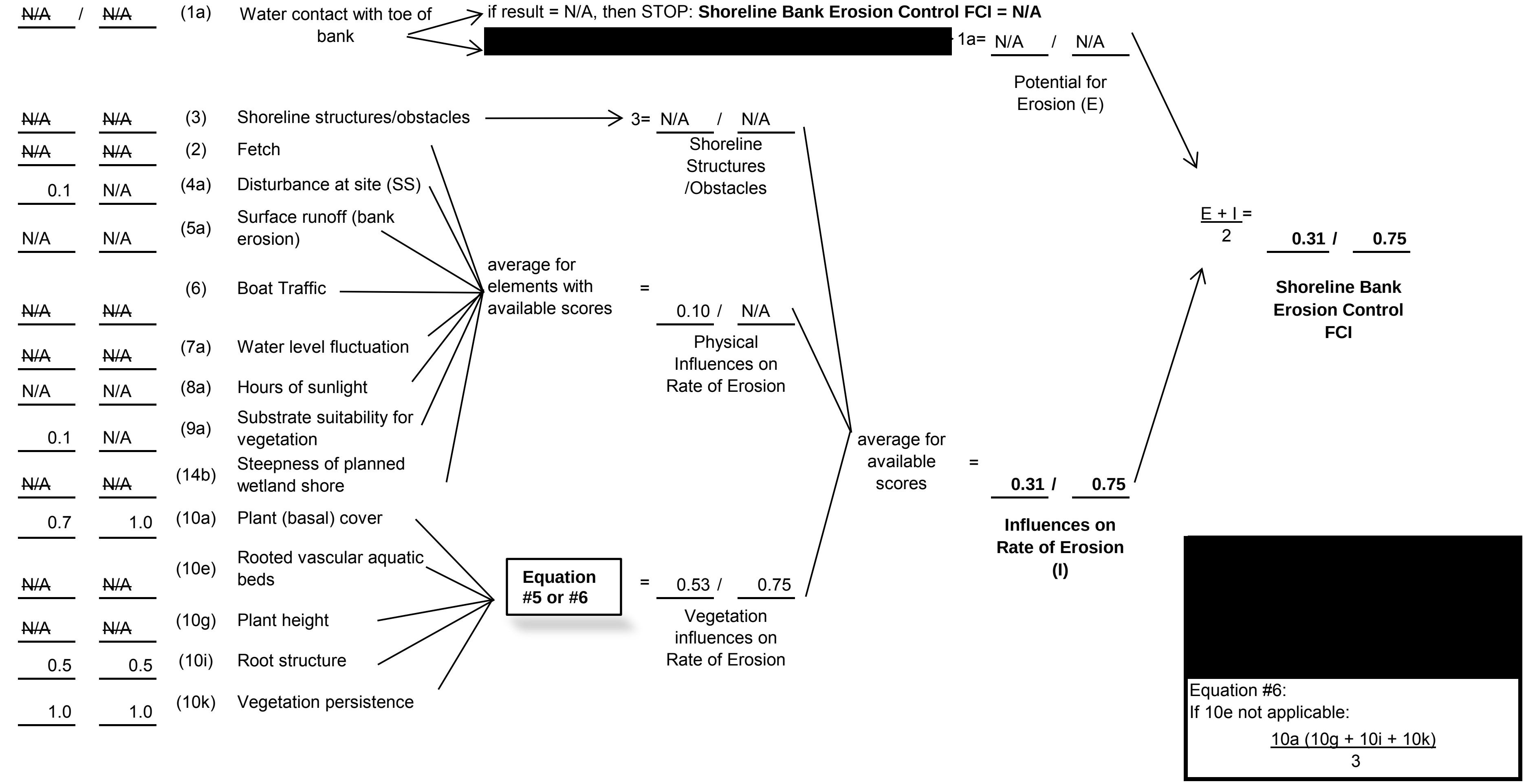
| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]



| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.53 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.68
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.46 / 0.84**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.83 / 0.90 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.30 / 0.55 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.56 / 0.82 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = **0.33 / 0.82 Wildlife FCI**

If F = NA: HC = **Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative C Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.71 | 11.39 | 8.09 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.71 | 11.39 | 8.09 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.62 | 11.39 | 7.06 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.32 | 11.39 | 3.64 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.45 | 11.39 | 5.13 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

### Table A.1.
### Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative C Year 2 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.51 | 2.66 | 1.36 | |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.64 | 2.66 | 1.70 | |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.53 | 2.66 | 1.41 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUUAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |

→ 3= 0.50 / N/A

Shoreline Structures /Obstacles

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |

average for elements with available scores = 0.30 / 0.37

Physical Influences on Rate of Erosion

| | | | |
|---|---|---|---|
| 0.7 | 0.3 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 0.8 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

**Equation #5 or #6** = 0.61 / 0.46

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.41

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 /** **0.71**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

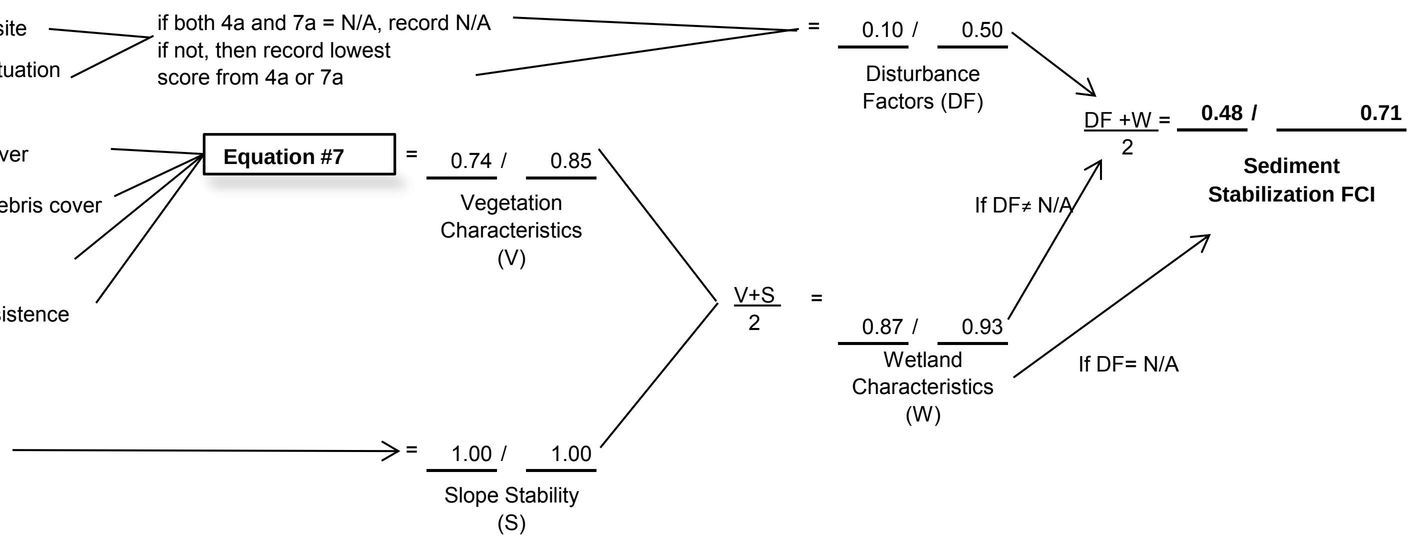
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |



if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= 0.10 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.74 / 0.85
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 0.93
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.48 / 0.71**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

0.7 / 0.7 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =

0.10 / 0.50
Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.75 / 0.85
Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.3 / 0.3 | (10b) | Plant (basal) cover |
| 0.8 / 0.8 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.27 / 0.27
Vegetation Characteristics (V)

SS + V= / 2

0.51 / 0.56
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.31 / 0.53
Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.7 / 0.7 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 0.70
Water contact (WC)

C + WC = / 2

**0.45 / 0.62**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.7 | (11a) | Layers |
| 0.7 / 0.3 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 1.0 / 0.5 | (13a) | % open water |
| 0.5 / 0.5 | (13b) | Vegetation/water interspersion |
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A; If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.33 / 0.42 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.61 / 0.53 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = **0.35 / 0.32 Wildlife FCI**

If F = NA: **Wildlife FCI**

`

PROJECT TITLE: Site 866. Oak Island Yards

Calclation of Fish (Tidal)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| | | | | |
|---|---|---|---|---|
| N/A | / | N/A | (1b) | Shoreline bank stability |
| 0.5 | / | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5

Limiting Factors

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 0.5 | (9c) | Substrate suitability for fish |
| 0.7 | / | 0.7 | (10d) | Plant (basal) cover |
| 0.7 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.3

Food/Cover

average for avaliable scores = **0.44 / 0.45**

**Fish (Tidal) FCI**

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | | | |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5

Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 866. Oak Island Yards

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements  with available scores  =  1.00 /  1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.10 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.53 / 0.53

Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.51**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 / 0.51**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.63 / 0.57 Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.79 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.46 / 0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.5 | 0.7 | (11a) | Layers |
| 1.0 | 0.3 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.1 | (12a) | Cover types |
| 0.5 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 0.1 | (21a) | Shape of upland/wetland edge |
| 1.0 | 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.83 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.55 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.56 / 0.53 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = **0.33 / 0.53 Wildlife FCI**

If F = NA: HC = **0.33 / 0.53 Wildlife FCI**

`

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative C Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.83 | 11.42 | 9.48 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.75 | 11.42 | 8.56 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.89 | 11.42 | 10.16 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.78 | 11.42 | 8.91 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.65 | 11.42 | 7.42 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative C Year 20 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.75 | 2.63 | 1.98 | ✓ |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.84 | 2.63 | 2.21 | |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.76 | 2.63 | 2.00 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUUAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.30 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.61 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 / 0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.74 / 1.00 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.48 /** **0.75**

**Sediment Stabilization FCI**

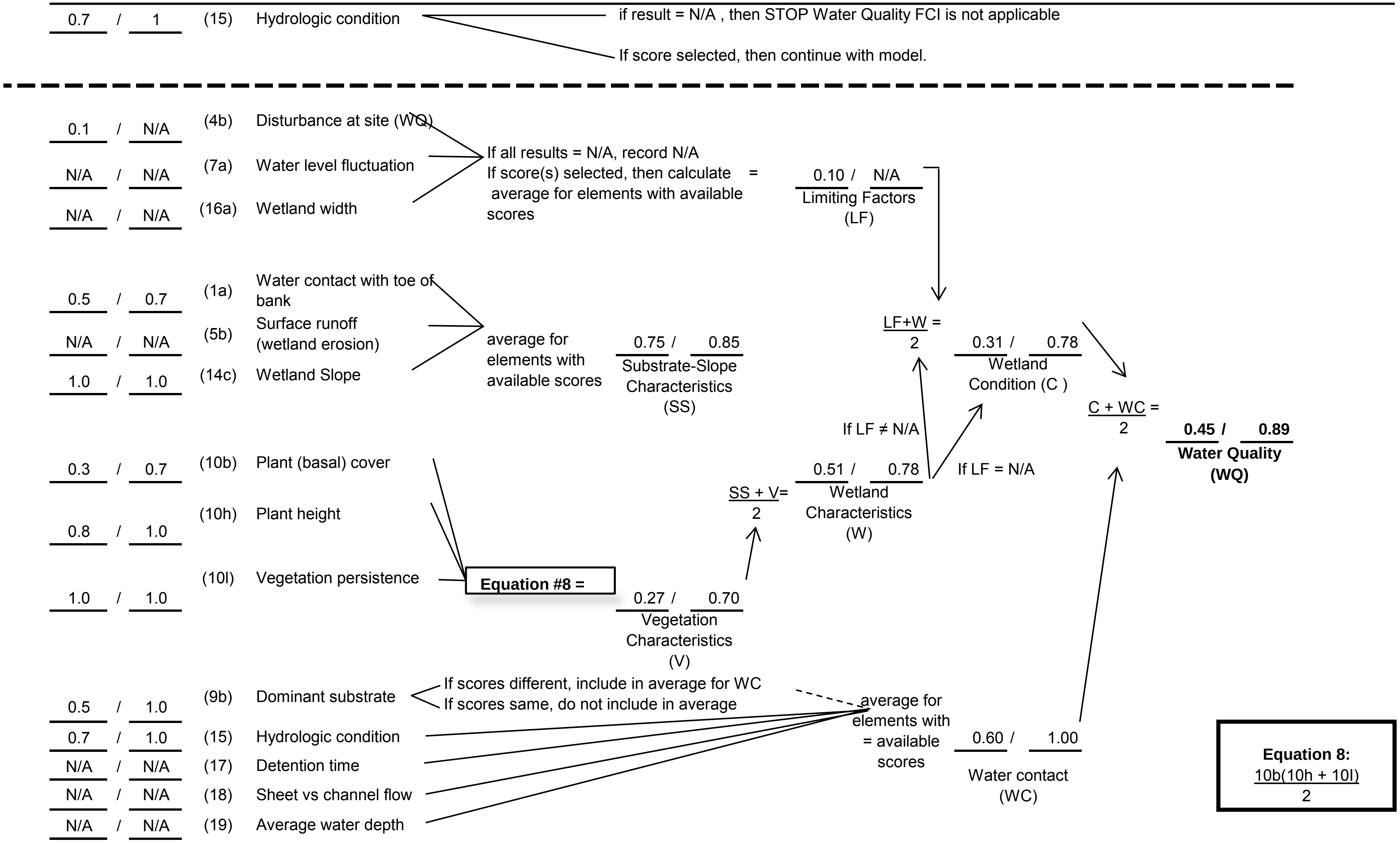
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20



| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =

0.10 / N/A
Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.75 / 0.85
Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.8 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

0.27 / 0.70
Vegetation Characteristics (V)

SS + V= / 2

0.51 / 0.78
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.31 / 0.78
Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.7 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.60 / 1.00
Water contact (WC)

C + WC = / 2

**0.45 / 0.89**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.7 / 0.9 | (11a) | Layers |
| 0.7 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.2 / 0.3 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 1.0 / 1.0 | (13a) | % open water |
| 0.5 / 1.0 | (13b) | Vegetation/water interspersion |
| 1.0 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.80 / 0.97 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.33 / 0.59 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.6 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.61 / 0.78 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = **0.35 / 0.78 Wildlife FCI**

If F = NA: **Wildlife FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish |
| 0.7 / 0.7 | (10d) | Plant (basal) cover |
| 0.7 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.8 Food/Cover

average for avaliable scores = **0.44 / 0.65**

**Fish (Tidal) FCI**

**x= 0.2**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |

3= N/A / N/A

Shoreline Structures /Obstacles

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |

average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

**Equation #5 or #6** = 0.53 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.31 /** **0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 /** **0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | UAA baseline / Planned Upland Alternative C - Yr 20 |
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 0.7 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.68
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.84
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.46 / 0.84**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.83 / 0.90 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.30 / 0.38 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.56 / 0.76 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$$\frac{F + HC}{2}$$ = **0.33 / 0.76**

**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between WAA# Baseline and wetland # Alternative C Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.59 | 7.80 | 4.60 | 0.68 | 1 | 4.60 | 0.68 | 6.78 | 0.83 | 10.85 | 9.00 | ✓ |
| SS | 0.48 | 7.80 | 3.74 | 0.53 | 1 | 3.74 | 0.53 | 7.09 | 0.75 | 10.85 | 8.14 | ✓ |
| WQ | 0.45 | 7.80 | 3.51 | 0.47 | 1 | 3.51 | 0.47 | 7.43 | 0.96 | 10.85 | 10.41 | ✓ |
| WL | 0.35 | 7.80 | 2.73 | 0.39 | 1 | 2.73 | 0.39 | 7.09 | 0.83 | 10.85 | 9.00 | ✓ |
| FT | 0.44 | 7.80 | 3.43 | 0.48 | 1 | 3.43 | 0.48 | 7.09 | 0.69 | 10.85 | 7.48 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 866. Oak Island Yards

Comparison between UAA# Baseline and upland # Alternative C Year 50 .

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.31 | 5.61 | 1.74 | 0.36 | 1 | 1.74 | 0.36 | 4.88 | 0.75 | 3.20 | 2.40 | ✓ |
| SS | 0.46 | 5.61 | 2.58 | 0.51 | 1 | 2.58 | 0.51 | 5.10 | 0.88 | 3.20 | 2.82 | ✓ |
| WL | 0.33 | 5.61 | 1.85 | 0.36 | 1 | 1.85 | 0.36 | 5.10 | 0.82 | 3.20 | 2.63 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUUAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

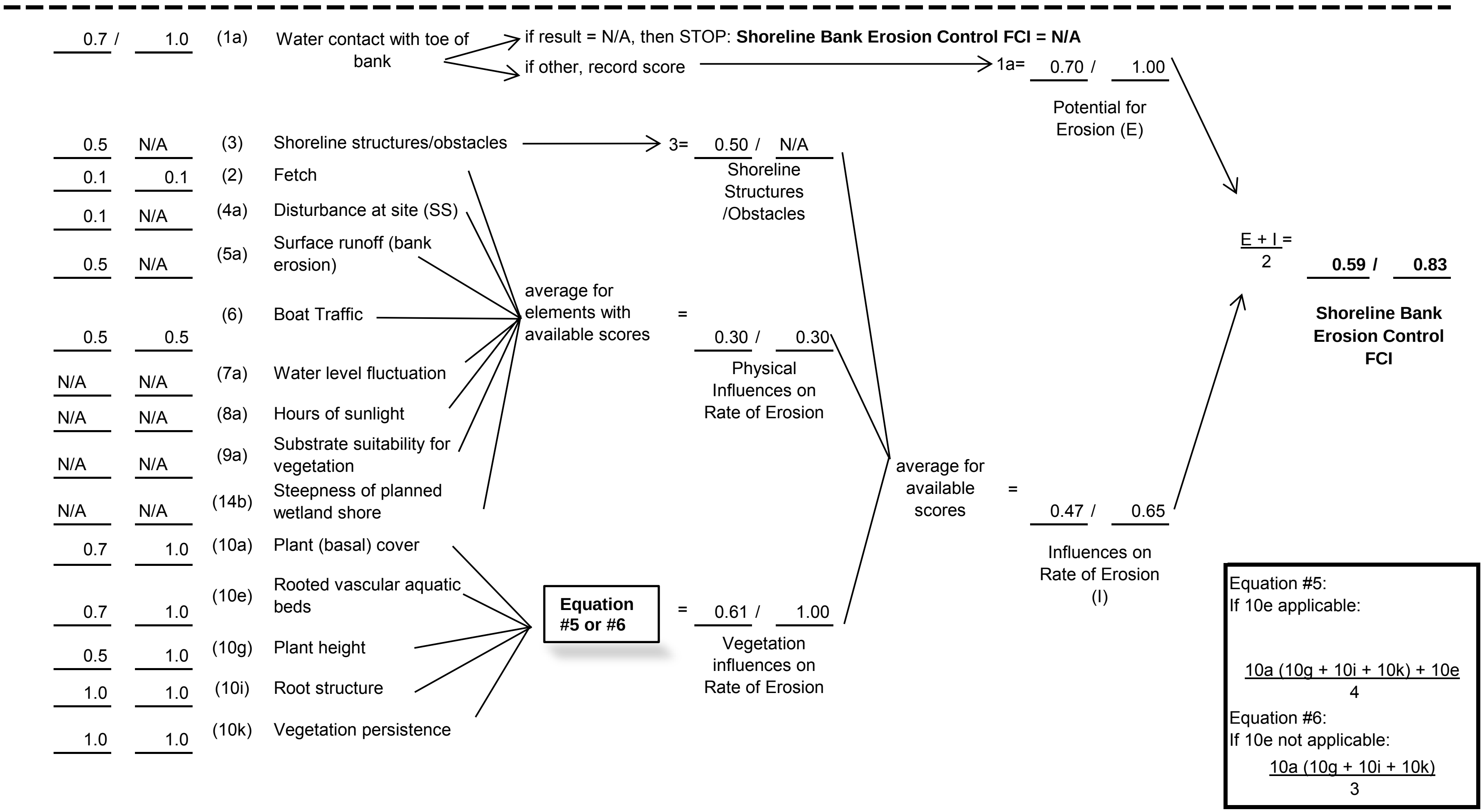
Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 0.1 | 0.1 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| | | | |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| 0.5 | N/A | (3) | Shoreline structures/obstacles |
| 0.1 | 0.1 | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| 0.5 | 0.5 | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| 0.7 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 0.5 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

3= 0.50 / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.30 / 0.30

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.61 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.47 / 0.65

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.59 /** **0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.8 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= 0.10 / 0.50 Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.74 / 1.00 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.87 / 1.00 Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **0.48 / 0.75**

If DF= N/A

**Sediment Stabilization FCI**

Equation #7:

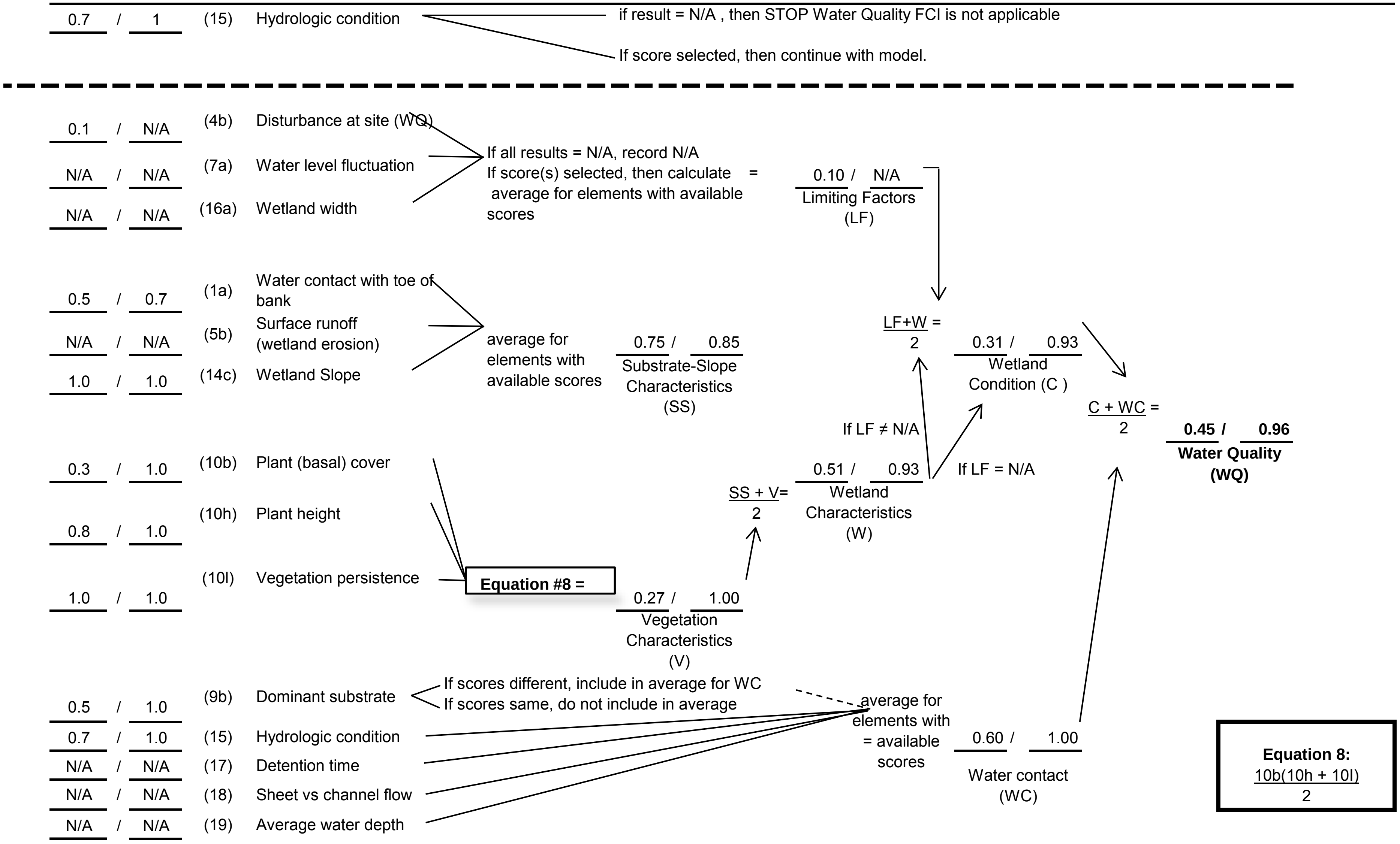
$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Water Quality

Selected Scores | (#) | Element

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50



0.7 / 1 (15) Hydrologic condition
if result = N/A , then STOP Water Quality FCI is not applicable
If score selected, then continue with model.

0.1 / N/A (4b) Disturbance at site (WQ)
N/A / N/A (7a) Water level fluctuation
N/A / N/A (16a) Wetland width
If all results = N/A, record N/A
If score(s) selected, then calculate average for elements with available scores =
0.10 / N/A Limiting Factors (LF)

0.5 / 0.7 (1a) Water contact with toe of bank
N/A / N/A (5b) Surface runoff (wetland erosion)
1.0 / 1.0 (14c) Wetland Slope
average for elements with available scores
0.75 / 0.85 Substrate-Slope Characteristics (SS)

0.3 / 1.0 (10b) Plant (basal) cover
0.8 / 1.0 (10h) Plant height
1.0 / 1.0 (10l) Vegetation persistence
**Equation #8 =**
0.27 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =
0.51 / 0.93 Wetland Characteristics (W)

If LF ≠ N/A
$\frac{LF+W}{2}$ =
If LF = N/A
0.31 / 0.93 Wetland Condition (C )

0.5 / 1.0 (9b) Dominant substrate
If scores different, include in average for WC
If scores same, do not include in average
0.7 / 1.0 (15) Hydrologic condition
N/A / N/A (17) Detention time
N/A / N/A (18) Sheet vs channel flow
N/A / N/A (19) Average water depth
average for elements with = available scores
0.60 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =
**0.45 / 0.96**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 1.0 | (11a) | Layers |
| 0.7 | 1.0 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.80 / 1.00
Vegetation Strata

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.2 | 0.3 | (12a) | Cover types |
| 0.5 | 1.0 | (12b) | Ratio of cover types |
| 0.5 | 1.0 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |

average for elements with available scores = 0.33 / 0.75
Vegetation Cover Types

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (13a) | % open water |
| 0.5 | 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.75 / 1.00
Vegetation/ Water Proportions

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| 0.1 | 0.1 | (23) | Islands |

average for elements with available scores = 0.6 / 0.6
Physical Features

average for available scores = 0.61 / 0.83
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.35 / 0.83**
**Wildlife FCI**

`

PROJECT TITLE: Site 866. Oak Island Yards

Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50 |
|---|---|---|---|

Site Suitability For Planned Wetland:

| | | | | |
|---|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | → | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| | | | |
|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability | average for elements with available scores = 0.5 / N/A Limiting Factors |
| 0.5 / N/A | (4a) | Disturbance at site (SS) | |
| N/A / N/A | (4d) | Disturbance in channel/open water | |
| N/A / N/A | (7b) | Most permanent hydroperiod | |
| N/A / N/A | (24) | Obstruction to fish passage | |

| | | | |
|---|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod | **Equation #9** = 0.3 / 0.9 Food/Cover |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish | |
| 0.7 / 1.0 | (10d) | Plant (basal) cover | |
| 0.7 / 1.0 | (10f) | Rooted vascular aquatic beds | |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge | |
| 0.5 / 0.5 | (22b) | Available fish cover/attractors | |

average for avaliable scores = **0.44 / 0.69**

**Fish (Tidal) FCI**

| | | | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |

| | | | |
|---|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | average for elements with available scores = 0.5 / 0.5 Water Quality (WQ) |
| INA / INA | (20d) | Dissolved Oxygen | |
| INA / INA | (20f) | Maximum water temperature | |

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 866. Oak Island Yards

Calculation of Uniqueness/Heritage

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50 |
| Site Suitability For Planned Wetland: | | | |
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements  with available scores  =  1.00 /  1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| 0.1 | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.7 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.10 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.53 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.31 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.31 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

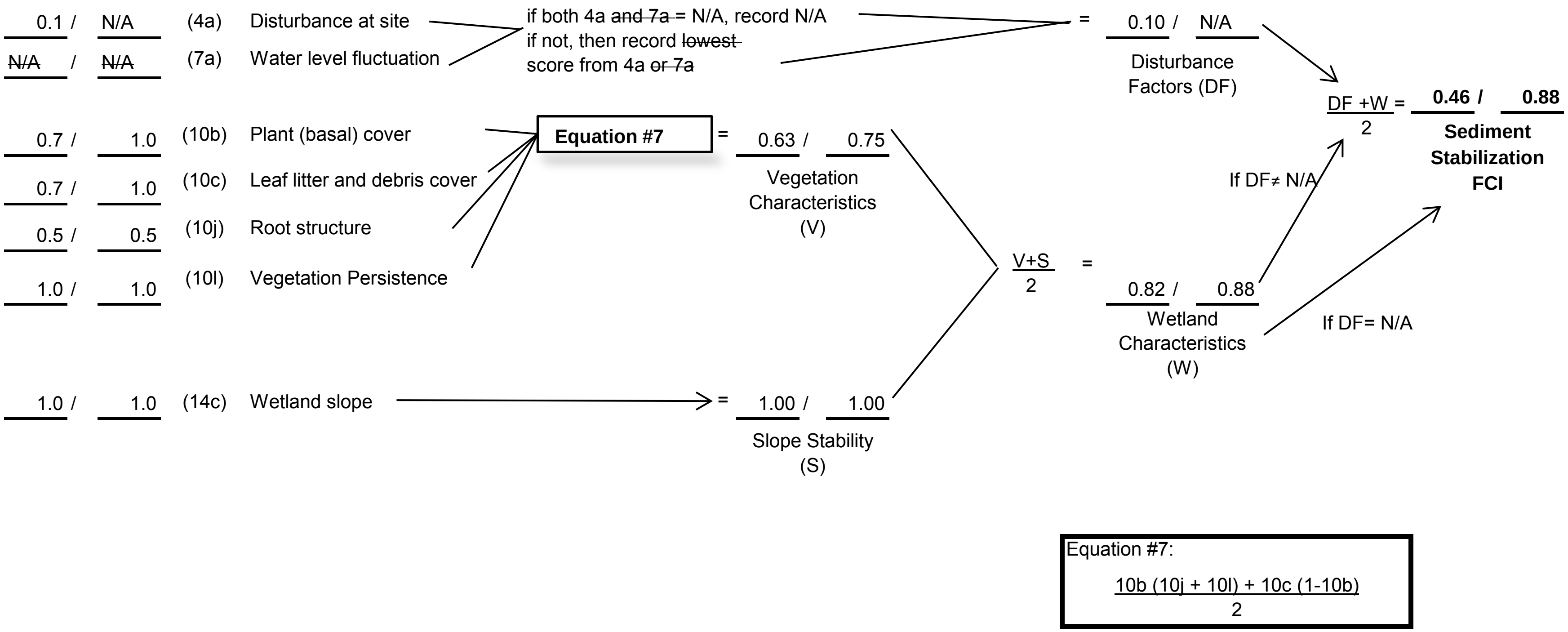
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 866. Oak Island Yards

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50



| | | | |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.7 / | 1.0 | (10b) | Plant (basal) cover |
| 0.7 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.63 / 0.75
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.82 / 0.88
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.46 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 866. Oak Island Yards

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 1.0 / 1.0 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.5 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| 1.0 / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A; If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.83 / 0.90 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.30 / 0.55 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a)–(23): average for elements with available scores = 0.55 / 1.00 Physical Features

average for available scores = 0.56 / 0.82 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ = 0.33 / 0.82 **Wildlife FCI**

If F = NA: HC → **Wildlife FCI**

# Site 719 - Meadowlark Marsh

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 0.63 | 87.22 | 54.95 | |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 0.60 | 87.22 | 52.33 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 0.76 | 87.22 | 66.29 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.52 | 87.22 | 45.35 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.48 | 87.22 | 41.87 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative A Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.51 | 5.08 | 2.59 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.64 | 5.08 | 3.25 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.43 | 5.08 | 2.18 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 0.3 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.75 / 0.75

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.78 / 0.35

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.55

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 /** **0.63**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.3 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / 0.50
Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.41
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.70
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 / 0.60**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.9 / 0.9 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 0.3 | (10b) | Plant (basal) cover |
| 1.0 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.93 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.71 / 0.52 Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.61 / 0.76**
**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.56 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.1 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.25 / 0.52 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.52 Wildlife FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1 |
|---|---|---|---|

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 / 0.5 | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitability for fish |
| 1.0 / 0.3 | (10d) | Plant (basal) cover |
| 0.7 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.5 Food/Cover

| Selected Scores | (#) | Element | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.43 / 0.48**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Site Suitability For Planned Wetland: | | | |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

[redacted]

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.37 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.53

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.51**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.51**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~ = 0.10 / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.33 / 0.57
Vegetation Characteristics (V)

(14c): = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.79
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.38 /** **0.64**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.5 | 0.7 | (11a) | Layers |
| 0.3 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.2 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| N/A | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 0.1 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.24 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

average for available scores = 0.31 / 0.43 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

0.21 / 0.43 **Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative A Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 1.00 | 87.22 | 87.22 | ✓ |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 1.00 | 87.22 | 87.22 | ✓ |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 1.00 | 87.22 | 87.22 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.79 | 87.22 | 68.90 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.69 | 87.22 | 60.18 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA#____Baseline___________ and upland #__Alternative A___Year 20____

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.75 | 5.08 | 3.81 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.88 | 5.08 | 4.47 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.73 | 5.08 | 3.71 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 1.00

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 / 1.00**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$

Equation #6:
If 10e not applicable:

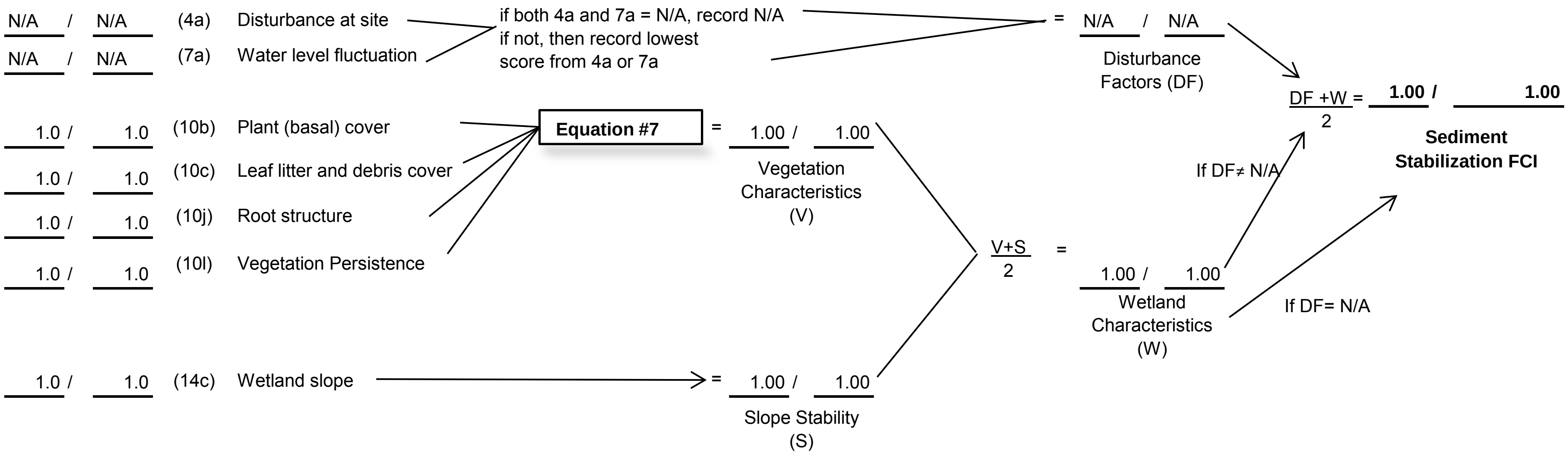
$\frac{10a\ (10g + 10i + 10k)}{3}$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Sediment Stabilization

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20



N/A / N/A (4a) Disturbance at site

N/A / N/A (7a) Water level fluctuation

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A Disturbance Factors (DF)

1.0 / 1.0 (10b) Plant (basal) cover

1.0 / 1.0 (10c) Leaf litter and debris cover

1.0 / 1.0 (10j) Root structure

1.0 / 1.0 (10l) Vegetation Persistence

**Equation #7** = 1.00 / 1.00 Vegetation Characteristics (V)

1.0 / 1.0 (14c) Wetland slope = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 /** **1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

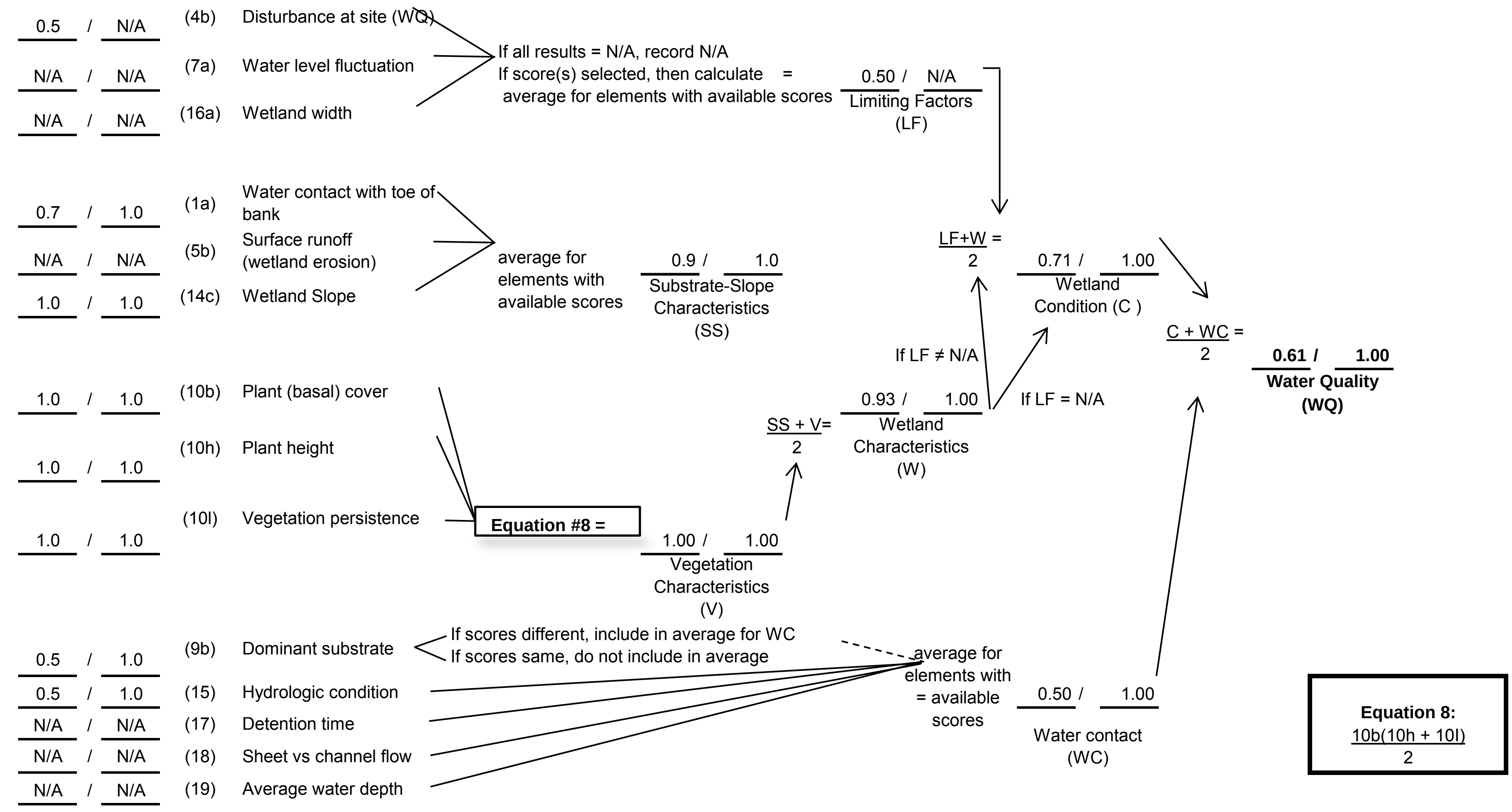
## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores
0.50 / N/A Limiting Factors (LF)

average for elements with available scores
0.9 / 1.0 Substrate-Slope Characteristics (SS)

Equation #8 =
1.00 / 1.00 Vegetation Characteristics (V)

SS + V= / 2
0.93 / 1.00 Wetland Characteristics (W)

If LF ≠ N/A
LF+W = / 2
If LF = N/A
0.71 / 1.00 Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average
average for elements with = available scores
0.50 / 1.00 Water contact (WC)

C + WC = / 2
**0.61 / 1.00**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.1 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.73 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.25 / 0.79 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.79**
**Wildlife FCI**

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calclation of Fish (Tidal)

Selected Scores | (#) | Element | Comparison: WAA baseline /  Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A    N/A | (24) | Obstruction to fish passage |

- if result = 0.1, STOP. There is no potential for providing tidal fish habitat
- if result ≠ 0.1  of NA, then continue with model

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitabuility for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.7 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.9 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

- If score available, record score for WQ
- If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.43 / 0.69**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a): if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a): [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3): 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.37 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.23 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

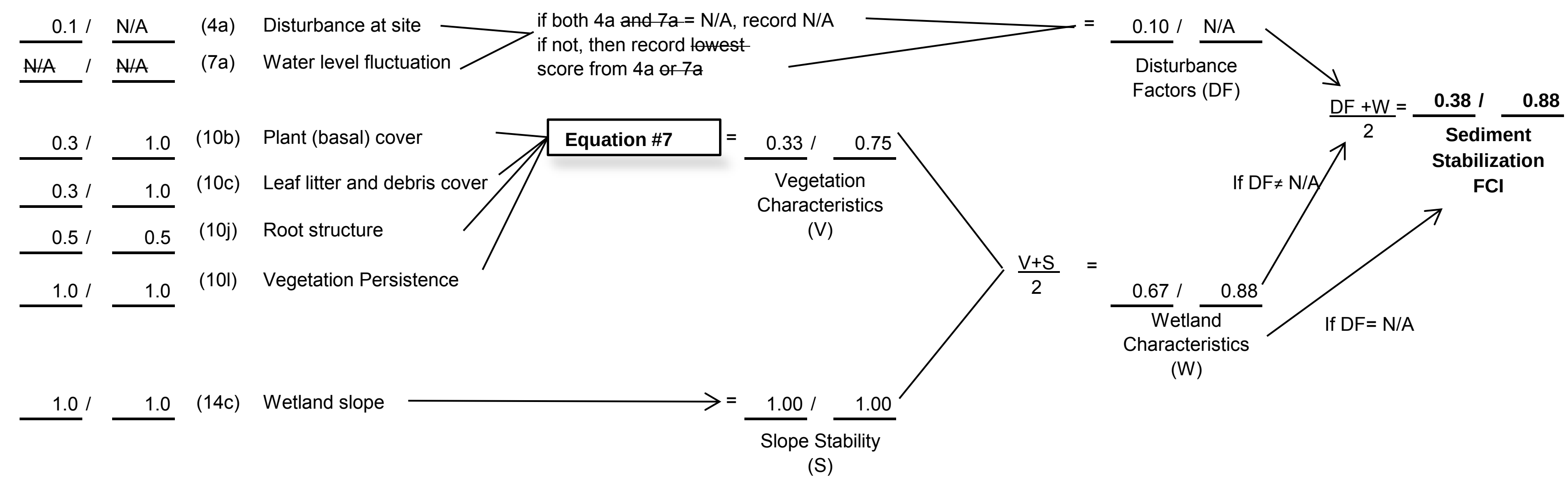
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |



if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A Disturbance Factors (DF)

**Equation #7** = 0.33 / 0.75 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.88 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.38 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | / | N/A | (20a) | Gross contamination |
| N/A | / | N/A | (16b) | Wetland size |
| 0.5 | / | 0.7 | (11a) | Layers |
| 0.3 | / | 0.7 | (11b) | Condition of Layers |
| 1.0 | / | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | / | 0.2 | (12a) | Cover types |
| 0.1 | / | 0.5 | (12b) | Ratio of cover types |
| 0.5 | / | 0.5 | (12c) | Cover type interspersion |
| N/A | / | N/A | (12d) | Undesirable species |
| ~~N/A~~ | / | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | / | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | / | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | / | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | / | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.24 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.31 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.21 / 0.73**

**Wildlife FCI**

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 1.00 | 82.86 | 82.86 | ✓ |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 1.00 | 82.86 | 82.86 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 1.00 | 82.86 | 82.86 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.79 | 82.86 | 65.46 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.69 | 82.86 | 57.17 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative A Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.75 | 9.44 | 7.08 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.88 | 9.44 | 8.31 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.73 | 9.44 | 6.89 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |

→ 3= N/A / N/A

Shoreline Structures /Obstacles

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |

average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

**Equation #5 or #6** = 0.78 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 1.00

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 / 1.00**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

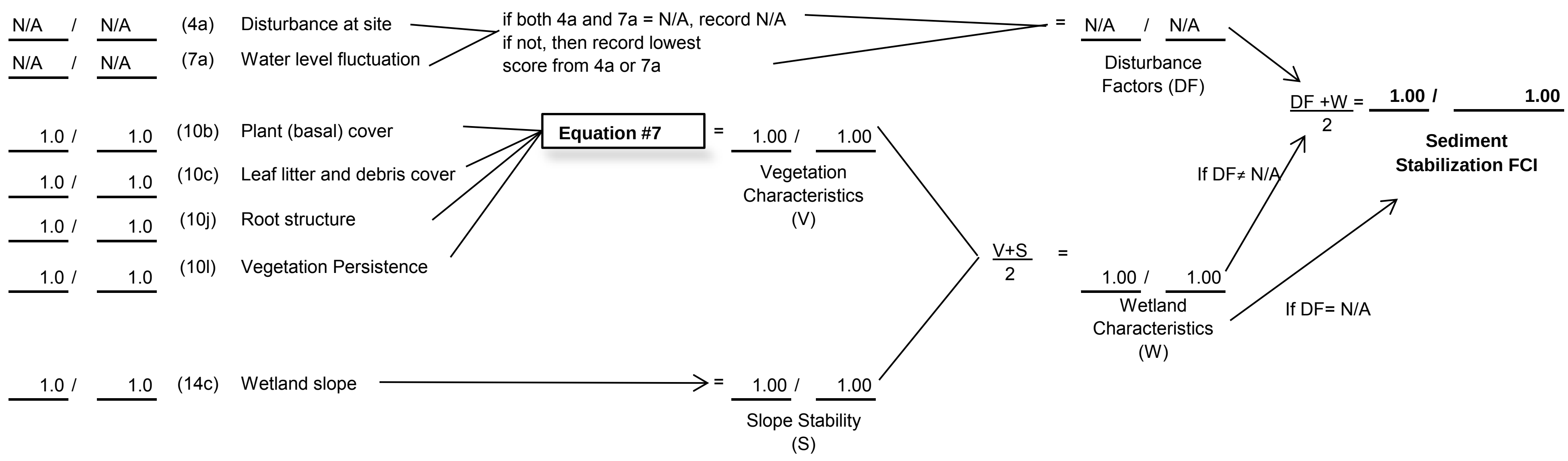
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Sediment Stabilization

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



| | | | |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 /** **1.00**

**Sediment Stabilization FCI**

Equation #7:

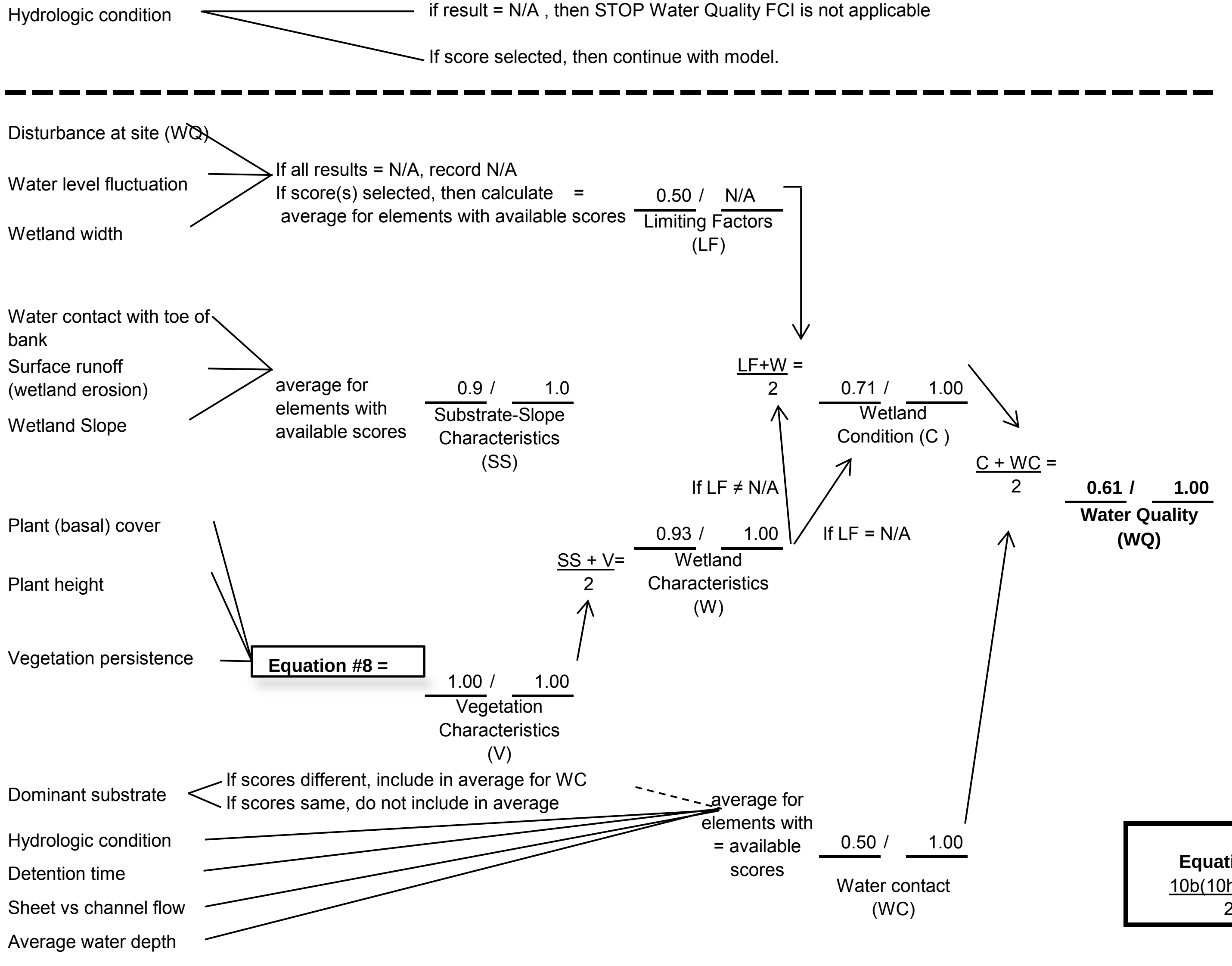
$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A

If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

average for elements with available scores

0.9 / 1.0 Substrate-Slope Characteristics (SS)

Equation #8 =

1.00 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.93 / 1.00 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.71 / 1.00 Wetland Condition (C )

If scores different, include in average for WC

If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.61 / 1.00**

**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 1.0 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.1 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.90
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.73
Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 1.00
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6
Physical Features

average for available scores = 0.25 / 0.79
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.79**
**Wildlife FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calclation of Fish (Tidal)

Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.7 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.9 Food/Cover

| Selected Scores | (#) | Element | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.43 / 0.69**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements  with available scores  =  1.00 /  1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Site Suitability For Planned Wetland: | | | |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

Fetch, Steepness of existing shore → [redacted]

Water contact with toe of bank → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

Water contact with toe of bank → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

Shoreline structures/obstacles → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.37 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.23 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~ = 0.10 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.33 / 0.75 Vegetation Characteristics (V)

(14c): = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.88 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **0.38 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | / | N/A | (20a) | Gross contamination |
| N/A | / | N/A | (16b) | Wetland size |
| 0.5 | / | 0.7 | (11a) | Layers |
| 0.3 | / | 0.7 | (11b) | Condition of Layers |
| 1.0 | / | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | / | 0.2 | (12a) | Cover types |
| 0.1 | / | 0.5 | (12b) | Ratio of cover types |
| 0.5 | / | 0.5 | (12c) | Cover type interspersion |
| N/A | / | N/A | (12d) | Undesirable species |
| ~~N/A~~ | / | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | / | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | / | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | / | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | / | ~~N/A~~ | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.60 / 0.80
Vegetation Strata

average for elements with available scores = 0.24 / 0.40
Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

average for elements with available scores = 0.10 / 1.00
Physical Features

average for available scores = 0.31 / 0.73
Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ =

**0.21 / 0.73**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative B Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 0.63 | 87.22 | 54.95 | |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 0.60 | 87.22 | 52.33 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 0.83 | 87.22 | 72.39 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.48 | 87.22 | 41.87 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.48 | 87.22 | 41.87 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative B Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.51 | 5.08 | 2.59 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.64 | 5.08 | 3.25 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.43 | 5.08 | 2.18 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 0.3 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

Shoreline structures/obstacles → 3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 0.75

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 0.35

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.55

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 / 0.63**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

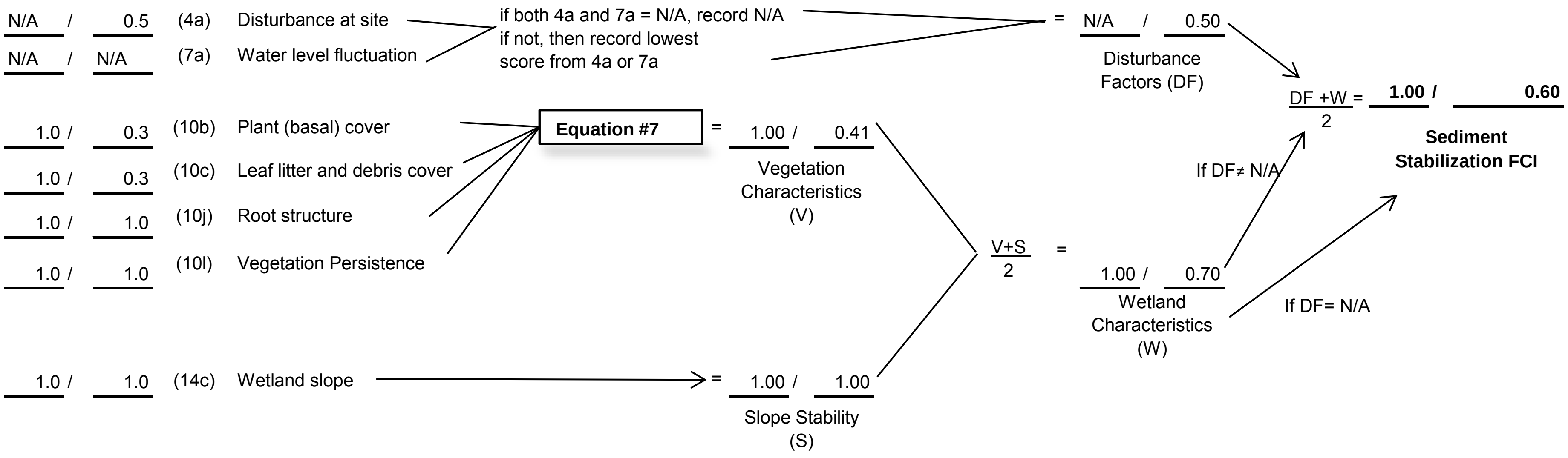
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1



| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.3 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / 0.50 Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.41 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.70 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 0.60**

**Sediment Stabilization FCI**

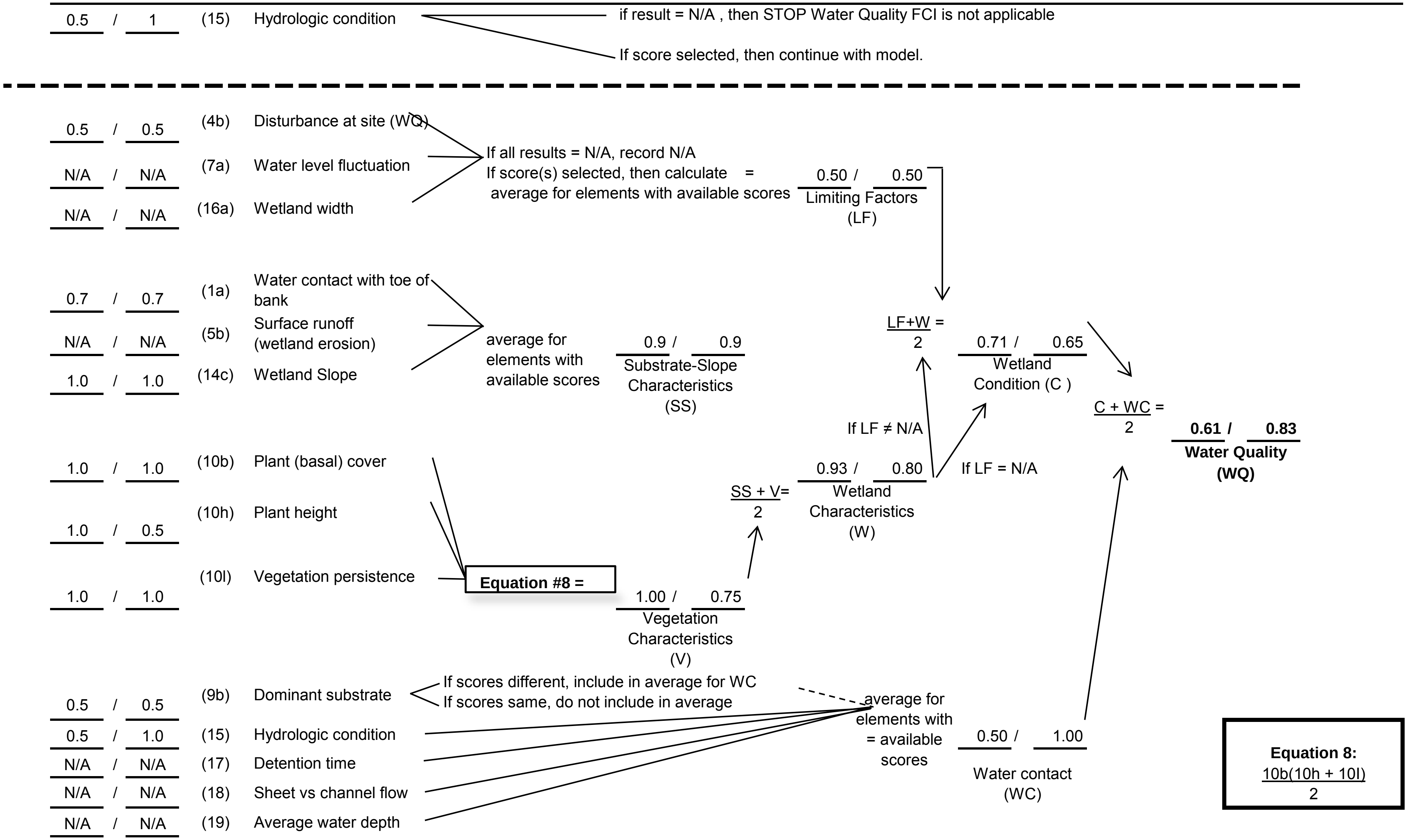
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.9 / 0.9 Substrate-Slope Characteristics (SS)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (10b) | Plant (basal) cover |
| 1.0 | 0.5 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 0.75 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.93 / 0.80 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ =

If LF = N/A

0.71 / 0.65 Wetland Condition (C )

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.5 | (9b) | Dominant substrate |
| 0.5 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.61 / 0.83**
**Water Quality (WQ)**

**Equation 8:**

$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calculation of Wildlife

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.1 Physical Features

average for available scores = 0.25 / 0.48 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.48**
**Wildlife FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calclation of Fish (Tidal)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

| | | | |
|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 / 0.5 | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| | | |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitabuility for fish |
| 1.0 / 0.3 | (10d) | Plant (basal) cover |
| 0.7 / 0.3 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 0.5 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.5 Food/Cover

average for avaliable scores = **0.43 / 0.48**

**Fish (Tidal) FCI**

| | | |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.37 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.53

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.51**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.51**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| Comparison: | | | UAA baseline / Planned Upland Alternative B - Yr 1 |
| 0.1 / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 0.3 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / 0.50
Disturbance Factors (DF)

**Equation #7** = 0.33 / 0.57
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.79
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.38 /** **0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.5 | 0.7 | (11a) | Layers |
| 0.3 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.2 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| N/A | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 0.1 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.24 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10 Physical Features

average for available scores = 0.31 / 0.43 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.21 / 0.43 Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative B Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 1.00 | 87.22 | 87.22 | ✓ |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 1.00 | 87.22 | 87.22 | ✓ |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 1.00 | 87.22 | 87.22 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.74 | 87.22 | 64.54 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.69 | 87.22 | 60.18 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative B Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.75 | 5.08 | 3.81 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.88 | 5.08 | 4.47 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.73 | 5.08 | 3.71 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

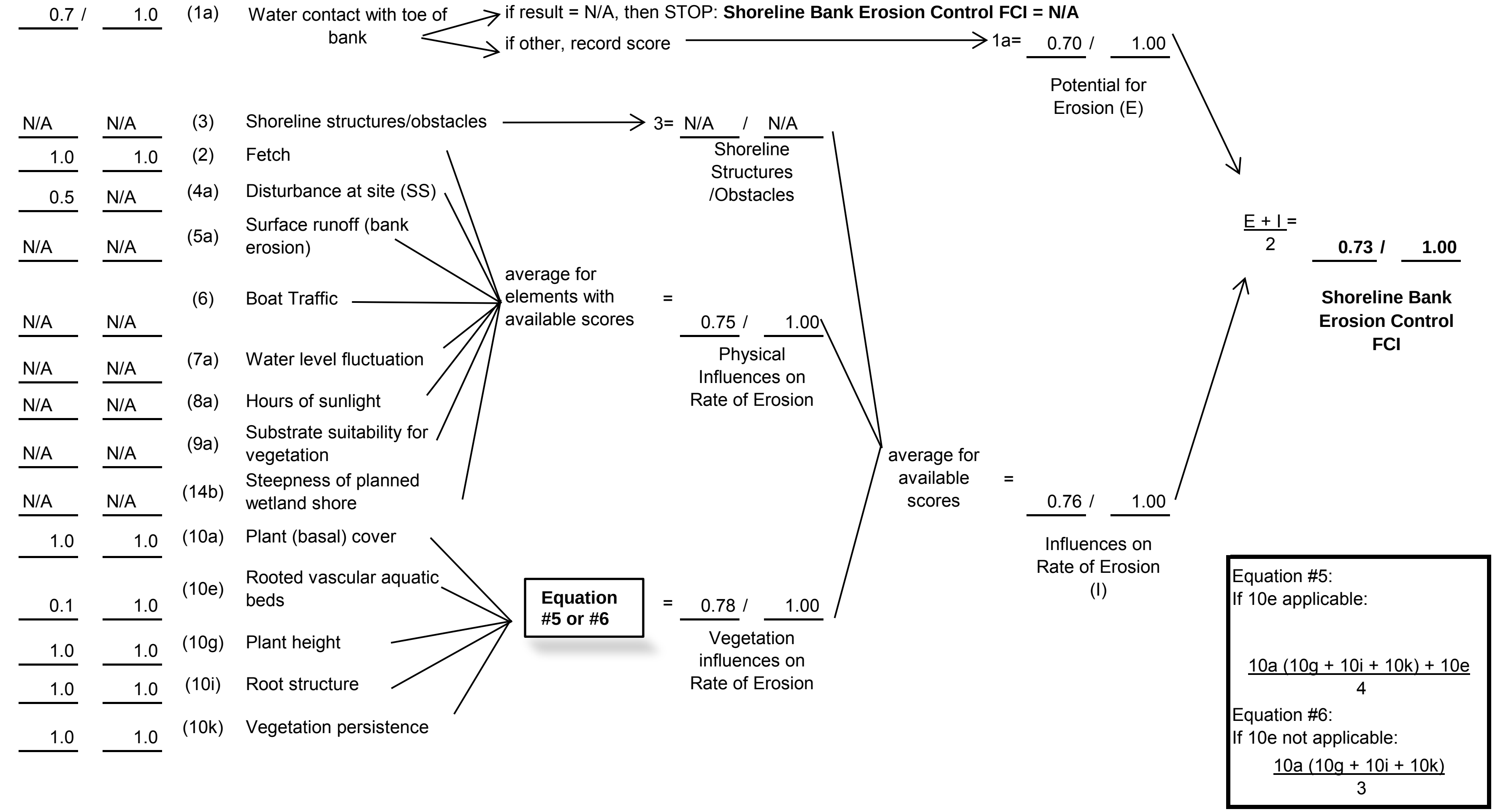
Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| | | | |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 1.00

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 / 1.00**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

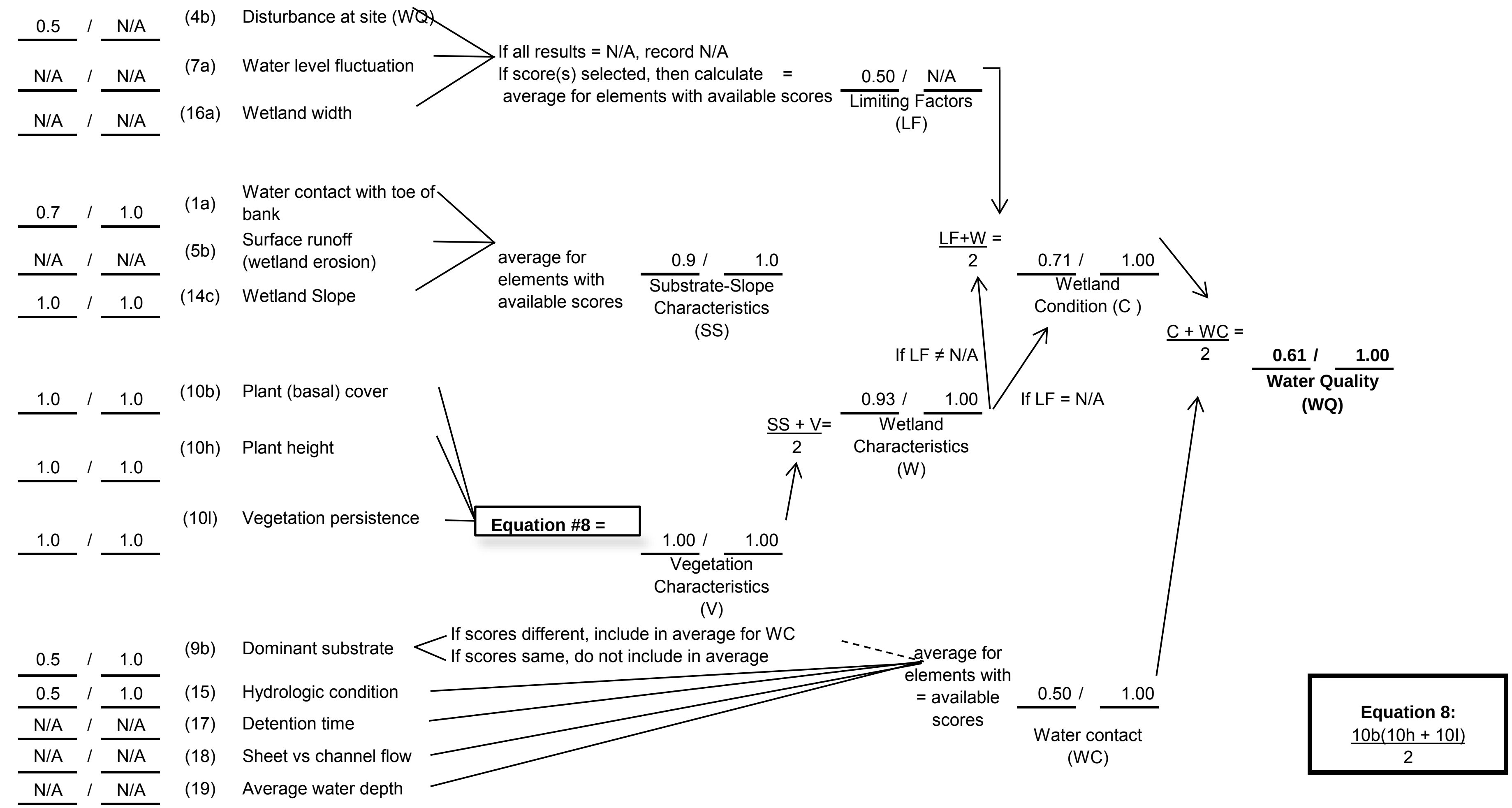
PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Water Quality

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20 |
| 0.5 | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| | | | |
|---|---|---|---|
| 0.5 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |
| 0.7 | 1.0 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |
| 1.0 | 1.0 | (10b) | Plant (basal) cover |
| 1.0 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.5 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

average for elements with available scores

0.9 / 1.0 Substrate-Slope Characteristics (SS)

Equation #8 =

1.00 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.93 / 1.00 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.71 / 1.00 Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.61 / 1.00 Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 1.0 | (13a) | % open water |
| 0.1 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.56 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 1.00 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.25 / 0.74 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.74**
**Wildlife FCI**

`

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20 |
|---|---|---|---|

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| | | | | |
|---|---|---|---|---|
| N/A | / | N/A | (1b) | Shoreline bank stability |
| 0.5 | / | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 1.0 | (9c) | Substrate suitability for fish |
| 1.0 | / | 1.0 | (10d) | Plant (basal) cover |
| 0.7 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.9 Food/Cover

average for avaliable scores = **0.43 / 0.69**

**Fish (Tidal) FCI**

**x= 0.2**

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | | | |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements  with available scores  =  1.00 /  1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.37 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.23 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A Disturbance Factors (DF)

**Equation #7** = 0.33 / 0.75 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.88 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.38 / 0.88**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | / N/A | (20a) | Gross contamination |
| N/A | / N/A | (16b) | Wetland size |
| 0.5 | / 0.7 | (11a) | Layers |
| 0.3 | / 0.7 | (11b) | Condition of Layers |
| 1.0 | / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | / 0.2 | (12a) | Cover types |
| 0.1 | / 0.5 | (12b) | Ratio of cover types |
| 0.5 | / 0.5 | (12c) | Cover type interspersion |
| N/A | / N/A | (12d) | Undesirable species |
| ~~N/A~~ | / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.24 / 0.40
Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00
Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.31 / 0.73
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.21 / 0.73**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative B Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 1.00 | 82.86 | 82.86 | ✓ |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 1.00 | 82.86 | 82.86 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 1.00 | 82.86 | 82.86 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.82 | 82.86 | 67.94 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.69 | 82.86 | 57.17 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative B Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.75 | 9.44 | 7.08 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.88 | 9.44 | 8.31 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.73 | 9.44 | 6.89 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 1.0 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 1.00

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 1.00

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 /** **1.00**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calculation of Sediment Stabilization

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 50

| | | | |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 /** **1.00**

**Sediment Stabilization FCI**

Equation #7:

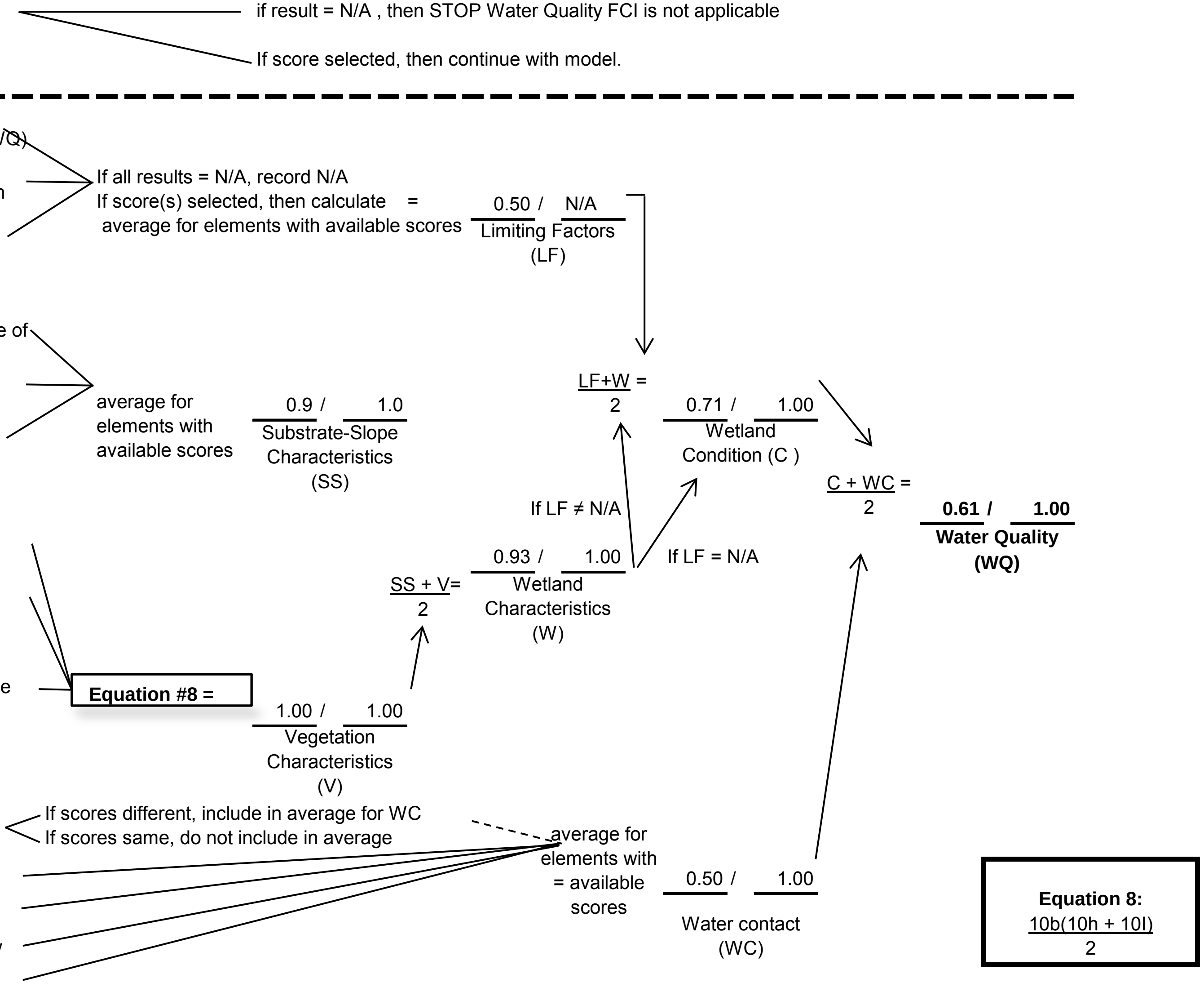
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 1.0 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife

| Selected Scores | (#) | Element |
|---|---|---|
| Comparison: | | WAA baseline / Planned Wetland Alternative B - Yr 50 |
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.40 / 1.00 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.20 / 0.73 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (13a) | % open water |
| 0.1 / 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.30 / 1.00 Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

average for elements with available scores = 0.1 / 0.6 Physical Features

average for available scores = 0.25 / 0.82 Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ =

If F = NA

**0.18 / 0.82**
**Wildlife FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitability for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.7 / 1.0 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.9 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.43 / 0.69**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.37 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.75

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.75**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.75**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.33 / 0.75
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.88
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.38 / 0.88**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE:  Site 719. Meadowlark Marsh

## Calculation of Wildlife (Upland)

Comparison: UAA baseline /  Planned Upland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.24 / 0.40
Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00
Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.31 / 0.73
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.21 / 0.73**
**Wildlife FCI**

**Table A.1.**
**Comparison of WAA and planned wetland: calculations of FCIs and FCUs**

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative C Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 0.63 | 85.43 | 53.82 | |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 0.64 | 85.43 | 54.68 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 0.76 | 85.43 | 64.93 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.42 | 85.43 | 35.88 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.55 | 85.43 | 46.99 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative C Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.36 | 6.87 | 2.47 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.82 | 6.87 | 5.63 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.43 | 6.87 | 2.95 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

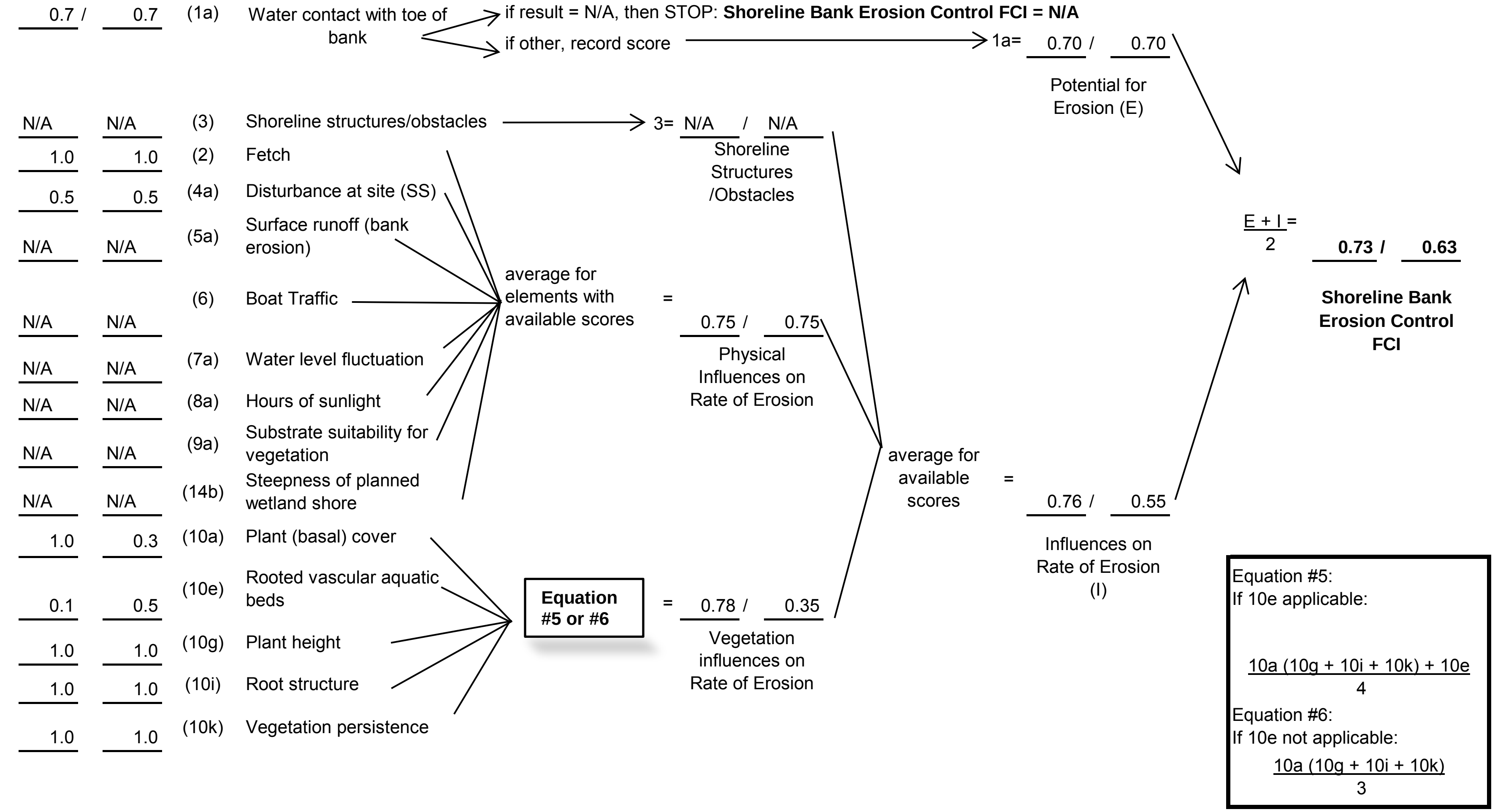
Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 0.3 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 0.70

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 0.75

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 0.35

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.55

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 / 0.63**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / 0.50
Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.55
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 /** **0.64**

**Sediment Stabilization FCI**

Equation #7:

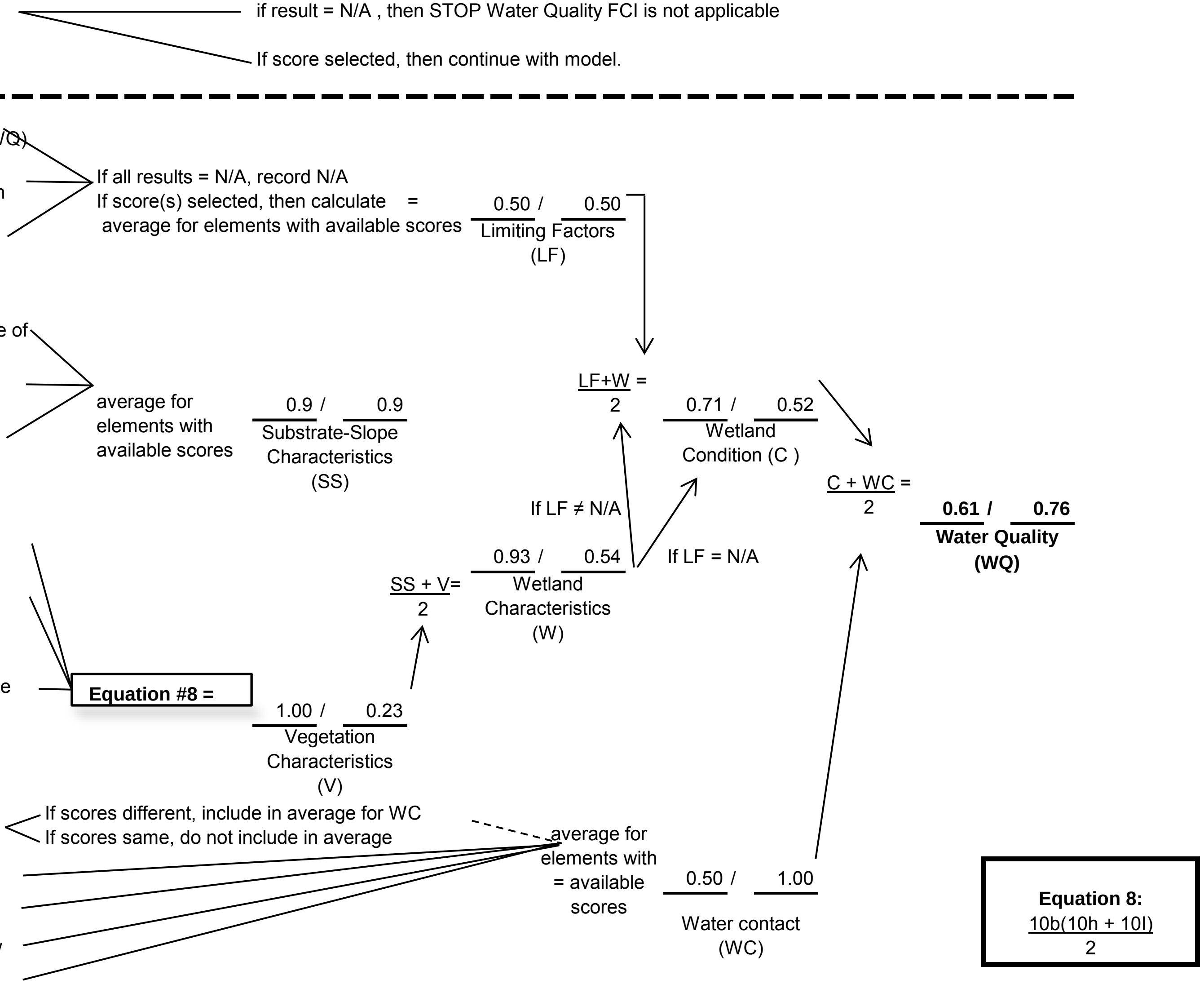
$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.7 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 1.0 / 0.3 | (10b) | Plant (basal) cover |
| 1.0 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |



if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

average for elements with available scores

0.9 / 0.9 Substrate-Slope Characteristics (SS)

Equation #8 =

1.00 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}=$

0.93 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}=$

If LF = N/A

0.71 / 0.52 Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}=$

**0.61 / 0.76**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.1 Physical Features

average for available scores = 0.25 / 0.42 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.42**
**Wildlife FCI**

`

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| N/A | / | N/A | (1b) | Shoreline bank stability |
| 0.5 | / | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 0.5 | (9c) | Substrate suitabuility for fish |
| 1.0 | / | 1.0 | (10d) | Plant (basal) cover |
| 0.7 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 | / | 0.1 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.7 Food/Cover

average for avaliable scores = **0.43 /** **0.55**

**Fish (Tidal) FCI**

**x= 0.2**

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | 0.5 | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.37 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.23

Vegetation influences on Rate of Erosion

average for available scores = **0.30 /** **0.36**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 /** **0.36**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$\frac{10a\ (10g + 10i + 10k)}{3}$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 0.7 | (10b) | Plant (basal) cover |
| 0.3 / | 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~ score from 4a ~~or 7a~~ = 0.10 / N/A Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 0.33 / 0.63 Vegetation Characteristics (V)

(14c) = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.82 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.38 / 0.82**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.60 / 0.80 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.24 / 0.40 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.10 / 0.10 Physical Features

average for available scores = 0.31 / 0.43 Habitat Complexity (HC)

If F ≠ NA

$$\frac{F + HC}{2}$$ = **0.21 / 0.43 Wildlife FCI**

If F = NA

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative C Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 0.98 | 85.43 | 83.72 | ✓ |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 1.00 | 85.43 | 85.43 | ✓ |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 1.00 | 85.43 | 85.43 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.58 | 85.43 | 49.55 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.58 | 85.43 | 49.55 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative C Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.53 | 6.87 | 3.64 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.82 | 6.87 | 5.63 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.73 | 6.87 | 5.02 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 0.93

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.96

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 /** **0.98**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

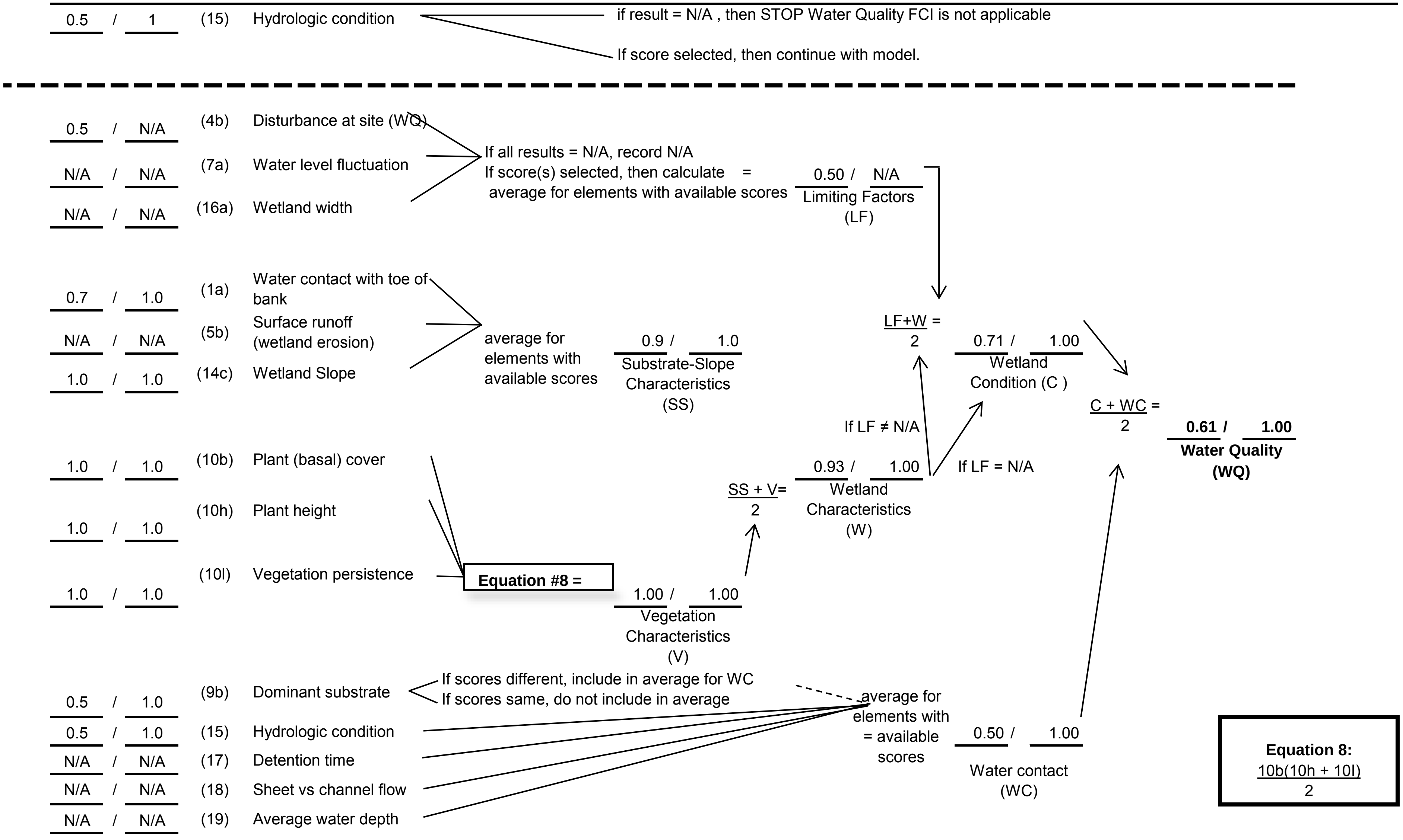
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A
Limiting Factors (LF)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.7 | 1.0 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.9 / 1.0
Substrate-Slope Characteristics (SS)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (10b) | Plant (basal) cover |
| 1.0 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 1.00
Vegetation Characteristics (V)

SS + V= / 2

0.93 / 1.00
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.71 / 1.00
Wetland Condition (C )

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.5 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00
Water contact (WC)

C + WC = / 2

**0.61 / 1.00**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.87 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

average for available scores = 0.25 / 0.58 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.58**
**Wildlife FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

Calclation of Fish (Tidal)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| | | | |
|---|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability | |
| 0.5 / N/A | (4a) | Disturbance at site (SS) | |
| 0.5 / N/A | (4d) | Disturbance in channel/open water | |
| N/A / N/A | (7b) | Most permanent hydroperiod | |
| N/A / N/A | (24) | Obstruction to fish passage | |

average for elements with available scores = 0.5 / N/A

Limiting Factors

| | | | |
|---|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod | |
| 0.5 / 0.5 | (9c) | Substrate suitabuility for fish | |
| 1.0 / 1.0 | (10d) | Plant (basal) cover | |
| 0.7 / 0.7 | (10f) | Rooted vascular aquatic beds | |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge | |
| 0.1 / 0.1 | (22b) | Available fish cover/attractors | |

**Equation #9** = 0.3 / 0.7

Food/Cover

average for avaliable scores = **0.43 / 0.58**

**Fish (Tidal) FCI**

**x= 0.2**

| | | | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | |

If score available, record score for WQ

If information not available, continue

| | | | |
|---|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | |
| INA / INA | (20d) | Dissolved Oxygen | |
| INA / INA | (20f) | Maximum water temperature | |

average for elements with available scores = 0.5 / 0.5

Water Quality (WQ)

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 719. Meadowlark Marsh

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: UAA baseline / Planned Upland Alternative C - Yr 20 |

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.37 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.53

Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.53**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.53**

**Shoreline Bank Erosion Control FCI**

[redacted]

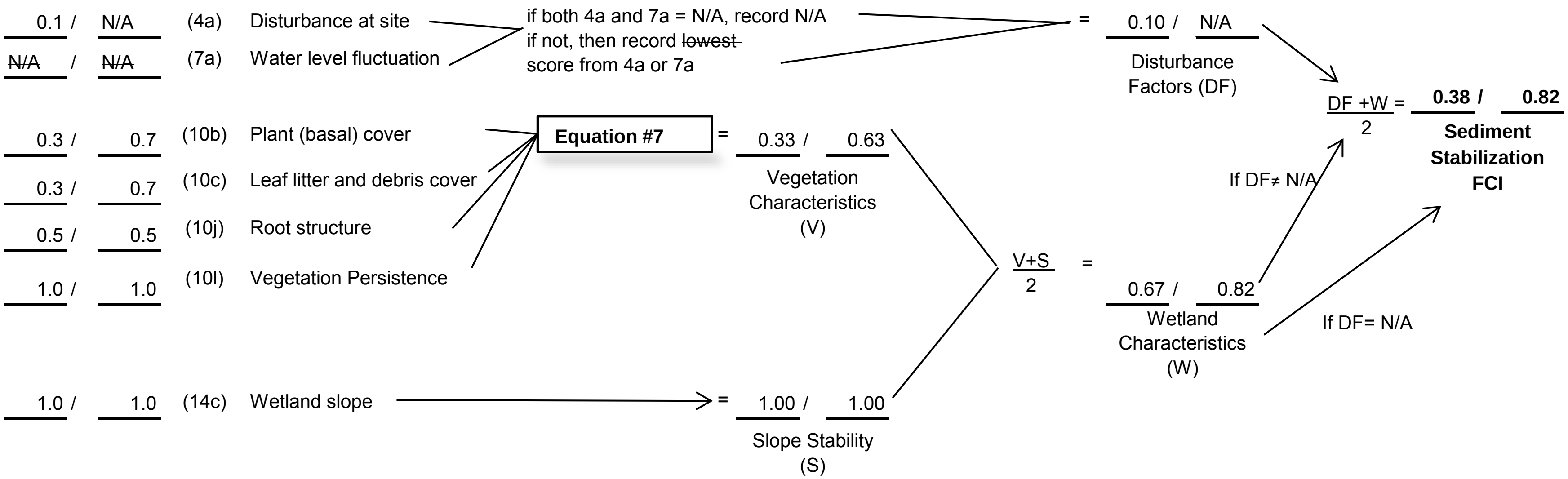
Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20



| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4a) | Disturbance at site |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / 0.7 | (10b) | Plant (basal) cover |
| 0.3 / 0.7 | (10c) | Leaf litter and debris cover |
| 0.5 / 0.5 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.33 / 0.63
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.82
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **0.38 / 0.82**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 | N/A | (20a) | Gross contamination |
| N/A | N/A | (16b) | Wetland size |
| 0.5 | 0.7 | (11a) | Layers |
| 0.3 | 0.7 | (11b) | Condition of Layers |
| 1.0 | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.2 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| N/A | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | N/A | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A; If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.60 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.24 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.31 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.21 / 0.73**
**Wildlife FCI**

`

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between WAA# Baseline and wetland # Alternative C Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 0.98 | 81.16 | 79.54 | ✓ |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 1.00 | 81.16 | 81.16 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 1.00 | 81.16 | 81.16 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.65 | 81.16 | 52.75 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.64 | 81.16 | 51.94 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 719. Meadowlark Marsh

Comparison between UAA# Baseline and upland # Alternative C Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.30 | 6.87 | 2.06 | 0.35 | 1 | 2.06 | 0.35 | 5.97 | 0.53 | 11.14 | 5.90 | ✓ |
| SS | 0.38 | 6.87 | 2.61 | 0.42 | 1 | 2.61 | 0.42 | 6.25 | 0.88 | 11.14 | 9.80 | ✓ |
| WL | 0.21 | 6.87 | 1.44 | 0.23 | 1 | 1.44 | 0.23 | 6.25 | 0.73 | 11.14 | 8.13 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

| | | | |
|---|---|---|---|
| 0.7 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.70 / 1.00

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 0.93

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.96

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.73 /** **0.98**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 /** **1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

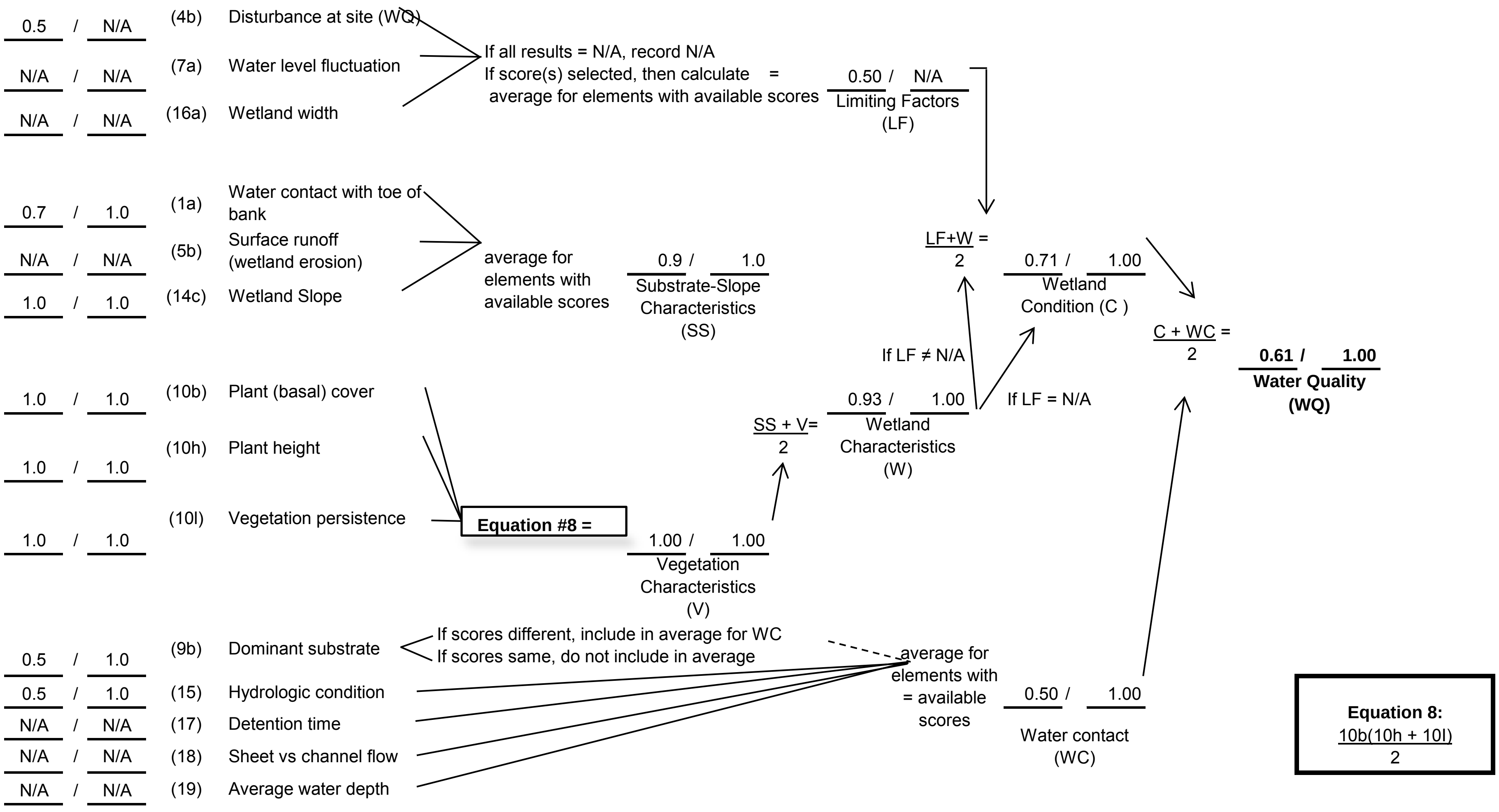
## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |
| 0.7 | 1.0 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |
| 1.0 | 1.0 | (10b) | Plant (basal) cover |
| 1.0 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.5 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A
Limiting Factors (LF)

average for elements with available scores

0.9 / 1.0
Substrate-Slope Characteristics (SS)

Equation #8 =

1.00 / 1.00
Vegetation Characteristics (V)

SS + V= / 2

0.93 / 1.00
Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.71 / 1.00
Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00
Water contact (WC)

C + WC = / 2

**0.61 / 1.00**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE:  Site 719. Meadowlark Marsh

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 1.0 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 0.1 / 0.5 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 1.00 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.56 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.30 / 0.50 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

average for available scores = 0.25 / 0.65 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.18 / 0.65**
**Wildlife FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (1b) | Shoreline bank stability |
| 0.5 / N/A | (4a) | Disturbance at site (SS) |
| 0.5 / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 1.0 | (9c) | Substrate suitabuility for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.7 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 1.0 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.1 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.3 / 0.8 Food/Cover

average for avaliable scores = **0.43 / 0.64**

**Fish (Tidal) FCI**

**x= 0.2**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Uniqueness/Heritage

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.1 | N/A | (4a) | Disturbance at site (SS) |
| 0.5 | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.5 | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A
Shoreline Structures /Obstacles

average for elements with available scores = 0.37 / N/A
Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.53
Vegetation influences on Rate of Erosion

average for available scores = **0.30 / 0.53**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.30 / 0.53**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 0.3 / | 1.0 | (10b) | Plant (basal) cover |
| 0.3 / | 1.0 | (10c) | Leaf litter and debris cover |
| 0.5 / | 0.5 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= 0.10 / N/A
Disturbance Factors (DF)

**Equation #7** = 0.33 / 0.75
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 0.67 / 0.88
Wetland Characteristics (W)

If DF≠ N/A

$\frac{DF+W}{2}$ = **0.38 / 0.88**

If DF= N/A

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 719. Meadowlark Marsh

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| 1.0 / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| N/A / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A
Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.60 / 0.80
Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.24 / 0.40
Vegetation Cover Types

(13a)–(13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00
Physical Features

average for available scores = 0.31 / 0.73
Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.21 / 0.73**
**Wildlife FCI**

`

# Site 721 - Metro Media Tract

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative A Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.73 | 85.43 | 62.36 | 0.84 | 1 | 62.36 | 0.84 | 74.29 | 0.63 | 87.22 | 54.95 | |
| SS | 1.00 | 85.43 | 85.43 | 1.00 | 1 | 85.43 | 1.00 | 85.43 | 0.60 | 87.22 | 52.33 | |
| WQ | 0.61 | 85.43 | 52.11 | 0.64 | 1 | 52.11 | 0.64 | 81.36 | 0.76 | 87.22 | 66.29 | ✓ |
| WL | 0.18 | 85.43 | 15.38 | 0.20 | 1 | 15.38 | 0.20 | 77.66 | 0.52 | 87.22 | 45.35 | ✓ |
| FT | 0.43 | 85.43 | 36.73 | 0.47 | 1 | 36.73 | 0.47 | 77.66 | 0.48 | 87.22 | 41.87 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

### Table A.1.
### Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative A Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.39 | 11.50 | 4.49 | ✓ |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 0.64 | 11.50 | 7.36 | ✓ |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.53 | 11.50 | 6.10 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1 |

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |

→ 3= N/A / N/A

Shoreline Structures /Obstacles

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |

average for elements with available scores = 0.75 / 0.75

Physical Influences on Rate of Erosion

| | | | |
|---|---|---|---|
| 1.0 | 0.3 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

**Equation #5 or #6** = 0.78 / 0.35

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.55

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= N/A / 0.50
Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.55
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| | | | |
|---|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition | if result = N/A , then STOP Water Quality FCI is not applicable<br>If score selected, then continue with model. |

---

| | | |
|---|---|---|
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

| | | |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.8 / 0.9 Substrate-Slope Characteristics (SS)

| | | |
|---|---|---|
| 1.0 / 0.3 | (10b) | Plant (basal) cover |
| 1.0 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.88 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.69 / 0.52 Wetland Condition (C )

| | | |
|---|---|---|
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.59 / 0.76**
**Water Quality (WQ)**

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a)–(11c): average for elements with available scores = 0.40 / 0.80 Vegetation Strata

(12a)–(12d): average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

(13a)–(13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

average for available scores = 0.36 / 0.62 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.62**
**Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1 |

Site Suitability For Planned Wetland:

| | | | | |
|---|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat | if result ≠ 0.1 of NA, then continue with model |

---

| | | | |
|---|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability | |
| N/A / 0.5 | (4a) | Disturbance at site (SS) | |
| N/A / 0.5 | (4d) | Disturbance in channel/open water | |
| N/A / N/A | (7b) | Most permanent hydroperiod | |
| N/A / N/A | (24) | Obstruction to fish passage | |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| | | | |
|---|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod | |
| 0.5 / 0.5 | (9c) | Substrate suitabiulity for fish | |
| 1.0 / 0.7 | (10d) | Plant (basal) cover | |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds | |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge | |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors | |

**Equation #9** = 0.24 / 0.68 Food/Cover

average for avaliable scores = **0.41 / 0.56**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

| | | | |
|---|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |

| | | | |
|---|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | |
| INA / INA | (20d) | Dissolved Oxygen | |
| INA / INA | (20f) | Maximum water temperature | |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b): average for elements with available scores = 0.50 / 0.50 Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k): **Equation #5 or #6** = 0.23 / 0.27 Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.39**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.39**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\,(10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 721. Metromedia Tract

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline /  Planned Upland Alternative A - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~
= N/A / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.00 / 0.55
Vegetation Characteristics (V)

(14c) = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 /** **0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| 0.1 / N/A | (16b) | Wetland size |
| 0.3 / 0.3 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.30 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.37 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.55 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.20 / 0.53 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.15 / 0.53**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative A Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.82 | 48.10 | 39.44 | ✓ |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 1.00 | 48.10 | 48.10 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 0.96 | 48.10 | 46.18 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.80 | 48.10 | 38.48 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.63 | 48.10 | 30.30 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative A Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.63 | 11.50 | 7.25 | ✓ |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 1.00 | 11.50 | 11.50 | ✓ |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.78 | 11.50 | 8.97 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 0.88

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.94

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.82**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Sediment Stabilization

| Selected Scores | (#) | Element |
|---|---|---|
| Comparison: | | WAA baseline / Planned Wetland Alternative A - Yr 20 |
| N/A / N/A | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= N/A / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

(14c): = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

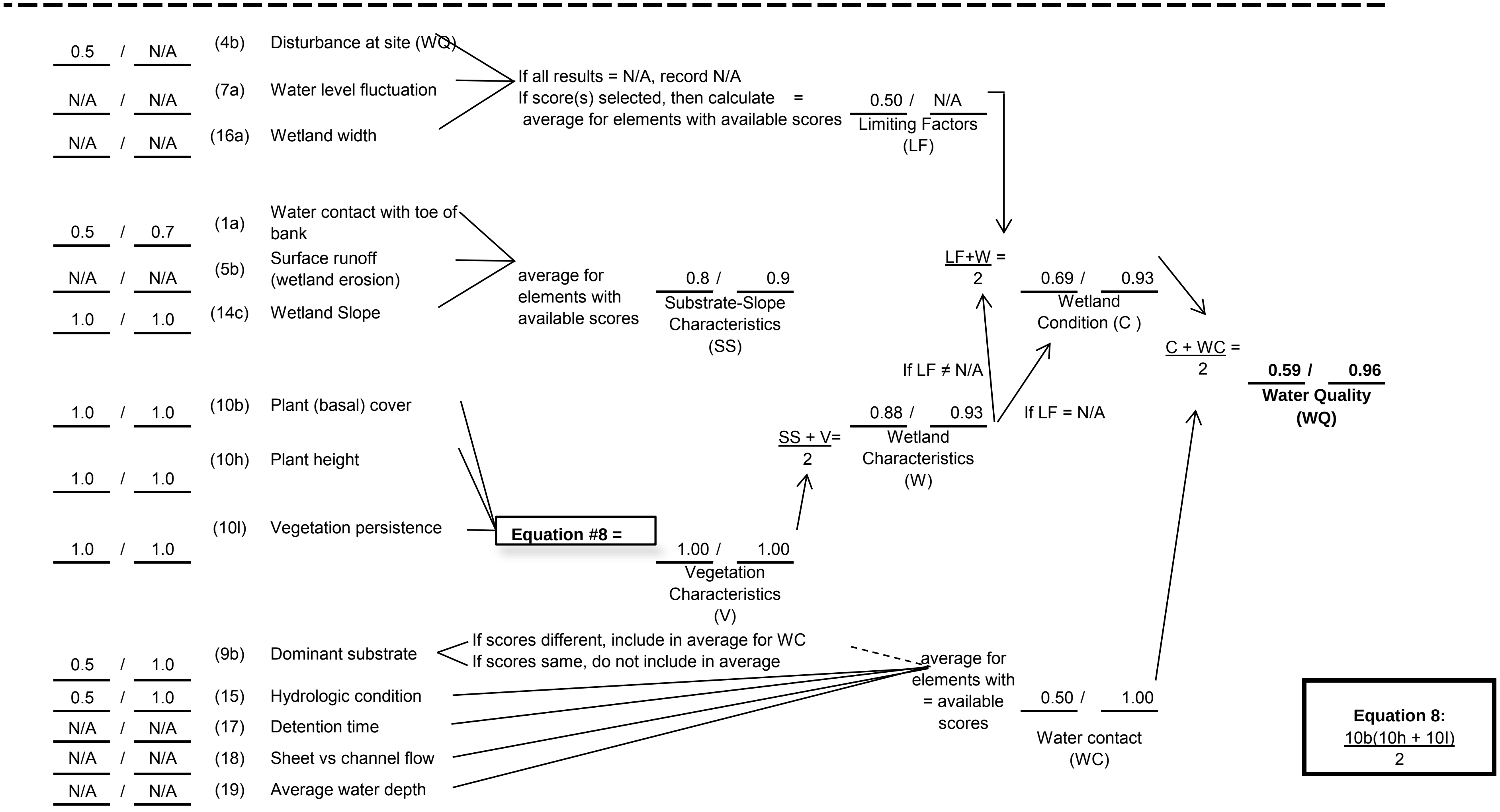
## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

average for elements with available scores

0.8 / 0.9 Substrate-Slope Characteristics (SS)

Equation #8 =

1.00 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.88 / 0.93 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.69 / 0.93 Wetland Condition (C )

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.59 / 0.96**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE:  Site 721. Metromedia Tract

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.90 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.56 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 1.0 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.36 / 0.80 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.80**
**Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | N/A | (1b) | Shoreline bank stability |
| N/A | / | N/A | (4a) | Disturbance at site (SS) |
| N/A | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 0.5 | (9c) | Substrate suitabuility for fish |
| 1.0 | / | 1.0 | (10d) | Plant (basal) cover |
| 0.3 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.75 Food/Cover

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.41 / 0.63**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.63

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

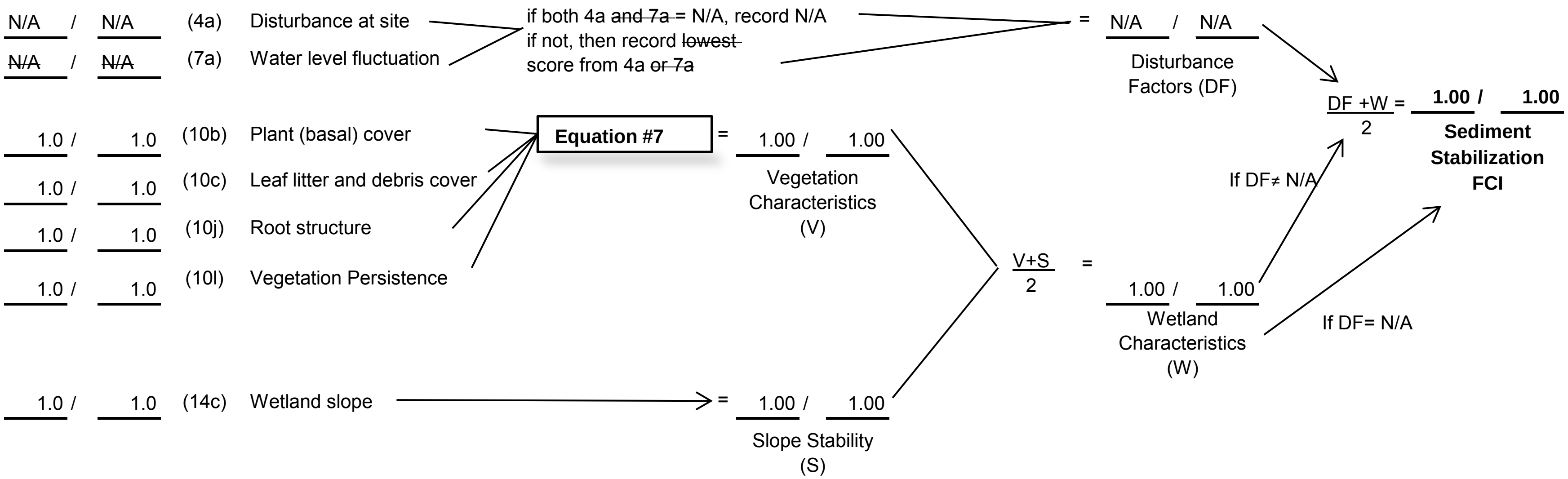
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20



| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| 0.1 / N/A | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.30 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.54 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.20 / 0.78 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.15 / 0.78**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative A Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.98 | 45.70 | 44.78 | ✓ |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 1.00 | 45.70 | 45.70 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 1.00 | 45.70 | 45.70 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.86 | 45.70 | 39.30 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.63 | 45.70 | 28.79 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

| | | |
|---|---|---|
| *FCUs | = | FCU x AREA |
| **Target FCI | = | *goal* established by decision makers |
| R | = | multiplying factor established by decision makers |
| Target FCUs | = | FCUWAA x R (i.e., planned wetland *goal*) |
| Predicted FCI | = | FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI) |
| Minimum Area | = | Target FCUs/Predicted FCI |

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative A Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.90 | 13.91 | 12.51 | ✓ |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 1.00 | 13.91 | 13.91 | ✓ |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.78 | 13.91 | 10.85 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 1.00

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 0.93

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.96

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.98**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

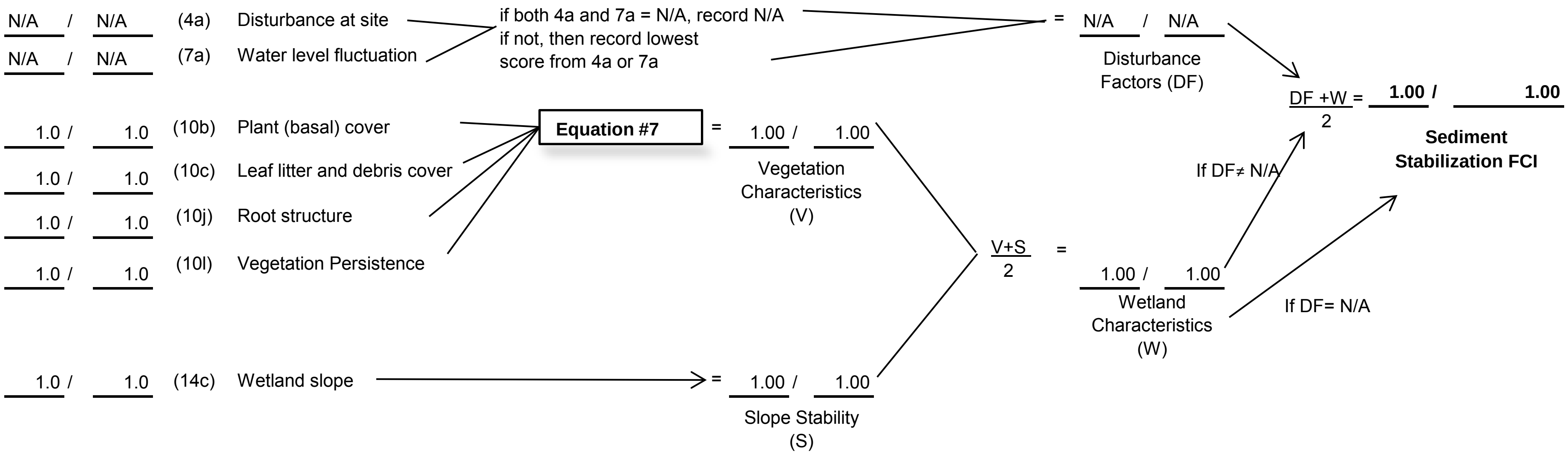
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 721. Metromedia Tract

## Calculation of Sediment Stabilization

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50



N/A / N/A (4a) Disturbance at site

N/A / N/A (7a) Water level fluctuation

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A Disturbance Factors (DF)

1.0 / 1.0 (10b) Plant (basal) cover

1.0 / 1.0 (10c) Leaf litter and debris cover

1.0 / 1.0 (10j) Root structure

1.0 / 1.0 (10l) Vegetation Persistence

**Equation #7** = 1.00 / 1.00 Vegetation Characteristics (V)

1.0 / 1.0 (14c) Wetland slope = 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Water Quality

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| | | | |
|---|---|---|---|
| 0.5 / | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| | | | |
|---|---|---|---|
| 0.5 / | N/A | (4b) | Disturbance at site (WQ) |
| N/A / | N/A | (7a) | Water level fluctuation |
| N/A / | N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate =
average for elements with available scores

0.50 / N/A
Limiting Factors
(LF)

| | | | |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |
| N/A / | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / | 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.8 / 1.0
Substrate-Slope Characteristics
(SS)

| | | | |
|---|---|---|---|
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10h) | Plant height |
| 1.0 / | 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 1.00
Vegetation Characteristics
(V)

$\frac{SS + V}{2} =$

0.88 / 1.00
Wetland Characteristics
(W)

If LF ≠ N/A

$\frac{LF+W}{2} =$

If LF = N/A

0.69 / 1.00
Wetland Condition (C )

| | | | |
|---|---|---|---|
| 0.5 / | 1.0 | (9b) | Dominant substrate |
| 0.5 / | 1.0 | (15) | Hydrologic condition |
| N/A / | N/A | (17) | Detention time |
| N/A / | N/A | (18) | Sheet vs channel flow |
| N/A / | N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00
Water contact
(WC)

$\frac{C + WC}{2} =$

**0.59 / 1.00**
**Water Quality**
**(WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.97 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.73 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 1.0 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.36 / 0.86 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.86**
**Wildlife FCI**

`

PROJECT TITLE:  Site 721. Metromedia Tract

## Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50 |

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| | | | | |
|---|---|---|---|---|
| 0.5 | / | N/A | (1b) | Shoreline bank stability |
| N/A | / | N/A | (4a) | Disturbance at site (SS) |
| N/A | / | N/A | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 0.5 | (9c) | Substrate suitabuility for fish |
| 1.0 | / | 1.0 | (10d) | Plant (basal) cover |
| 0.3 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.75 Food/Cover

average for avaliable scores = **0.41 / 0.63**

**Fish (Tidal) FCI**

| | | | | |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| | | | | |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 1.0 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.90

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.90**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.90**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

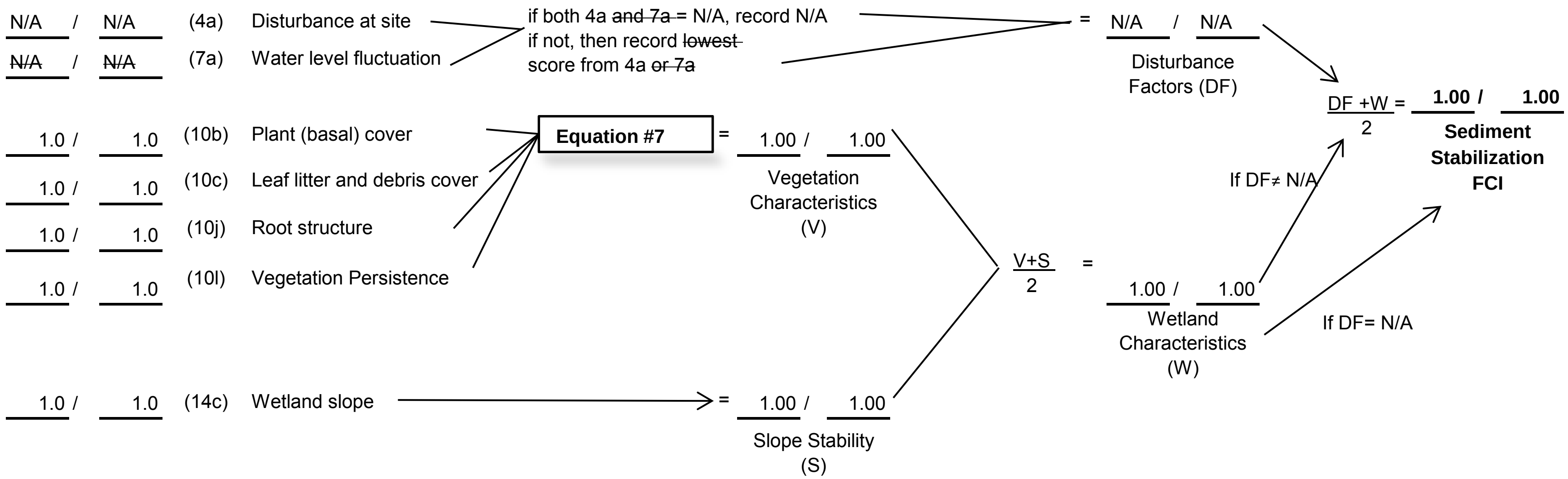
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50



| | | | |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 /** **1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative A - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| 0.1 | N/A | (16b) | Wetland size |
| 0.3 | 0.7 | (11a) | Layers |
| 0.3 | 0.7 | (11b) | Condition of Layers |
| N/A | 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 | 0.1 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 1.0 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 | 1.0 | (21a) | Shape of upland/wetland edge |
| N/A | 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A; If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.30 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.54 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.20 / 0.78 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.15 / 0.78**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative B Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.63 | 59.40 | 37.42 | |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 0.64 | 59.40 | 38.02 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 0.76 | 59.40 | 45.14 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.49 | 59.40 | 29.11 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.45 | 59.40 | 26.73 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative B Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.39 | N/A | | |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 0.64 | N/A | | |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.53 | N/A | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 0.3 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 0.75 Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 0.35 Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.55 Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / 0.5 | (4a) | Disturbance at site |
| N/A / N/A | (7a) | Water level fluctuation |
| 1.0 / 0.3 | (10b) | Plant (basal) cover |
| 1.0 / 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / 1.0 | (10j) | Root structure |
| 1.0 / 1.0 | (10l) | Vegetation Persistence |
| 1.0 / 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / 0.50 Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.55 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 / 0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|
| | | Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1 |
| 0.5 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50
Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.8 / 0.9
Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 0.3 | (10b) | Plant (basal) cover |
| 1.0 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 0.23
Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.88 / 0.54
Wetland Characteristics (W)

If LF ≠ N/A

If LF = N/A

$\frac{LF+W}{2}$ =

0.69 / 0.52
Wetland Condition (C )

$\frac{C + WC}{2}$ =

**0.59 / 0.76**
**Water Quality (WQ)**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00
Water contact (WC)

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.40 / 0.73 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

average for elements with available scores = 0.1 / 0.1 Physical Features

average for available scores = 0.36 / 0.49 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.49 Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element | |
|---|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

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| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| N/A / 0.5 | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / 0.5 | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitabuility for fish |
| 1.0 / 0.7 | (10d) | Plant (basal) cover |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.34 Food/Cover

average for avaliable scores = **0.41 / 0.45** **Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ
If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.23 / 0.27

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.39**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.39**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / 0.50
Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.55
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 / 0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE:  Site 721. Metromedia Tract

## Calculation of Wildlife (Upland)

Comparison: UAA baseline /  Planned Upland Alternative B - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (4c) | Disturbance of wildlife habitat |
| N/A | N/A | (20a) | Gross contamination |
| 0.1 | N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.3 | 0.3 | (11a) | Layers |
| 0.3 | 0.7 | (11b) | Condition of Layers |
| N/A | 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.30 / 0.67 Vegetation Strata

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (12a) | Cover types |
| 0.1 | 0.5 | (12b) | Ratio of cover types |
| 0.5 | 0.5 | (12c) | Cover type interspersion |
| 0.1 | N/A | (12d) | Undesirable species |

average for elements with available scores = 0.20 / 0.37 Vegetation Cover Types

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ | ~~N/A~~ | (13b) | Vegetation/water interspersion |

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.1 | 0.1 | (21a) | Shape of upland/wetland edge |
| N/A | 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ | ~~N/A~~ | (23) | Islands |

average for elements with available scores = 0.10 / 0.55 Physical Features

average for available scores = 0.20 / 0.53 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ =

**0.15 / 0.53**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative B Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.82 | 59.40 | 48.71 | ✓ |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 1.00 | 59.40 | 59.40 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 0.89 | 59.40 | 52.87 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.69 | 59.40 | 40.99 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.63 | 59.40 | 37.42 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative B Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.63 | N/A | N/A | |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 1.00 | N/A | N/A | |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.73 | N/A | N/A | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

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| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 0.88

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.94

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.82**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= N/A / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

(14c) = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **1.00 / 1.00**

If DF= N/A: **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

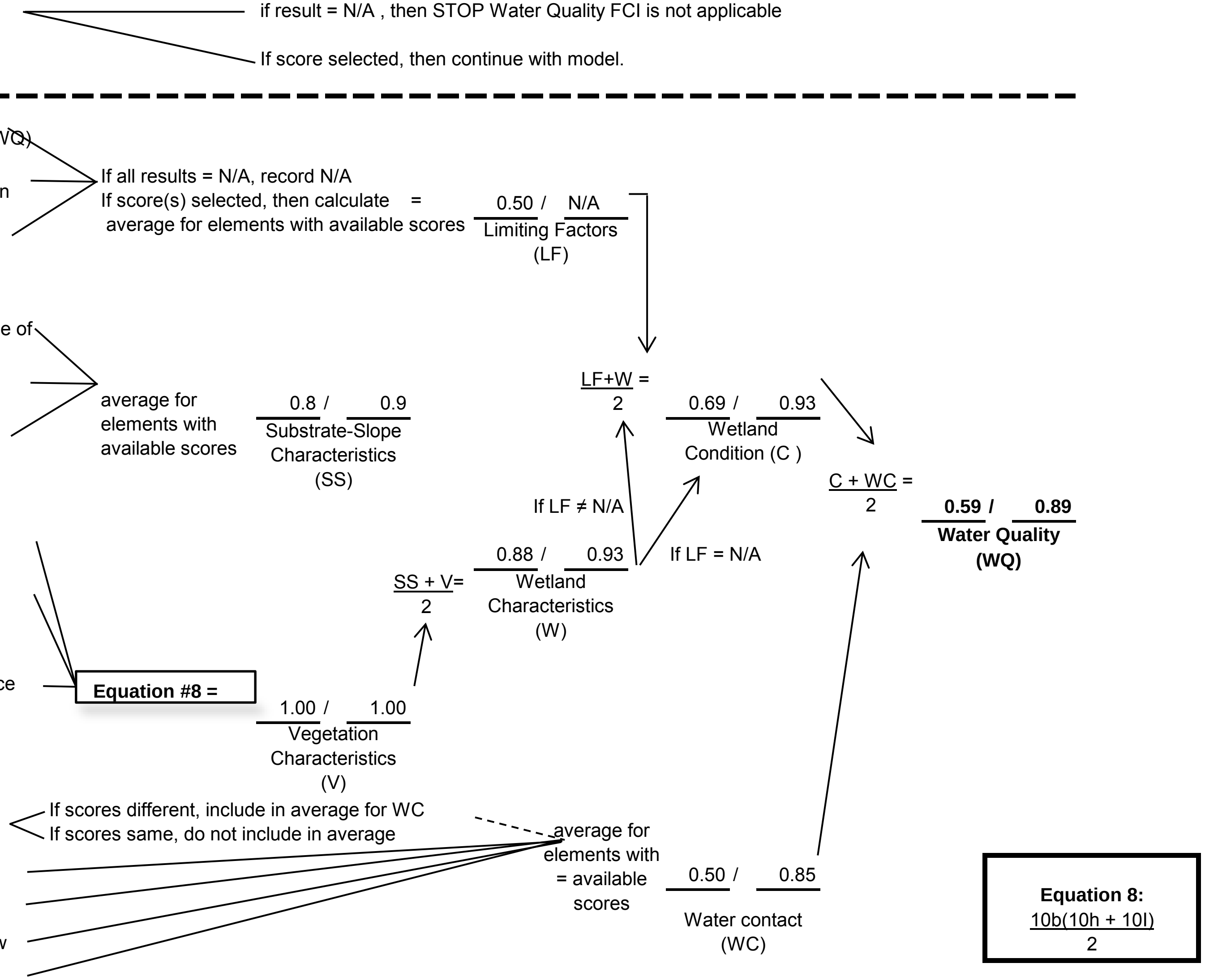
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE:  Site 721. Metromedia Tract

Calculation of Water Quality

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 | 0.7 | (15) | Hydrologic condition |
| 0.5 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |
| 0.5 | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |
| 1.0 | 1.0 | (10b) | Plant (basal) cover |
| 1.0 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.5 | 0.7 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |



PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.90 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.56 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

average for available scores = 0.36 / 0.69 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.69**
**Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| N/A N/A | (24) | Obstruction to fish passage |

- if result = 0.1, STOP. There is no potential for providing tidal fish habitat
- if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| N/A / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitabuility for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.75 Food/Cover

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

- If score available, record score for WQ
- If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.41 / 0.63**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 721. Metromedia Tract

Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements  with available scores  = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: UAA baseline / Planned Upland Alternative B - Yr 20 |

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.63

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

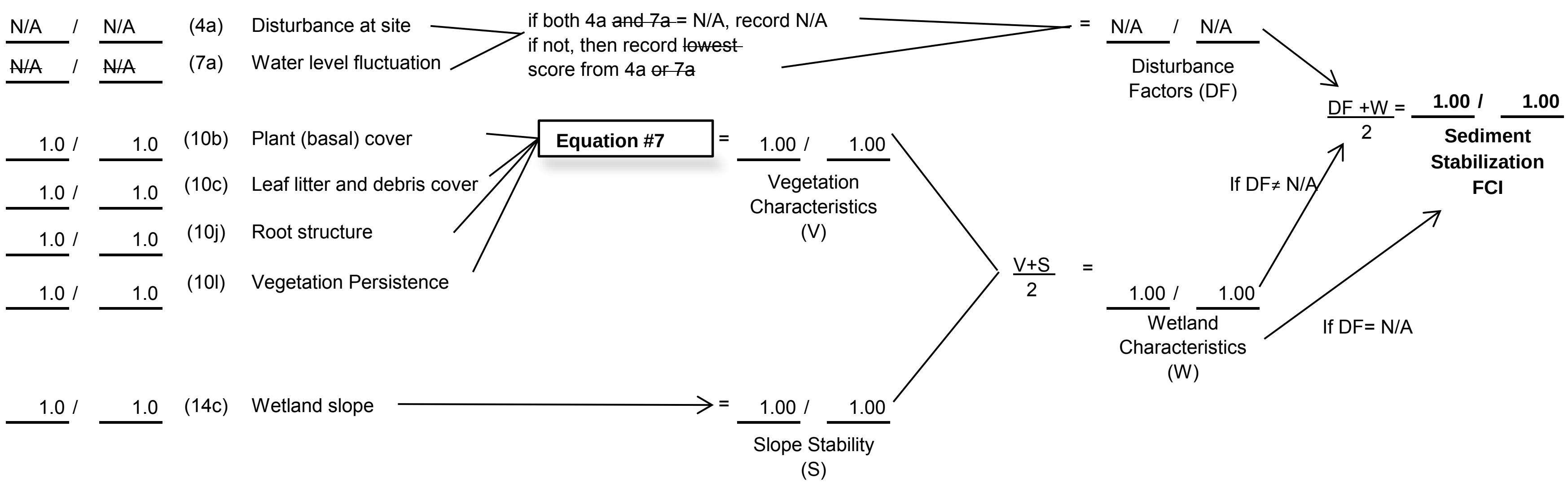
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20



| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| 0.1 / N/A | (16b) | Wetland size |
| 0.3 / 0.3 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / 1.0 | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.30 / 0.67 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.54 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.20 / 0.73 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.15 / 0.73**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative B Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.98 | 56.43 | 55.30 | ✓ |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 1.00 | 56.43 | 56.43 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 0.93 | 56.43 | 52.48 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.75 | 56.43 | 42.32 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.63 | 56.43 | 35.55 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )

Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative B Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.63 | N/A | N/A | |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 1.00 | N/A | N/A | |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.78 | N/A | N/A | |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Shoreline Bank Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| | | | |
|---|---|---|---|
| 0.5 / | 1.0 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 1.00

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 0.93

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.96

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.98**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 721. Metromedia Tract

## Calculation of Sediment Stabilization

Comparison: WAA baseline /  Planned Wetland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00 Vegetation Characteristics (V)

= 1.00 / 1.00 Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00 Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

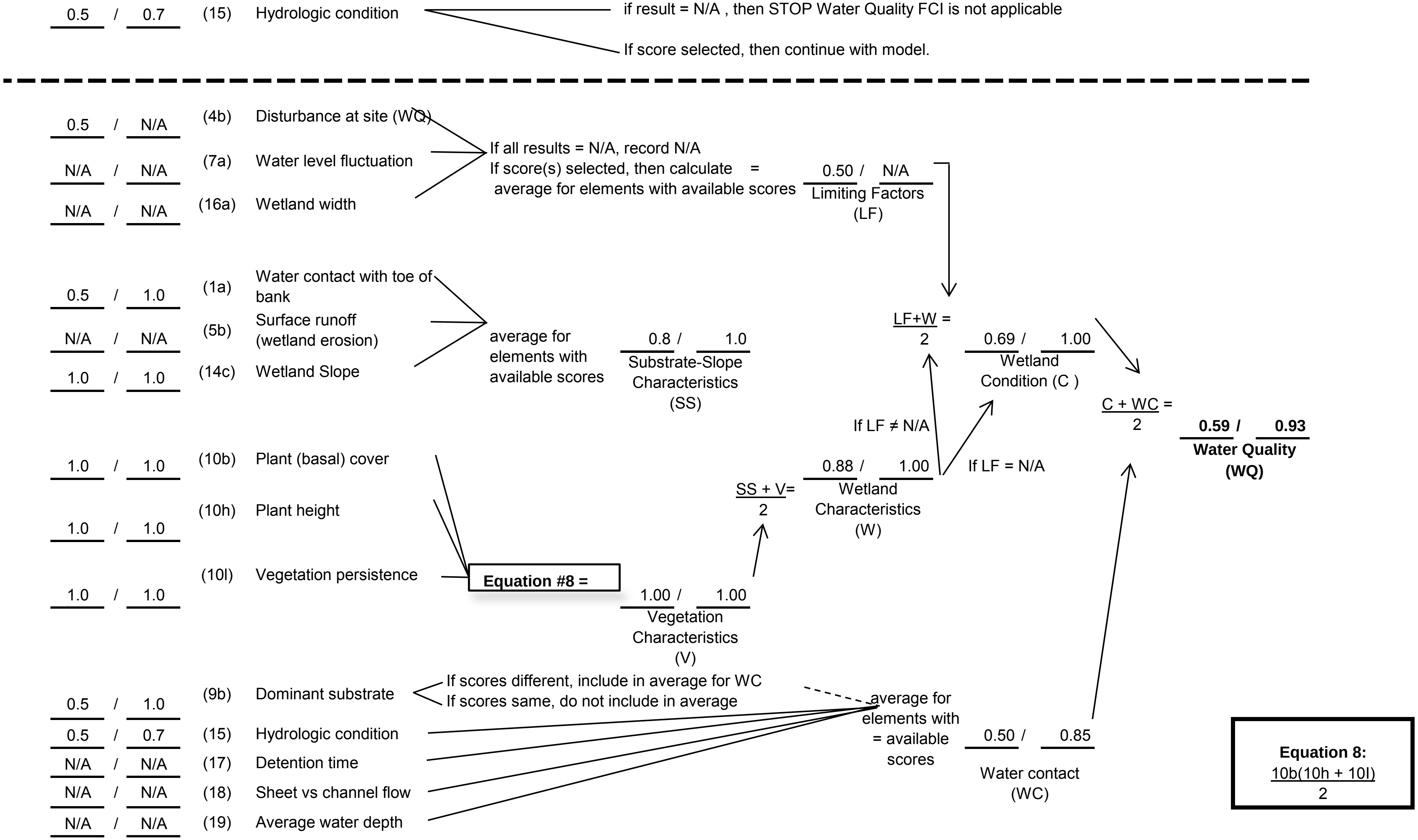
$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Water Quality

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50



0.5 / 0.7 (15) Hydrologic condition

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

0.5 / N/A (4b) Disturbance at site (WQ)

N/A / N/A (7a) Water level fluctuation

N/A / N/A (16a) Wetland width

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

0.5 / 1.0 (1a) Water contact with toe of bank

N/A / N/A (5b) Surface runoff (wetland erosion)

1.0 / 1.0 (14c) Wetland Slope

average for elements with available scores

0.8 / 1.0 Substrate-Slope Characteristics (SS)

1.0 / 1.0 (10b) Plant (basal) cover

1.0 / 1.0 (10h) Plant height

1.0 / 1.0 (10l) Vegetation persistence

**Equation #8 =**

1.00 / 1.00 Vegetation Characteristics (V)

SS + V= / 2

0.88 / 1.00 Wetland Characteristics (W)

If LF ≠ N/A

If LF = N/A

LF+W = / 2

0.69 / 1.00 Wetland Condition (C )

C + WC = / 2

**0.59 / 0.93 Water Quality (WQ)**

0.5 / 1.0 (9b) Dominant substrate

If scores different, include in average for WC
If scores same, do not include in average

0.5 / 0.7 (15) Hydrologic condition

N/A / N/A (17) Detention time

N/A / N/A (18) Sheet vs channel flow

N/A / N/A (19) Average water depth

average for elements with = available scores

0.50 / 0.85 Water contact (WC)

**Equation 8:**

$$\frac{10b(10h + 10l)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 1.0 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 1.0 | (12b) | Ratio of cover types |
| 0.5 / 1.0 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 0.1 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.97 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.73 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/ Water Proportions, Physical Features: average for available scores = 0.36 / 0.75 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.75**
**Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calclation of Fish (Tidal)

| Selected Scores | (#) | Element | Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50 |
|---|---|---|---|

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat
if result ≠ 0.1 of NA, then continue with model

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| N/A / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitability for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.75 Food/Cover

average for avaliable scores = **0.41 / 0.63**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ
If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (29) | Endangered species |
| N/A / N/A | (30) | Rarity |
| N/A / N/A | (31) | Unique features |
| N/A / N/A | (32) | Historical or archaeological significance |
| N/A / N/A | (33) | Natural landmark |
| N/A / N/A | (34) | Connected to Wild and Scenic River |
| N/A / 1.0 | (35) | Park, sanctuary, etc. |
| N/A / N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.63

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative B - Yr 50

| Selected Scores | (#) | Element | | |
|---|---|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat | If 4c, 16b and 20a = N/A, record N/A<br>If any score = 0.1, record 0.1 | = 0.10 / N/A<br>Features Which Reduce Habitat Value (F) |
| N/A / N/A | (20a) | Gross contamination | | |
| 0.1 / N/A | (16b) | Wetland size | | |
| 0.3 / 0.7 | (11a) | Layers | average for elements with available scores | = 0.30 / 0.80<br>Vegetation Strata |
| 0.3 / 0.7 | (11b) | Condition of Layers | | |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees | | |
| 0.1 / 0.1 | (12a) | Cover types | average for elements with available scores | = 0.20 / 0.54<br>Vegetation Cover Types |
| 0.1 / 0.5 | (12b) | Ratio of cover types | | |
| 0.5 / 1.0 | (12c) | Cover type interspersion | | |
| 0.1 / N/A | (12d) | Undesirable species | | |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water | average for elements with available scores | = ~~N/A~~ / ~~N/A~~<br>Vegetation/ Water Proportions |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion | | |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge | average for elements with available scores | = 0.10 / 1.00<br>Physical Features |
| N/A / 1.0 | (22a) | Wildlife attractors | | |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands | | |

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.20 / 0.78 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.15 / 0.78**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative C Year 2

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.63 | 58.20 | 36.67 | |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 0.64 | 58.20 | 37.25 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 0.76 | 58.20 | 44.23 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.62 | 58.20 | 36.08 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.56 | 58.20 | 32.59 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative C Year 2

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.36 | 1.10 | 0.40 | |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 0.64 | 1.10 | 0.70 | |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.16 | 1.10 | 0.18 | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

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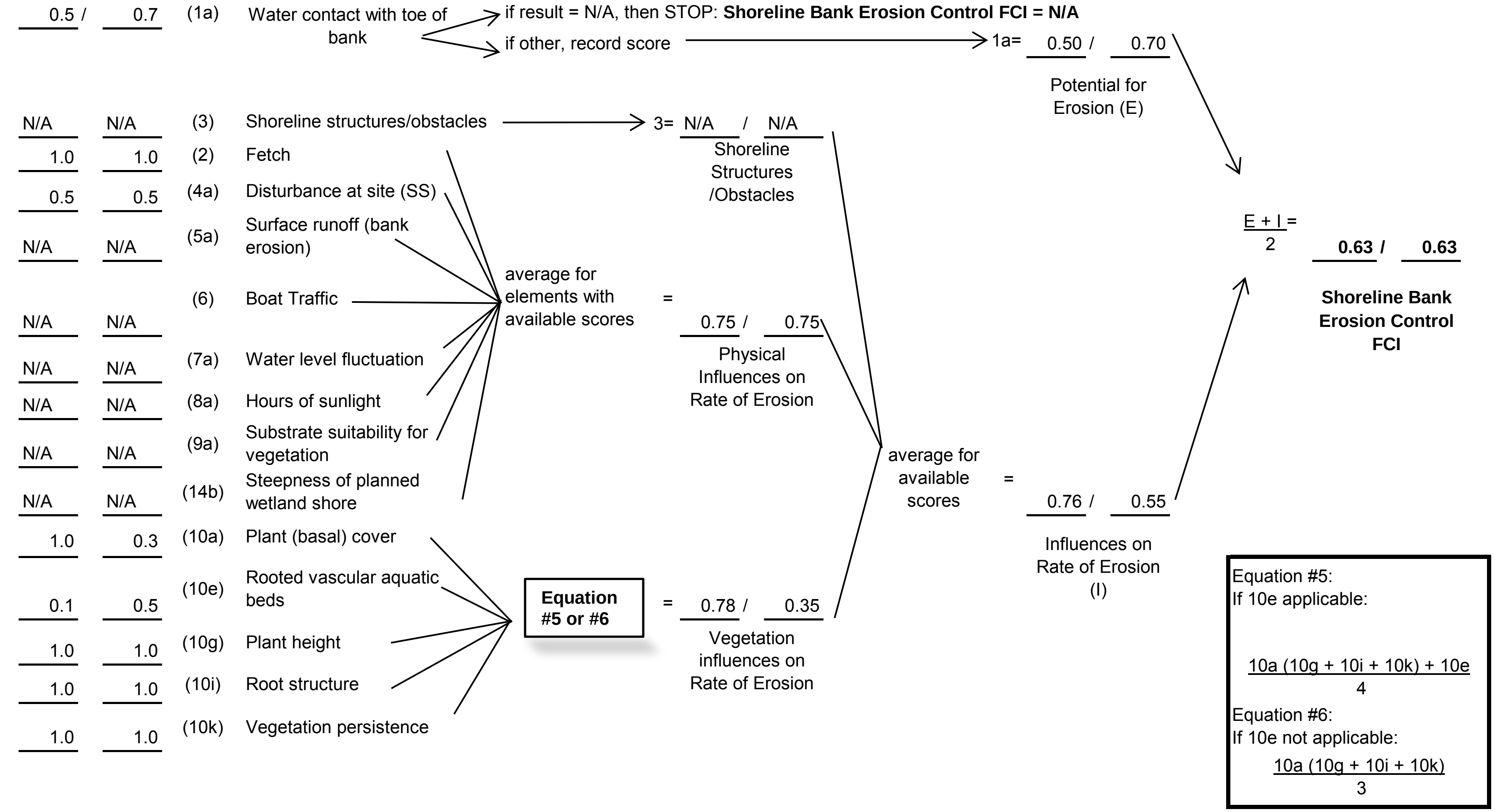


| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 0.3 | (10a) | Plant (basal) cover |
| 0.1 | 0.5 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.75 / 0.75

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.78 / 0.35

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.55

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.63**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= N/A / 0.50
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.00 / 0.55
Vegetation Characteristics (V)

(14c): = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77
Wetland Characteristics (W)

If DF≠ N/A: $\frac{DF+W}{2}$ = **1.00 /** **0.64**

If DF= N/A: **Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / 0.50 Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.8 / 0.9 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 0.3 | (10b) | Plant (basal) cover |
| 1.0 / 0.5 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 0.23 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ =

0.88 / 0.54 Wetland Characteristics (W)

If LF ≠ N/A

$\frac{LF+W}{2}$ =

If LF = N/A

0.69 / 0.52 Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ =

**0.59 / 0.76**
**Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A. If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.40 / 0.80 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

(13a), (13b): average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.1 / 0.6 Physical Features

Vegetation Strata, Vegetation Cover Types, Vegetation/Water Proportions, Physical Features: average for available scores = 0.36 / 0.62 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.62**
**Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | N/A | (1b) | Shoreline bank stability |
| N/A | / | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | / | 0.5 | (4d) | Disturbance in channel/open water |
| N/A | / | N/A | (7b) | Most permanent hydroperiod |
| N/A | / | N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / 0.5 Limiting Factors

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 | / | 0.5 | (9c) | Substrate suitability for fish |
| 1.0 | / | 0.7 | (10d) | Plant (basal) cover |
| 0.3 | / | 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 | / | 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 | / | 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.68 Food/Cover

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.5 | / | 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 0.1 | / | 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA | / | INA | (20d) | Dissolved Oxygen |
| INA | / | INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

average for avaliable scores = **0.41 / 0.56**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| Selected Scores | | | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements with available scores = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Upland Erosion Control

| Selected Scores | | (#) | Element |
|---|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

Site Suitability For Planned Wetland:

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| | | | |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

| | | | |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | 0.5 | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / 0.50

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.23

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.36**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.36**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Sediment Stabilization (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | 0.5 | (4a) | Disturbance at site |
| ~~N/A~~ / | ~~N/A~~ | (7a) | Water level fluctuation |
| 1.0 / | 0.3 | (10b) | Plant (basal) cover |
| 1.0 / | 0.7 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / 0.50
Disturbance Factors (DF)

**Equation #7** = 1.00 / 0.55
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 0.77
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 / 0.64**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\,(10j + 10l) + 10c\,(1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 1

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| 0.1 / 0.1 | (16b) | Wetland size |
| 0.3 / 0.3 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| N/A / N/A | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.1 / 0.1 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 0.1 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10
Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.30 / 0.30
Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.24
Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~
Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 0.10
Physical Features

average for available scores = 0.20 / 0.21
Habitat Complexity (HC)

If F ≠ NA

$\frac{F + HC}{2}$ = **0.15 / 0.16**

If F = NA

**Wildlife FCI**

### Table A.1.
### Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative C Year 20

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.83 | 58.20 | 48.31 | ✓ |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 1.00 | 58.20 | 58.20 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 0.96 | 58.20 | 55.87 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.74 | 58.20 | 43.07 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.63 | 58.20 | 36.67 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal*)
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

**Table A.1.**
**Comparison of UAA and planned upland: calculations of FCIs and FCUs**

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative C Year 20

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.23 | 1.10 | 0.25 | |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 1.00 | 1.10 | 1.10 | |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.32 | 1.10 | 0.35 | ✓ |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCU UAA x R (i.e., planned upland goal)
Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2)–(14b): average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

(10a)–(10k): **Equation #5 or #6** = 0.78 / 0.93

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.96

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 /** **0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 721. Metromedia Tract

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a
= N/A / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

(14c) → = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

$\frac{DF + W}{2}$ = **1.00 /** **1.00**

If DF= N/A

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

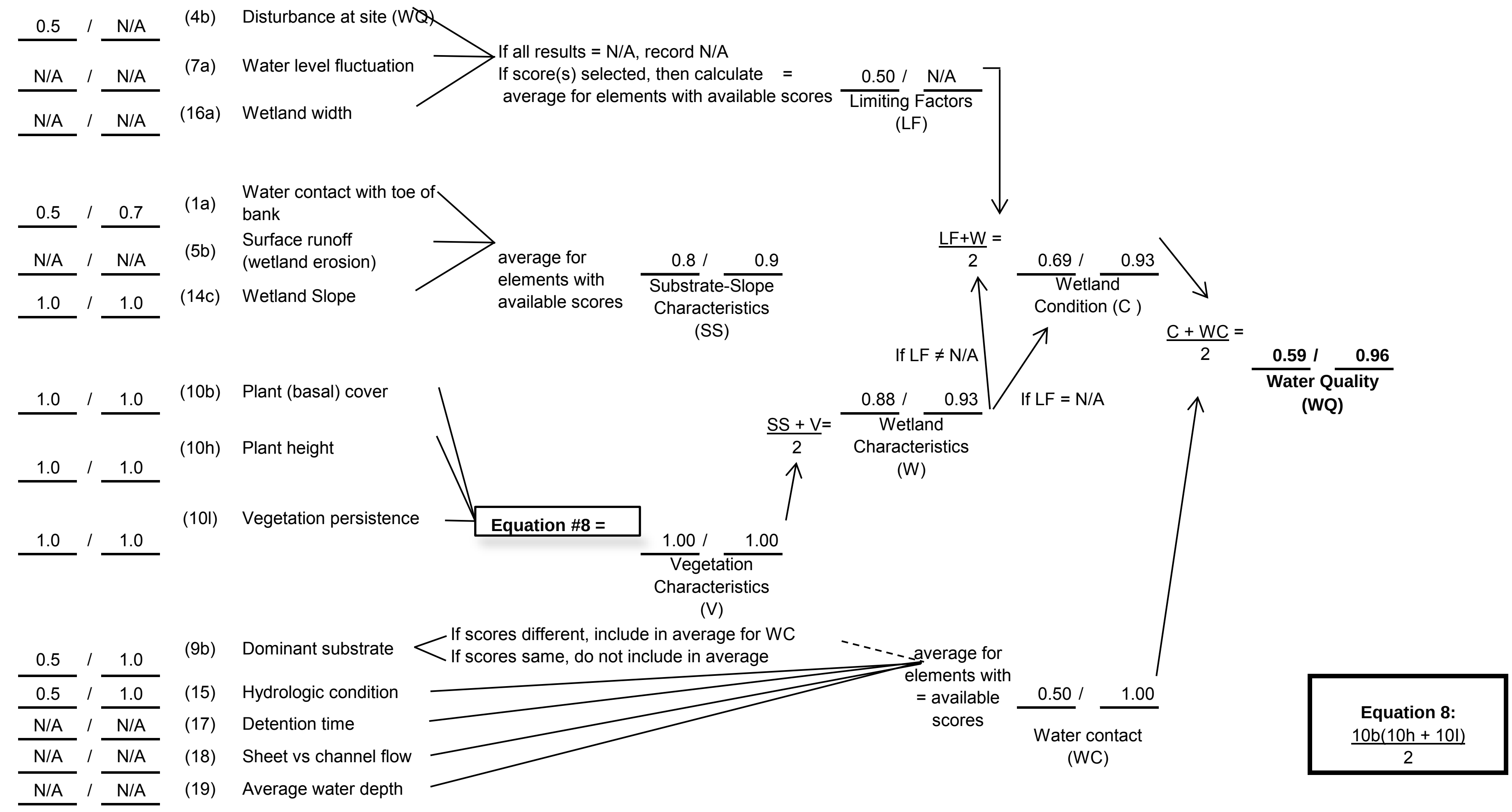
## Calculation of Water Quality

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.



| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (4b) | Disturbance at site (WQ) |
| N/A / N/A | (7a) | Water level fluctuation |
| N/A / N/A | (16a) | Wetland width |

If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (1a) | Water contact with toe of bank |
| N/A / N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 / 1.0 | (14c) | Wetland Slope |

average for elements with available scores

0.8 / 0.9 Substrate-Slope Characteristics (SS)

| Selected Scores | (#) | Element |
|---|---|---|
| 1.0 / 1.0 | (10b) | Plant (basal) cover |
| 1.0 / 1.0 | (10h) | Plant height |
| 1.0 / 1.0 | (10l) | Vegetation persistence |

**Equation #8 =**

1.00 / 1.00 Vegetation Characteristics (V)

$\frac{SS + V}{2}$ = 0.88 / 0.93 Wetland Characteristics (W)

If LF ≠ N/A: $\frac{LF+W}{2}$ = 0.69 / 0.93 Wetland Condition (C )

If LF = N/A: Wetland Condition (C )

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (9b) | Dominant substrate |
| 0.5 / 1.0 | (15) | Hydrologic condition |
| N/A / N/A | (17) | Detention time |
| N/A / N/A | (18) | Sheet vs channel flow |
| N/A / N/A | (19) | Average water depth |

If scores different, include in average for WC
If scores same, do not include in average

average for elements with available scores = 0.50 / 1.00 Water contact (WC)

$\frac{C + WC}{2}$ = **0.59 / 0.96 Water Quality (WQ)**

**Equation 8:**
$\frac{10b(10h + 10l)}{2}$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.7 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.40 / 0.80 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

average for elements with available scores = 0.1 / 1.0 Physical Features

average for available scores = 0.36 / 0.74 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ =

**0.23 / 0.74**
**Wildlife FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element | |
|---|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage | if result = 0.1, STOP. There is no potential for providing tidal fish habitat<br>if result ≠ 0.1 of NA, then continue with model |

---

| Selected Scores | (#) | Element | |
|---|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability | average for elements with available scores = 0.5 / N/A Limiting Factors |
| N/A / N/A | (4a) | Disturbance at site (SS) | |
| N/A / N/A | (4d) | Disturbance in channel/open water | |
| N/A / N/A | (7b) | Most permanent hydroperiod | |
| N/A / N/A | (24) | Obstruction to fish passage | |
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod | **Equation #9** = 0.24 / 0.75 Food/Cover |
| 0.5 / 0.5 | (9c) | Substrate suitability for fish | |
| 1.0 / 1.0 | (10d) | Plant (basal) cover | |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds | |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge | |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors | |
| 0.5 / 0.5 | (20b) | Water quality rating | If score available, record score for WQ<br>If information not available, continue |
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources | average for elements with available scores = 0.5 / 0.5 Water Quality (WQ) |
| INA / INA | (20d) | Dissolved Oxygen | |
| INA / INA | (20f) | Maximum water temperature | |

average for avaliable scores = **0.41 / 0.63**

**Fish (Tidal) FCI**

**x= 0.2**

**Equation #9:**

$$\frac{7c\,[9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 721. Metromedia Tract

Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores |  |  | (#) | Element |
|---|---|---|---|---|
| 1.0 | / | 1.0 | (29) | Endangered species |
| N/A | / | N/A | (30) | Rarity |
| N/A | / | N/A | (31) | Unique features |
| N/A | / | N/A | (32) | Historical or archaeological significance |
| N/A | / | N/A | (33) | Natural landmark |
| N/A | / | N/A | (34) | Connected to Wild and Scenic River |
| N/A | / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A | / | N/A | (36) | Scientific research site |

average for elements  with available scores  =  1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.3 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.5 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

[redacted] 1a= N/A / N/A

Potential for Erosion (E)

3= N/A / N/A

Shoreline Structures /Obstacles

average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

**Equation #5 or #6** = 0.23 / 0.23

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.23**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.23**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Sediment Stabilization (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

| | | | |
|---|---|---|---|
| N/A / N/A | (4a) | Disturbance at site | |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation | |
| 1.0 / 1.0 | (10b) | Plant (basal) cover | |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover | |
| 1.0 / 1.0 | (10j) | Root structure | |
| 1.0 / 1.0 | (10l) | Vegetation Persistence | |
| 1.0 / 1.0 | (14c) | Wetland slope | |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF+W}{2}$ = **1.00 / 1.00**
**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 20

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| 0.1 / 0.1 | (16b) | Wetland size |
| 0.3 / 0.5 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| N/A / N/A | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.1 / 0.1 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

(4c), (20a), (16b): If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

(11a), (11b), (11c): average for elements with available scores = 0.30 / 0.40 Vegetation Strata

(12a), (12b), (12c), (12d): average for elements with available scores = 0.20 / 0.24 Vegetation Cover Types

(13a), (13b): average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

(21a), (22a), (23): average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.20 / 0.55 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.15 / 0.32**
**Wildlife FCI**

## Table A.1.
## Comparison of WAA and planned wetland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between WAA# Baseline and wetland # Alternative C Year 50

| Function | WAA | | | Goals for Planned Wetland** | | | | | Planned Wetland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.63 | 59.50 | 37.49 | 0.72 | 1 | 37.49 | 0.72 | 51.74 | 0.83 | 55.29 | 45.89 | ✓ |
| SS | 1.00 | 59.50 | 59.50 | 1.00 | 1 | 59.50 | 1.00 | 59.50 | 1.00 | 55.29 | 55.29 | |
| WQ | 0.59 | 59.50 | 35.11 | 0.62 | 1 | 35.11 | 0.62 | 56.67 | 1.00 | 55.29 | 55.29 | ✓ |
| WL | 0.23 | 59.50 | 13.69 | 0.25 | 1 | 13.69 | 0.25 | 54.09 | 0.75 | 55.29 | 41.47 | ✓ |
| FT | 0.41 | 59.50 | 24.40 | 0.45 | 1 | 24.40 | 0.45 | 54.09 | 0.63 | 55.29 | 34.83 | ✓ |
| UH | 1.00 | | | 1.00 | | | | | 1.00 | | | |

*FCUs = FCU x AREA
**Target FCI = *goal* established by decision makers
R = multiplying factor established by decision makers
Target FCUs = FCUWAA x R (i.e., planned wetland *goal* )
Predicted FCI = FCIs which designers presume planned wetland may achieve at a particular site (Note this may be greater than Target FCI)
Minimum Area = Target FCUs/Predicted FCI

## Table A.1.
## Comparison of UAA and planned upland: calculations of FCIs and FCUs

Project Title: Site 721. Metromedia Tract

Comparison between UAA# Baseline and upland # Alternative C Year 50

| Function | UAA | | | Goals for Planned Upland** | | | | | Planned Upland | | | Check if goals met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FCI | AREA | FCUs* | Target FCI | R | Target FCUs | Predicted FCI | Minimum Area | FCI | Area | FCUs* | |
| SB | 0.36 | 1.76 | 0.63 | 0.41 | 1 | 0.63 | 0.41 | 1.53 | 0.63 | 4.01 | 2.53 | ✓ |
| SS | 1.00 | 1.76 | 1.76 | 1.00 | 1 | 1.76 | 1.00 | 1.76 | 1.00 | 4.01 | 4.01 | ✓ |
| WL | 0.15 | 1.76 | 0.26 | 0.17 | 1 | 0.26 | 0.17 | 1.60 | 0.34 | 4.01 | 1.36 | ✓ |

*FCUs = FCU x AREA

**Target FCI = *goal* established by decision makers

R = multiplying factor established by decision makers

Target FCUs = FCU UAA x R (i.e., planned upland goal)

Predicted FCI = FCIs which designers presume planned upland may achieve at a particular site (Note this may be greater than Target FCI)

Minimum Area = Target FCUs/Predicted FCI

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Shoreline Bank Erosion Control

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 1.0 | 1.0 | (14a) | Steepness of existing shore |

if result = 0.1 for either element, then the planned wetland site is UNSUITABLE

if result ≠ 0.1 for both elements, then continue with model

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 0.5 / | 0.7 | (1a) | Water contact with toe of bank |

if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

if other, record score → 1a= 0.50 / 0.70

Potential for Erosion (E)

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (3) | Shoreline structures/obstacles |

→ 3= N/A / N/A

Shoreline Structures /Obstacles

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| N/A | N/A | (6) | Boat Traffic |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| N/A | N/A | (14b) | Steepness of planned wetland shore |

average for elements with available scores = 0.75 / 1.00

Physical Influences on Rate of Erosion

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 | 1.0 | (10a) | Plant (basal) cover |
| 0.1 | 0.7 | (10e) | Rooted vascular aquatic beds |
| 1.0 | 1.0 | (10g) | Plant height |
| 1.0 | 1.0 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

**Equation #5 or #6** = 0.78 / 0.93

Vegetation influences on Rate of Erosion

average for available scores = 0.76 / 0.96

Influences on Rate of Erosion (I)

$\frac{E + I}{2}$ = **0.63 / 0.83**

**Shoreline Bank Erosion Control FCI**

Equation #5:
If 10e applicable:

$$\frac{10a\ (10g + 10i + 10k) + 10e}{4}$$

Equation #6:
If 10e not applicable:

$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE:  Site 721. Metromedia Tract

Calculation of Sediment Stabilization

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A / | N/A | (4a) | Disturbance at site |
| N/A / | N/A | (7a) | Water level fluctuation |
| 1.0 / | 1.0 | (10b) | Plant (basal) cover |
| 1.0 / | 1.0 | (10c) | Leaf litter and debris cover |
| 1.0 / | 1.0 | (10j) | Root structure |
| 1.0 / | 1.0 | (10l) | Vegetation Persistence |
| 1.0 / | 1.0 | (14c) | Wetland slope |

(4a), (7a): if both 4a and 7a = N/A, record N/A
if not, then record lowest
score from 4a or 7a

= N/A / N/A
Disturbance Factors (DF)

(10b), (10c), (10j), (10l): **Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

(14c) = 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 /** **1.00**

**Sediment Stabilization FCI**

Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1-10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

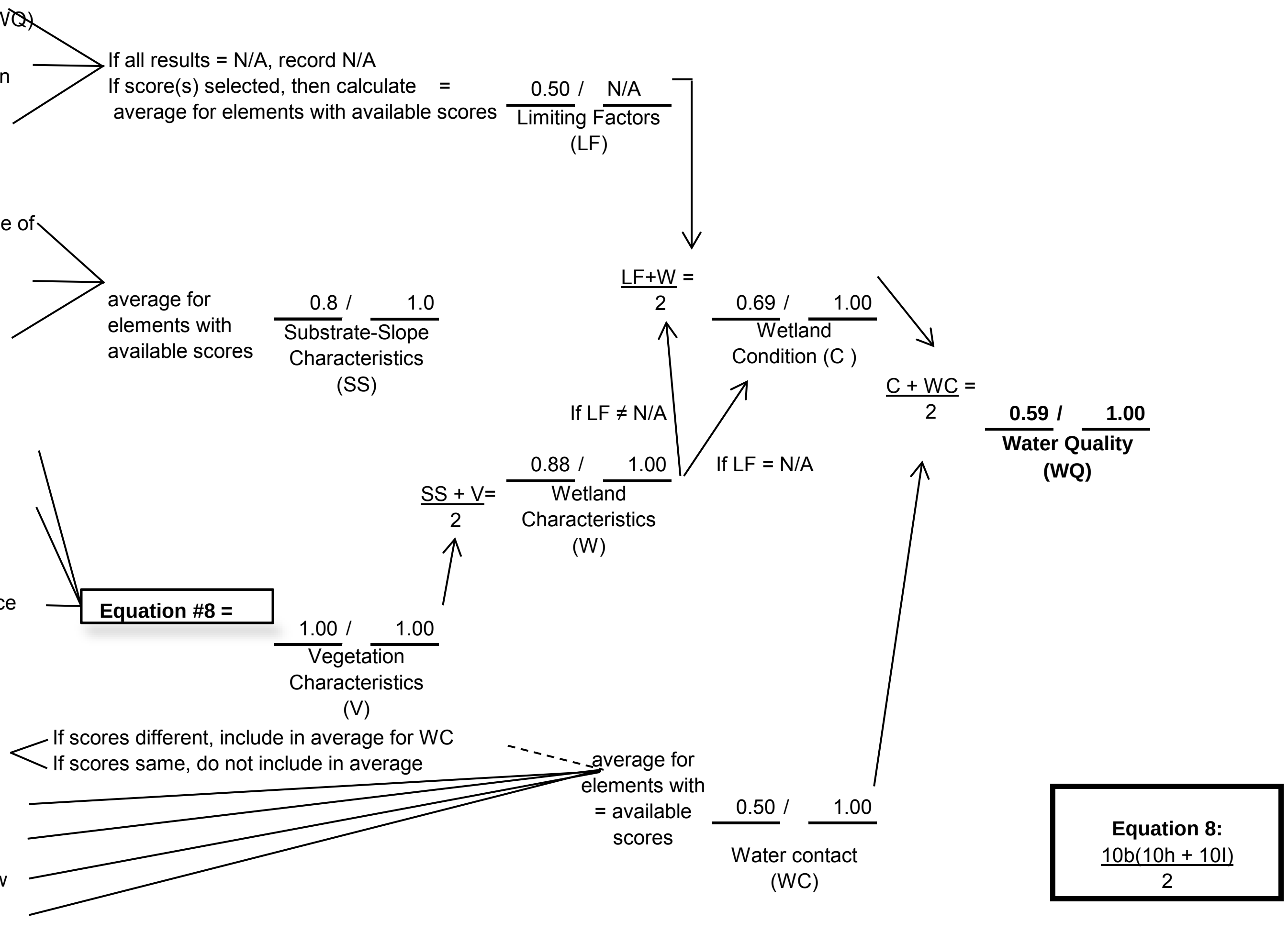
Calculation of Water Quality

| Selected Scores | | (#) | Element |
|---|---|---|---|
| | | | Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50 |
| 0.5 | 1 | (15) | Hydrologic condition |

if result = N/A , then STOP Water Quality FCI is not applicable

If score selected, then continue with model.

| | | | |
|---|---|---|---|
| 0.5 | N/A | (4b) | Disturbance at site (WQ) |
| N/A | N/A | (7a) | Water level fluctuation |
| N/A | N/A | (16a) | Wetland width |
| 0.5 | 1.0 | (1a) | Water contact with toe of bank |
| N/A | N/A | (5b) | Surface runoff (wetland erosion) |
| 1.0 | 1.0 | (14c) | Wetland Slope |
| 1.0 | 1.0 | (10b) | Plant (basal) cover |
| 1.0 | 1.0 | (10h) | Plant height |
| 1.0 | 1.0 | (10l) | Vegetation persistence |
| 0.5 | 1.0 | (9b) | Dominant substrate |
| 0.5 | 1.0 | (15) | Hydrologic condition |
| N/A | N/A | (17) | Detention time |
| N/A | N/A | (18) | Sheet vs channel flow |
| N/A | N/A | (19) | Average water depth |



If all results = N/A, record N/A
If score(s) selected, then calculate = average for elements with available scores

0.50 / N/A Limiting Factors (LF)

average for elements with available scores

0.8 / 1.0 Substrate-Slope Characteristics (SS)

Equation #8 =

1.00 / 1.00 Vegetation Characteristics (V)

SS + V= / 2

0.88 / 1.00 Wetland Characteristics (W)

If LF ≠ N/A

LF+W = / 2

If LF = N/A

0.69 / 1.00 Wetland Condition (C )

C + WC = / 2

**0.59 / 1.00**
**Water Quality (WQ)**

If scores different, include in average for WC
If scores same, do not include in average

average for elements with = available scores

0.50 / 1.00 Water contact (WC)

**Equation 8:**
10b(10h + 10l) / 2

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Wildlife

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| 0.1 / N/A | (20a) | Gross contamination |
| N/A / N/A | (16b) | Wetland size |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / N/A Features Which Reduce Habitat Value (F)

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.9 | (11a) | Layers |
| 0.3 / 0.7 | (11b) | Condition of Layers |
| N/A / 1.0 | (11c) | Spatial pattern of shrubs/trees |

average for elements with available scores = 0.40 / 0.87 Vegetation Strata

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.2 | (12a) | Cover types |
| 0.1 / 0.5 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |

average for elements with available scores = 0.20 / 0.40 Vegetation Cover Types

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (13a) | % open water |
| 1.0 / 1.0 | (13b) | Vegetation/water interspersion |

average for elements with available scores = 0.75 / 0.75 Vegetation/ Water Proportions

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| 0.1 / 1.0 | (23) | Islands |

average for elements with available scores = 0.1 / 1.0 Physical Features

average for available scores = 0.36 / 0.75 Habitat Complexity (HC)

If F ≠ NA: $\frac{F + HC}{2}$ =

If F = NA:

**0.23 / 0.75 Wildlife FCI**

`

PROJECT TITLE: Site 721. Metromedia Tract

## Calclation of Fish (Tidal)

Comparison: WAA baseline / Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| N/A | N/A | (24) | Obstruction to fish passage |

if result = 0.1, STOP. There is no potential for providing tidal fish habitat

if result ≠ 0.1 of NA, then continue with model

---

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / N/A | (1b) | Shoreline bank stability |
| N/A / N/A | (4a) | Disturbance at site (SS) |
| N/A / N/A | (4d) | Disturbance in channel/open water |
| N/A / N/A | (7b) | Most permanent hydroperiod |
| N/A / N/A | (24) | Obstruction to fish passage |

average for elements with available scores = 0.5 / N/A Limiting Factors

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 1.0 | (7c) | Spatially dominant hydroperiod |
| 0.5 / 0.5 | (9c) | Substrate suitability for fish |
| 1.0 / 1.0 | (10d) | Plant (basal) cover |
| 0.3 / 0.7 | (10f) | Rooted vascular aquatic beds |
| 0.5 / 1.0 | (21b) | Shape of wetland/water edge |
| 0.1 / 0.5 | (22b) | Available fish cover/attractors |

**Equation #9** = 0.24 / 0.75 Food/Cover

average for avaliable scores = **0.41 / 0.63**

**Fish (Tidal) FCI**

| Selected Scores | (#) | Element |
|---|---|---|
| 0.5 / 0.5 | (20b) | Water quality rating |

If score available, record score for WQ

If information not available, continue

| Selected Scores | (#) | Element |
|---|---|---|
| 0.1 / 0.5 | (20c) | Nutrient/sediment/contaminant sources |
| INA / INA | (20d) | Dissolved Oxygen |
| INA / INA | (20f) | Maximum water temperature |

average for elements with available scores = 0.5 / 0.5 Water Quality (WQ)

**x= 0.2**

**Equation #9:**

$$\frac{7c\ [9c + (1-x)(10d) + (x)(10f) + 21b + 22b]}{4}$$

Where x = portion of AREA which is represented by lower shore zone in increments of 0.1 (e.g., 0.1, 0.2, 0.3,… 1.0)

PROJECT TITLE:  Site 721. Metromedia Tract

## Calculation of Uniqueness/Heritage

Comparison: WAA baseline /  Planned Wetland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| 1.0 / | 1.0 | (29) | Endangered species |
| N/A / | N/A | (30) | Rarity |
| N/A / | N/A | (31) | Unique features |
| N/A / | N/A | (32) | Historical or archaeological significance |
| N/A / | N/A | (33) | Natural landmark |
| N/A / | N/A | (34) | Connected to Wild and Scenic River |
| N/A / | 1.0 | (35) | Park, sanctuary, etc. |
| N/A / | N/A | (36) | Scientific research site |

average for elements  with available scores  = 1.00 / 1.00

**Uniqueness/ Heritage FCI**

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Upland Erosion Control

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50

Site Suitability For Planned Wetland:

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| ~~N/A~~ | ~~N/A~~ | (14a) | Steepness of existing shore |

[redacted]

---

| Selected Scores | | (#) | Element |
|---|---|---|---|
| ~~N/A~~ / | ~~N/A~~ | (1a) | Water contact with toe of bank |
| ~~N/A~~ | ~~N/A~~ | (3) | Shoreline structures/obstacles |
| ~~N/A~~ | ~~N/A~~ | (2) | Fetch |
| 0.5 | N/A | (4a) | Disturbance at site (SS) |
| N/A | N/A | (5a) | Surface runoff (bank erosion) |
| ~~N/A~~ | ~~N/A~~ | (6) | Boat Traffic |
| ~~N/A~~ | ~~N/A~~ | (7a) | Water level fluctuation |
| N/A | N/A | (8a) | Hours of sunlight |
| N/A | N/A | (9a) | Substrate suitability for vegetation |
| ~~N/A~~ | ~~N/A~~ | (14b) | Steepness of planned wetland shore |
| 0.3 | 0.7 | (10a) | Plant (basal) cover |
| ~~N/A~~ | ~~N/A~~ | (10e) | Rooted vascular aquatic beds |
| ~~N/A~~ | ~~N/A~~ | (10g) | Plant height |
| 0.5 | 0.8 | (10i) | Root structure |
| 1.0 | 1.0 | (10k) | Vegetation persistence |

(1a) → if result = N/A, then STOP: **Shoreline Bank Erosion Control FCI = N/A**

(1a) → [redacted] 1a= N/A / N/A

Potential for Erosion (E)

(3) → 3= N/A / N/A

Shoreline Structures /Obstacles

(2), (4a), (5a), (6), (7a), (8a), (9a), (14b) → average for elements with available scores = 0.50 / N/A

Physical Influences on Rate of Erosion

(10a), (10e), (10g), (10i), (10k) → **Equation #5 or #6** = 0.23 / 0.63

Vegetation influences on Rate of Erosion

average for available scores = **0.36 / 0.63**

**Influences on Rate of Erosion (I)**

$\frac{E + I}{2}$ = **0.36 / 0.63**

**Shoreline Bank Erosion Control FCI**

[redacted]

Equation #6:
If 10e not applicable:

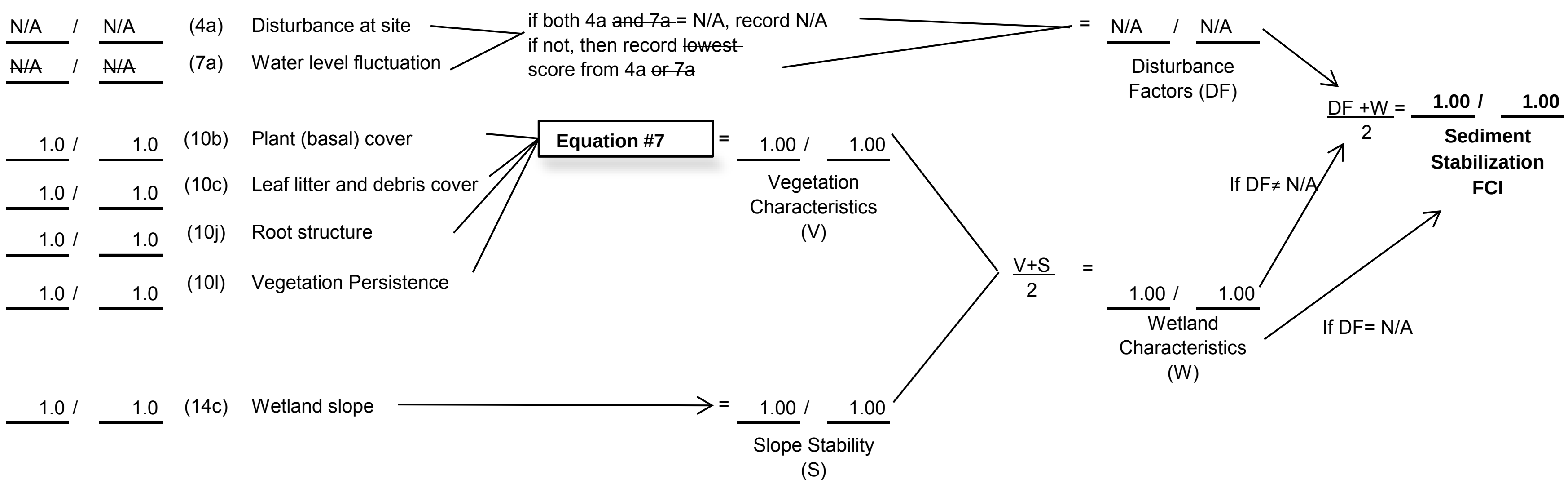
$$\frac{10a\ (10g + 10i + 10k)}{3}$$

PROJECT TITLE: Site 721. Metromedia Tract

## Calculation of Sediment Stabilization (Upland)

| Selected Scores | (#) | Element |
|---|---|---|

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50



| | | | |
|---|---|---|---|
| N/A / N/A | (4a) | Disturbance at site | |
| ~~N/A~~ / ~~N/A~~ | (7a) | Water level fluctuation | |
| 1.0 / 1.0 | (10b) | Plant (basal) cover | |
| 1.0 / 1.0 | (10c) | Leaf litter and debris cover | |
| 1.0 / 1.0 | (10j) | Root structure | |
| 1.0 / 1.0 | (10l) | Vegetation Persistence | |
| 1.0 / 1.0 | (14c) | Wetland slope | |

if both 4a ~~and 7a~~ = N/A, record N/A
if not, then record ~~lowest~~
score from 4a ~~or 7a~~

= N/A / N/A
Disturbance Factors (DF)

**Equation #7** = 1.00 / 1.00
Vegetation Characteristics (V)

= 1.00 / 1.00
Slope Stability (S)

$\frac{V+S}{2}$ = 1.00 / 1.00
Wetland Characteristics (W)

If DF≠ N/A

If DF= N/A

$\frac{DF + W}{2}$ = **1.00 / 1.00**

**Sediment Stabilization FCI**

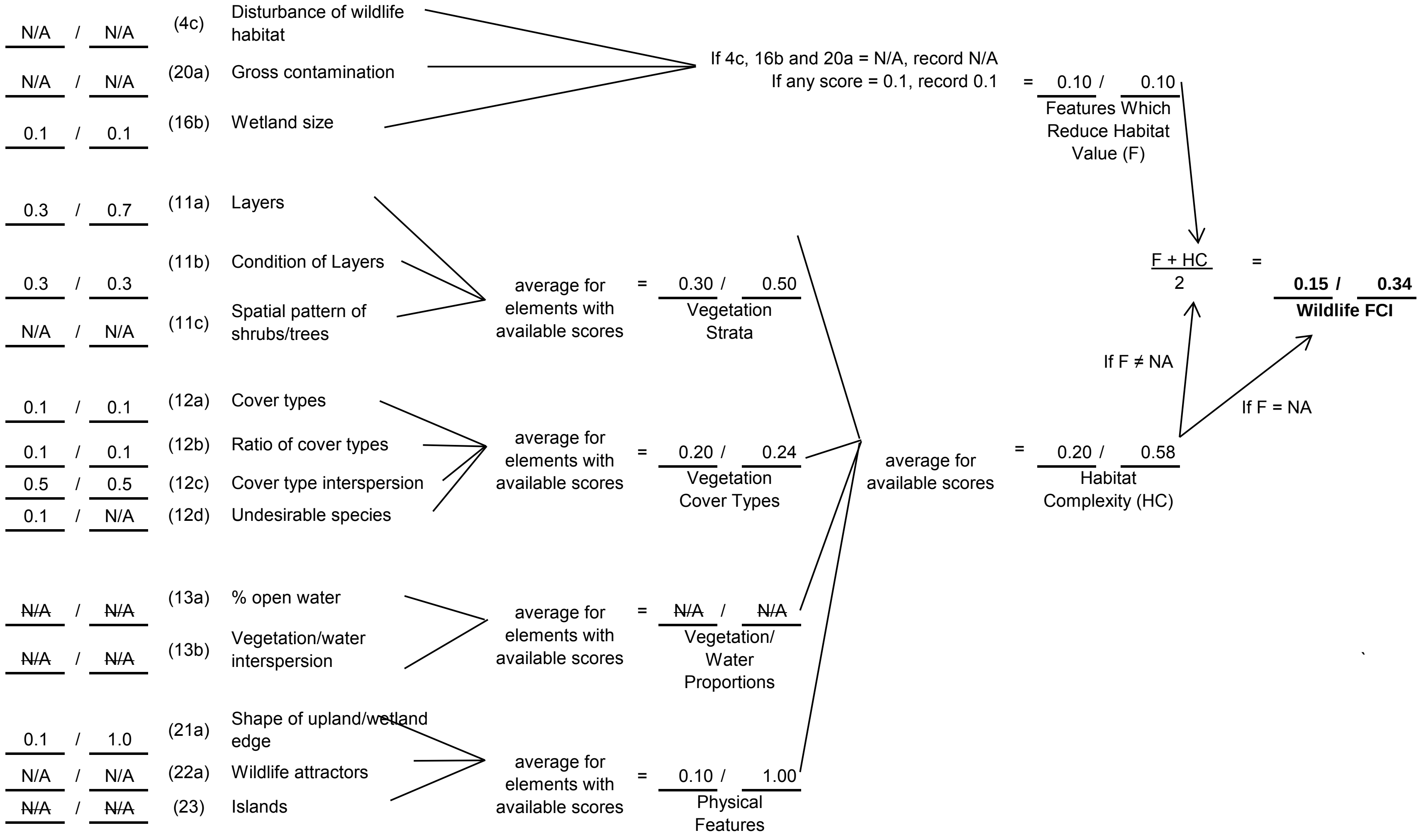
Equation #7:

$$\frac{10b\ (10j + 10l) + 10c\ (1\text{-}10b)}{2}$$

PROJECT TITLE: Site 721. Metromedia Tract

Calculation of Wildlife (Upland)

Comparison: UAA baseline / Planned Upland Alternative C - Yr 50



| Selected Scores | (#) | Element |
|---|---|---|
| N/A / N/A | (4c) | Disturbance of wildlife habitat |
| N/A / N/A | (20a) | Gross contamination |
| 0.1 / 0.1 | (16b) | Wetland size |
| 0.3 / 0.7 | (11a) | Layers |
| 0.3 / 0.3 | (11b) | Condition of Layers |
| N/A / N/A | (11c) | Spatial pattern of shrubs/trees |
| 0.1 / 0.1 | (12a) | Cover types |
| 0.1 / 0.1 | (12b) | Ratio of cover types |
| 0.5 / 0.5 | (12c) | Cover type interspersion |
| 0.1 / N/A | (12d) | Undesirable species |
| ~~N/A~~ / ~~N/A~~ | (13a) | % open water |
| ~~N/A~~ / ~~N/A~~ | (13b) | Vegetation/water interspersion |
| 0.1 / 1.0 | (21a) | Shape of upland/wetland edge |
| N/A / N/A | (22a) | Wildlife attractors |
| ~~N/A~~ / ~~N/A~~ | (23) | Islands |

If 4c, 16b and 20a = N/A, record N/A
If any score = 0.1, record 0.1 = 0.10 / 0.10 Features Which Reduce Habitat Value (F)

average for elements with available scores = 0.30 / 0.50 Vegetation Strata

average for elements with available scores = 0.20 / 0.24 Vegetation Cover Types

average for elements with available scores = ~~N/A~~ / ~~N/A~~ Vegetation/ Water Proportions

average for elements with available scores = 0.10 / 1.00 Physical Features

average for available scores = 0.20 / 0.58 Habitat Complexity (HC)

If F ≠ NA

If F = NA

$\frac{F + HC}{2}$ = **0.15 / 0.34 Wildlife FCI**

# Attachment B

# AAFCU Scores

# Site 902 - Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Average Annualized FCUs - Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.54 | 2.81 | 1.52 | 5.99 | 3.09 | 1.55 | 5.99 | 62.47 | 3.12 | 5.69 | 155.34 | 3.11 |
| | SS | 0.62 | 2.81 | 1.74 | 5.99 | 2.83 | 1.41 | 5.99 | 67.29 | 3.36 | 5.69 | 167.37 | 3.35 |
| | WQ | 0.50 | 2.81 | 1.41 | 5.99 | 3.04 | 1.52 | 5.99 | 65.22 | 3.26 | 5.69 | 162.08 | 3.24 |
| | WL | 0.41 | 2.81 | 1.15 | 5.99 | 1.78 | 0.89 | 5.99 | 49.26 | 2.46 | 5.69 | 122.47 | 2.45 |
| | FT | 0.37 | 2.81 | 1.04 | 5.99 | 1.87 | 0.94 | 5.99 | 45.92 | 2.30 | 5.69 | 114.14 | 2.28 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative B | SB | 0.54 | 2.81 | 1.52 | 2.88 | 1.56 | 0.78 | 2.88 | 34.07 | 1.70 | 2.74 | 84.87 | 1.70 |
| | SS | 0.62 | 2.81 | 1.74 | 2.88 | 1.82 | 0.91 | 2.88 | 40.30 | 2.01 | 2.74 | 109.95 | 2.20 |
| | WQ | 0.50 | 2.81 | 1.41 | 2.88 | 1.59 | 0.80 | 2.88 | 37.61 | 1.88 | 2.74 | 94.32 | 1.89 |
| | WL | 0.41 | 2.81 | 1.15 | 2.88 | 1.44 | 0.72 | 2.88 | 28.95 | 1.45 | 2.74 | 69.91 | 1.40 |
| | FT | 0.37 | 2.81 | 1.04 | 2.88 | 1.12 | 0.56 | 2.88 | 22.17 | 1.11 | 2.74 | 59.07 | 1.18 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative C | SB | 0.54 | 2.81 | 1.52 | 2.81 | 1.66 | 0.83 | 2.81 | 31.50 | 1.58 | 2.67 | 73.82 | 1.48 |
| | SS | 0.62 | 2.81 | 1.74 | 2.81 | 1.74 | 0.87 | 2.81 | 33.10 | 1.66 | 2.67 | 83.23 | 1.66 |
| | WQ | 0.50 | 2.81 | 1.41 | 2.81 | 1.62 | 0.81 | 2.81 | 32.03 | 1.60 | 2.67 | 74.44 | 1.49 |
| | WL | 0.41 | 2.81 | 1.15 | 2.81 | 1.22 | 0.61 | 2.81 | 23.76 | 1.19 | 2.67 | 59.70 | 1.19 |
| | FT | 0.37 | 2.81 | 1.04 | 2.81 | 1.92 | 0.96 | 2.81 | 18.15 | 0.91 | 2.67 | 45.68 | 0.91 |
| | UH | 1.00 | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.
For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.
Calculations:
AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:
Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:
T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2
Rounding results in minor summation and multiplication variability of the presented data.

$$\text{Cumulative FCUs} = (Time_{\,2} - Time_{\,1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

# Site 900 - Dundee Island Park/Pulaski Park

## Average Annualized FCUs - Dundee Island Park/Pulaski Park

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.52 | 0.47 | 0.24 | 0.47 | 0.25 | 0.12 | 0.54 | 6.76 | 0.34 | 0.51 | 15.10 | 0.30 |
| | SS | 0.46 | 0.47 | 0.22 | 0.47 | 0.25 | 0.13 | 0.54 | 6.53 | 0.33 | 0.51 | 17.08 | 0.34 |
| | WQ | 0.45 | 0.47 | 0.21 | 0.47 | 0.22 | 0.11 | 0.54 | 6.09 | 0.30 | 0.51 | 15.25 | 0.31 |
| | WL | 0.22 | 0.47 | 0.10 | 0.47 | 0.12 | 0.06 | 0.54 | 2.75 | 0.14 | 0.51 | 7.26 | 0.15 |
| | FT | 0.38 | 0.47 | 0.18 | 0.47 | 0.18 | 0.09 | 0.54 | 3.85 | 0.19 | 0.51 | 9.89 | 0.20 |
| | UH | N/A | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.
For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.
Calculations:

Cumulative FCUs = $(Time_{\ 2} - Time_{\ 1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$

AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:
Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:
T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2
Rounding results in minor summation and multiplication variability of the presented data.

# Site 887- Essex County Branch Brook Park

## Average Annualized FCUs - Essex County Branch Brook Park

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.64 | 35.80 | 22.94 | 53.33 | 32.81 | 16.40 | 53.33 | 691.06 | 34.55 | 50.66 | 1647.61 | 32.95 |
| | SS | 0.66 | 35.80 | 23.54 | 53.33 | 29.36 | 14.68 | 53.33 | 688.68 | 34.43 | 50.66 | 1641.99 | 32.84 |
| | WQ | 0.52 | 35.80 | 18.71 | 53.33 | 26.55 | 13.27 | 53.33 | 608.21 | 30.41 | 50.66 | 1507.19 | 30.14 |
| | WL | 0.47 | 35.80 | 16.99 | 53.33 | 17.48 | 8.74 | 53.33 | 557.70 | 27.89 | 50.66 | 1392.24 | 27.84 |
| | FP | 0.37 | 35.80 | 13.25 | 53.33 | 16.25 | 8.13 | 53.33 | 362.92 | 18.15 | 50.66 | 951.77 | 19.04 |
| | UH | | | | | | | | | | | | |
| Alternative B | SB | 0.64 | 35.80 | 22.94 | 42.88 | 25.39 | 12.70 | 42.88 | 605.66 | 30.28 | 40.74 | 1516.77 | 30.34 |
| | SS | 0.66 | 35.80 | 23.54 | 42.88 | 31.79 | 15.90 | 42.88 | 623.30 | 31.16 | 40.74 | 1560.92 | 31.22 |
| | WQ | 0.52 | 35.80 | 18.71 | 42.88 | 21.52 | 10.76 | 42.88 | 512.77 | 25.64 | 40.74 | 1207.22 | 24.14 |
| | WL | 0.47 | 35.80 | 16.99 | 42.88 | 15.95 | 7.97 | 42.88 | 395.34 | 19.77 | 40.74 | 990.94 | 19.82 |
| | FP | 0.37 | 35.80 | 13.25 | 42.88 | 15.16 | 7.58 | 42.88 | 299.66 | 14.98 | 40.74 | 751.26 | 15.03 |
| | UH | | | | | | | | | | | | |
| Alternative C | SB | 0.64 | 35.80 | 22.94 | 35.90 | 23.32 | 11.66 | 35.90 | 442.99 | 22.15 | 34.11 | 1113.70 | 22.27 |
| | SS | 0.66 | 35.80 | 23.54 | 35.90 | 23.62 | 11.81 | 35.90 | 510.04 | 25.50 | 34.11 | 1281.10 | 25.62 |
| | WQ | 0.52 | 35.80 | 18.71 | 35.90 | 19.76 | 9.88 | 35.90 | 385.72 | 19.29 | 34.11 | 960.70 | 19.21 |
| | WL | 0.47 | 35.80 | 16.99 | 35.90 | 16.93 | 8.47 | 35.90 | 396.69 | 19.83 | 34.11 | 995.86 | 19.92 |
| | FP | 0.37 | 35.80 | 13.25 | 35.90 | 13.62 | 6.81 | 35.90 | 258.84 | 12.94 | 34.11 | 650.68 | 13.01 |
| | UH | | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.
For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.
Calculations:
AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:
Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:
T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2
Rounding results in minor summation and multiplication variability of the presented data.

$$\text{Cumulative FCUs} = (Time_{\,2} - Time_{\,1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

# Site 865 - Kearny Point

## Average Annualized FCUs - Kearny Point

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.58 | 34.70 | 20.13 | 57.89 | 25.60 | 12.80 | 57.89 | 557.82 | 27.89 | 55.00 | 1392.74 | 27.85 |
| | SS | 0.49 | 34.70 | 17.00 | 57.89 | 25.44 | 12.72 | 57.89 | 674.03 | 33.70 | 55.00 | 1679.43 | 33.59 |
| | WQ | 0.45 | 34.70 | 15.62 | 57.89 | 28.61 | 14.30 | 57.89 | 638.85 | 31.94 | 55.00 | 1591.53 | 31.83 |
| | WL | 0.31 | 34.70 | 10.76 | 57.89 | 18.11 | 9.06 | 57.89 | 572.89 | 28.64 | 55.00 | 1425.67 | 28.51 |
| | FT | 0.34 | 34.70 | 11.80 | 57.89 | 18.00 | 9.00 | 57.89 | 465.85 | 23.29 | 55.00 | 1160.74 | 23.21 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative B | SB | 0.58 | 34.70 | 20.13 | 54.04 | 24.31 | 12.15 | 54.04 | 534.17 | 26.71 | 51.34 | 1334.79 | 26.70 |
| | SS | 0.49 | 34.70 | 17.00 | 54.04 | 24.36 | 12.18 | 54.04 | 643.67 | 32.18 | 51.34 | 1605.06 | 32.10 |
| | WQ | 0.45 | 34.70 | 15.62 | 54.04 | 27.34 | 13.67 | 54.04 | 578.30 | 28.92 | 51.34 | 1520.74 | 30.41 |
| | WL | 0.31 | 34.70 | 10.76 | 54.04 | 13.99 | 7.00 | 54.04 | 487.41 | 24.37 | 51.34 | 1225.63 | 24.51 |
| | FT | 0.34 | 34.70 | 11.80 | 54.04 | 17.23 | 8.61 | 54.04 | 426.79 | 21.34 | 51.34 | 1064.49 | 21.29 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative C | SB | 0.58 | 34.70 | 20.13 | 51.77 | 23.69 | 11.58 | 51.77 | 485.20 | 24.26 | 49.18 | 1213.69 | 24.27 |
| | SS | 0.49 | 34.70 | 17.00 | 51.77 | 24.64 | 12.32 | 51.77 | 625.78 | 31.29 | 49.18 | 1561.20 | 31.22 |
| | WQ | 0.45 | 34.70 | 15.62 | 51.77 | 23.37 | 11.69 | 51.77 | 562.27 | 28.11 | 49.18 | 1402.93 | 28.06 |
| | WL | 0.31 | 34.70 | 10.76 | 51.77 | 13.63 | 6.82 | 51.77 | 429.76 | 21.49 | 49.18 | 1071.75 | 21.44 |
| | FT | 0.34 | 34.70 | 11.80 | 51.77 | 29.64 | 14.82 | 51.77 | 388.74 | 19.44 | 49.18 | 1013.87 | 20.28 |
| | UH | 1.00 | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.
For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.
Calculations:
AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:
Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:
T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2
Rounding results in minor summation and multiplication variability of the presented data.

$$\text{Cumulative FCUs} = (Time_{\,2} - Time_{\,1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

# Site 866 - Oak Island Yards

## Average Annualized FCUs - Oak Island Yards

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.59 | 7.80 | 4.60 | 11.44 | 5.73 | 2.86 | 11.46 | 131.31 | 6.57 | 10.89 | 328.12 | 6.56 |
| | SS | 0.48 | 7.80 | 3.74 | 11.44 | 5.59 | 2.79 | 11.46 | 138.43 | 6.92 | 10.89 | 345.39 | 6.91 |
| | WQ | 0.45 | 7.80 | 3.51 | 11.44 | 6.02 | 3.01 | 11.46 | 135.86 | 6.79 | 10.89 | 295.42 | 5.91 |
| | WL | 0.35 | 7.80 | 2.73 | 11.44 | 3.47 | 1.73 | 11.46 | 116.58 | 5.83 | 10.89 | 293.11 | 5.86 |
| | FT | 0.44 | 7.80 | 3.43 | 11.44 | 4.69 | 2.35 | 11.46 | 110.68 | 5.53 | 10.89 | 276.35 | 5.53 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative B | SB | 0.59 | 7.80 | 4.60 | 11.40 | 5.51 | 2.76 | 11.43 | 131.09 | 6.55 | 10.86 | 327.56 | 6.55 |
| | SS | 0.48 | 7.80 | 3.74 | 11.40 | 5.73 | 2.87 | 11.43 | 113.90 | 5.70 | 10.86 | 284.51 | 5.69 |
| | WQ | 0.45 | 7.80 | 3.51 | 11.40 | 5.34 | 2.67 | 11.43 | 131.72 | 6.59 | 10.86 | 328.65 | 6.57 |
| | WL | 0.35 | 7.80 | 2.73 | 11.40 | 3.36 | 1.68 | 11.43 | 98.89 | 4.94 | 10.86 | 249.19 | 4.98 |
| | FT | 0.44 | 7.80 | 3.43 | 11.40 | 4.89 | 2.44 | 11.43 | 100.77 | 5.04 | 10.86 | 261.40 | 5.23 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative C | SB | 0.59 | 7.80 | 4.60 | 11.39 | 6.27 | 3.14 | 11.42 | 131.00 | 6.55 | 10.85 | 327.35 | 6.55 |
| | SS | 0.48 | 7.80 | 3.74 | 11.39 | 5.78 | 2.89 | 11.42 | 113.83 | 5.69 | 10.85 | 284.32 | 5.69 |
| | WQ | 0.45 | 7.80 | 3.51 | 11.39 | 5.18 | 2.59 | 11.42 | 124.84 | 6.24 | 10.85 | 328.43 | 6.57 |
| | WL | 0.35 | 7.80 | 2.73 | 11.39 | 3.21 | 1.60 | 11.42 | 105.62 | 5.28 | 10.85 | 275.52 | 5.51 |
| | FT | 0.44 | 7.80 | 3.43 | 11.39 | 6.79 | 3.40 | 11.42 | 100.70 | 5.04 | 10.85 | 261.23 | 5.22 |
| | UH | 1.00 | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.

For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.

Calculations:

AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:

Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:

T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1

A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2

Rounding results in minor summation and multiplication variability of the presented data.

$$\text{Cumulative FCUs} = (Time_{2} - Time_{1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

# Site 719 - Meadowlark Marsh

## Average Annualized FCUs - Meadowlark Marsh

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.73 | 85.43 | 62.36 | 87.22 | 58.69 | 29.34 | 87.22 | 1419.52 | 70.98 | 82.86 | 3563.63 | 71.27 |
| | SS | 1.00 | 85.43 | 85.43 | 87.22 | 69.00 | 34.50 | 87.22 | 1640.18 | 82.01 | 82.86 | 4123.08 | 82.46 |
| | WQ | 0.61 | 85.43 | 52.11 | 87.22 | 59.16 | 29.58 | 87.22 | 1321.45 | 66.07 | 82.86 | 3314.99 | 66.30 |
| | WL | 0.18 | 85.43 | 15.38 | 87.22 | 30.26 | 15.13 | 87.22 | 797.21 | 39.86 | 82.86 | 1993.29 | 39.87 |
| | FT | 0.43 | 85.43 | 36.73 | 87.22 | 39.29 | 19.64 | 87.22 | 919.23 | 45.96 | 82.86 | 2306.20 | 46.12 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative B | SB | 0.73 | 85.43 | 62.36 | 87.22 | 58.69 | 29.34 | 87.22 | 1419.52 | 70.98 | 82.86 | 3563.63 | 71.27 |
| | SS | 1.00 | 85.43 | 85.43 | 87.22 | 69.00 | 34.50 | 87.22 | 1640.18 | 82.01 | 82.86 | 4123.08 | 82.46 |
| | WQ | 0.61 | 85.43 | 52.11 | 87.22 | 62.19 | 31.09 | 87.22 | 1321.45 | 66.07 | 82.86 | 3314.99 | 66.30 |
| | WL | 0.18 | 85.43 | 15.38 | 87.22 | 28.53 | 14.27 | 87.22 | 756.07 | 37.80 | 82.86 | 2054.82 | 41.10 |
| | FT | 0.43 | 85.43 | 36.73 | 87.22 | 39.29 | 19.64 | 87.22 | 919.23 | 45.96 | 82.86 | 2306.20 | 46.12 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative C | SB | 0.73 | 85.43 | 62.36 | 85.43 | 58.09 | 29.05 | 85.43 | 1387.81 | 69.39 | 81.16 | 3485.25 | 69.71 |
| | SS | 1.00 | 85.43 | 85.43 | 85.43 | 70.05 | 35.03 | 85.43 | 1623.17 | 81.16 | 81.16 | 4081.42 | 81.63 |
| | WQ | 0.61 | 85.43 | 52.11 | 85.43 | 58.52 | 29.26 | 85.43 | 1306.65 | 65.33 | 81.16 | 3278.74 | 65.57 |
| | WL | 0.18 | 85.43 | 15.38 | 85.43 | 25.63 | 12.81 | 85.43 | 616.80 | 30.84 | 81.16 | 1685.59 | 33.71 |
| | FT | 0.43 | 85.43 | 36.73 | 85.43 | 66.21 | 33.10 | 85.43 | 819.70 | 40.99 | 81.16 | 2179.90 | 43.60 |
| | UH | 1.00 | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.
For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.
Calculations:
AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:
Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:
T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2
Rounding results in minor summation and multiplication variability of the presented data.

$$\text{Cumulative FCUs} = (Time\ _2 - Time\ _1)\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

# Site 721 - Metro Media Tract

## Average Annualized FCUs - Metromedia Tract

| Alternatives | EPW Wetland Functions | WAA (Existing) | | | Year 1 | | | Year 20 | | | Year 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FCI | Area | FCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU | Area | Cumulative FCU | AAFCU |
| Alternative A | SB | 0.63 | 59.50 | 37.49 | 48.10 | 33.89 | 16.95 | 48.10 | 737.67 | 36.88 | 45.70 | 2054.98 | 41.10 |
| | SS | 1.00 | 59.50 | 59.50 | 48.10 | 44.46 | 22.23 | 48.10 | 1022.20 | 51.11 | 45.70 | 2577.28 | 51.55 |
| | WQ | 0.59 | 59.50 | 35.11 | 48.10 | 36.15 | 18.08 | 48.10 | 785.53 | 39.28 | 45.70 | 2025.82 | 40.52 |
| | WL | 0.23 | 59.50 | 13.69 | 48.10 | 22.49 | 11.25 | 48.10 | 516.14 | 25.81 | 45.70 | 1369.10 | 27.38 |
| | FT | 0.41 | 59.50 | 24.40 | 48.10 | 25.95 | 12.98 | 48.10 | 527.57 | 26.38 | 45.70 | 1327.78 | 26.56 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative B | SB | 0.63 | 59.50 | 37.49 | 59.40 | 37.45 | 18.73 | 59.40 | 818.89 | 40.94 | 56.43 | 2282.04 | 45.64 |
| | SS | 1.00 | 59.50 | 59.50 | 59.40 | 48.75 | 24.38 | 59.40 | 1129.55 | 56.48 | 56.43 | 2840.29 | 56.81 |
| | WQ | 0.59 | 59.50 | 35.11 | 59.40 | 40.13 | 20.06 | 59.40 | 835.82 | 41.79 | 56.43 | 2154.35 | 43.09 |
| | WL | 0.23 | 59.50 | 13.69 | 59.40 | 21.40 | 10.70 | 59.40 | 519.52 | 25.98 | 56.43 | 1385.22 | 27.70 |
| | FT | 0.41 | 59.50 | 24.40 | 59.40 | 25.56 | 12.78 | 59.40 | 587.33 | 29.37 | 56.43 | 1474.19 | 29.48 |
| | UH | 1.00 | | | | | | | | | | | |
| Alternative C | SB | 0.63 | 59.50 | 37.49 | 58.20 | 37.08 | 18.54 | 58.20 | 815.84 | 40.79 | 55.29 | 2049.58 | 40.99 |
| | SS | 1.00 | 59.50 | 59.50 | 58.20 | 48.30 | 24.15 | 58.20 | 1118.15 | 55.91 | 55.29 | 2812.36 | 56.25 |
| | WQ | 0.59 | 59.50 | 35.11 | 58.20 | 39.71 | 19.85 | 58.20 | 865.80 | 43.29 | 55.29 | 2228.77 | 44.58 |
| | WL | 0.23 | 59.50 | 13.69 | 58.20 | 24.97 | 12.48 | 58.20 | 541.25 | 27.06 | 55.29 | 1369.11 | 27.38 |
| | FT | 0.41 | 59.50 | 24.40 | 58.20 | 45.95 | 22.98 | 58.20 | 580.99 | 29.05 | 55.29 | 1458.64 | 29.17 |
| | UH | 1.00 | | | | | | | | | | | |

For Year 20, it was assumed that stabilized banks would contain 10 percent more wetlands than Year 1.
For Year 50, it was assumed that all wetlands would realize a 5 percent loss due to erosion.
Calculations:
AAFCUs = Cumulative FCUs ÷ Number of years in the life of the project, where:

$$\text{Cumulative FCUs} = (Time_{\,2} - Time_{\,1})\left[\frac{(Area_1 * FCI_1) + (Area_2 * FCI_2)}{3} + \frac{(Area_2 * FCI_1) + (Area_1 * FCI_2)}{6}\right]$$

Cumulative FCUs = Sum (T2 -T1)[((A1 F1 +A2 F2) / 3) + ((A2 F1 +A1 F2) / 6)] and where:
T1 = First Target Year time interval; T2 = Second Target Year time interval; A1 = Area of available wetland assessment area at beginning of T1
A2 = Area of available wetland assessment area at end of T2; F1 = FCI at beginning of T1; F2 = FCI at end of T2
Rounding results in minor summation and multiplication variability of the presented data.

# Attachment C

# SVAP Data Sheets

# Site 887- Essex County Branch Brook Park

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ______

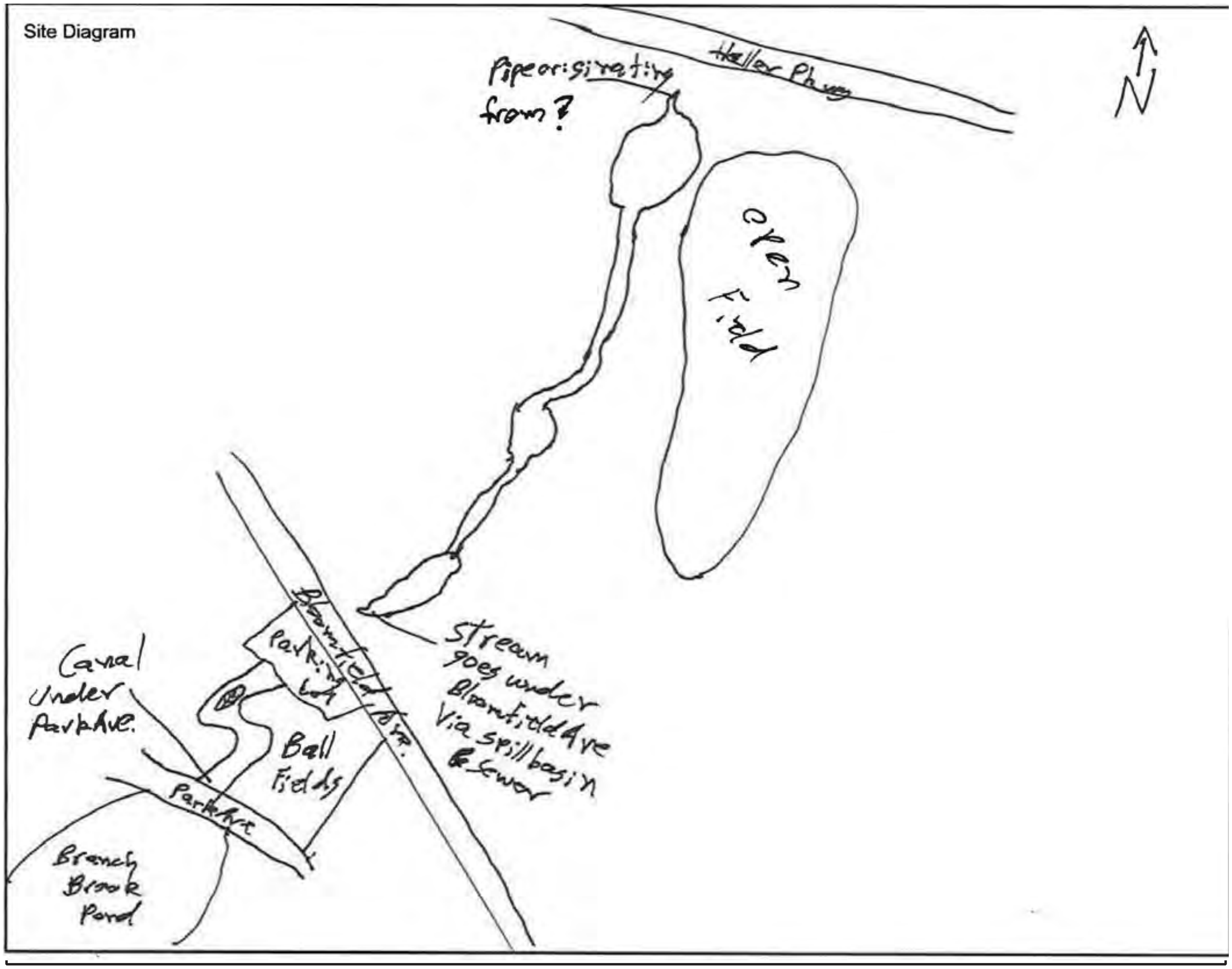
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X

**Site Diagram**



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ______

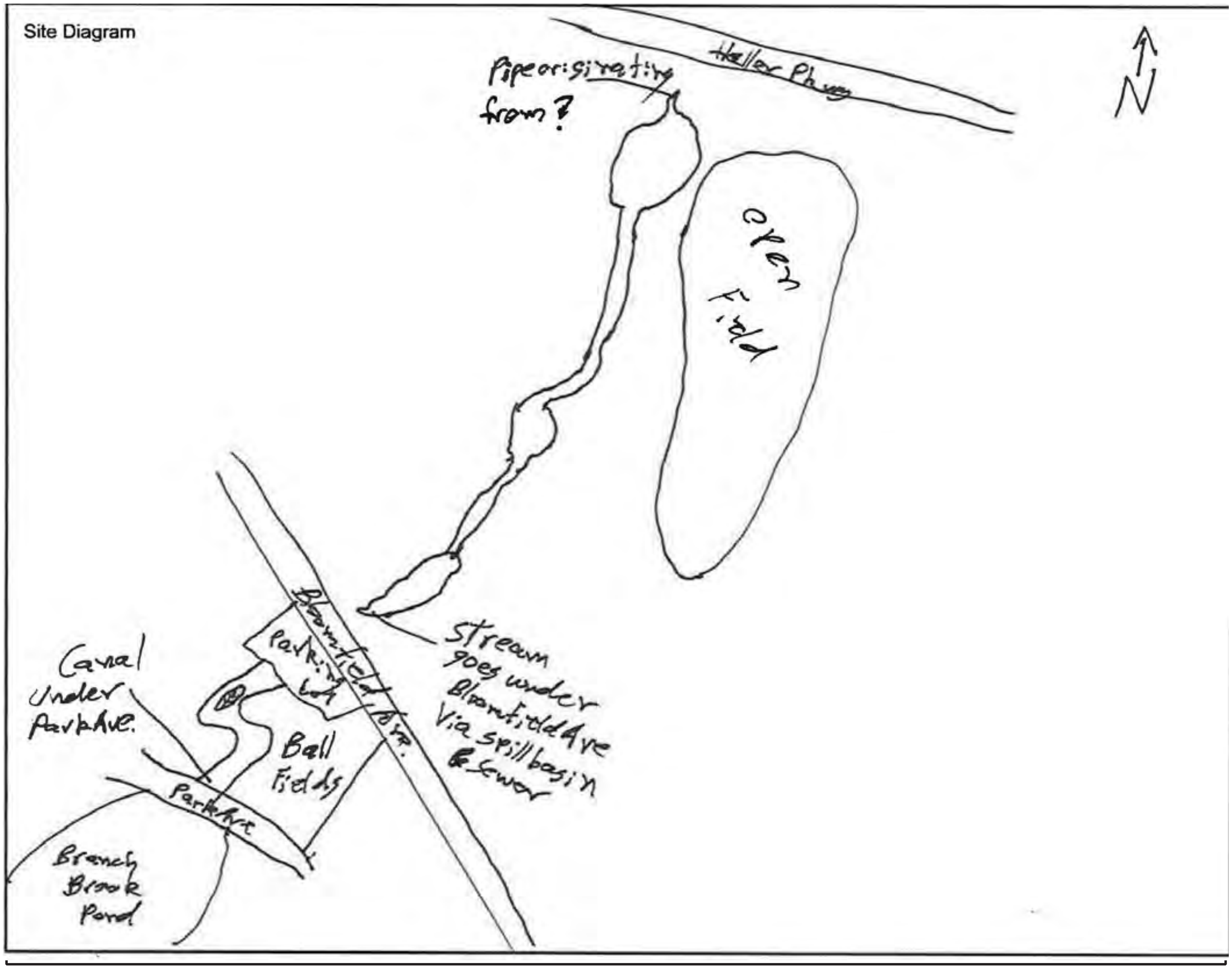
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X

**Site Diagram**



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ____

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

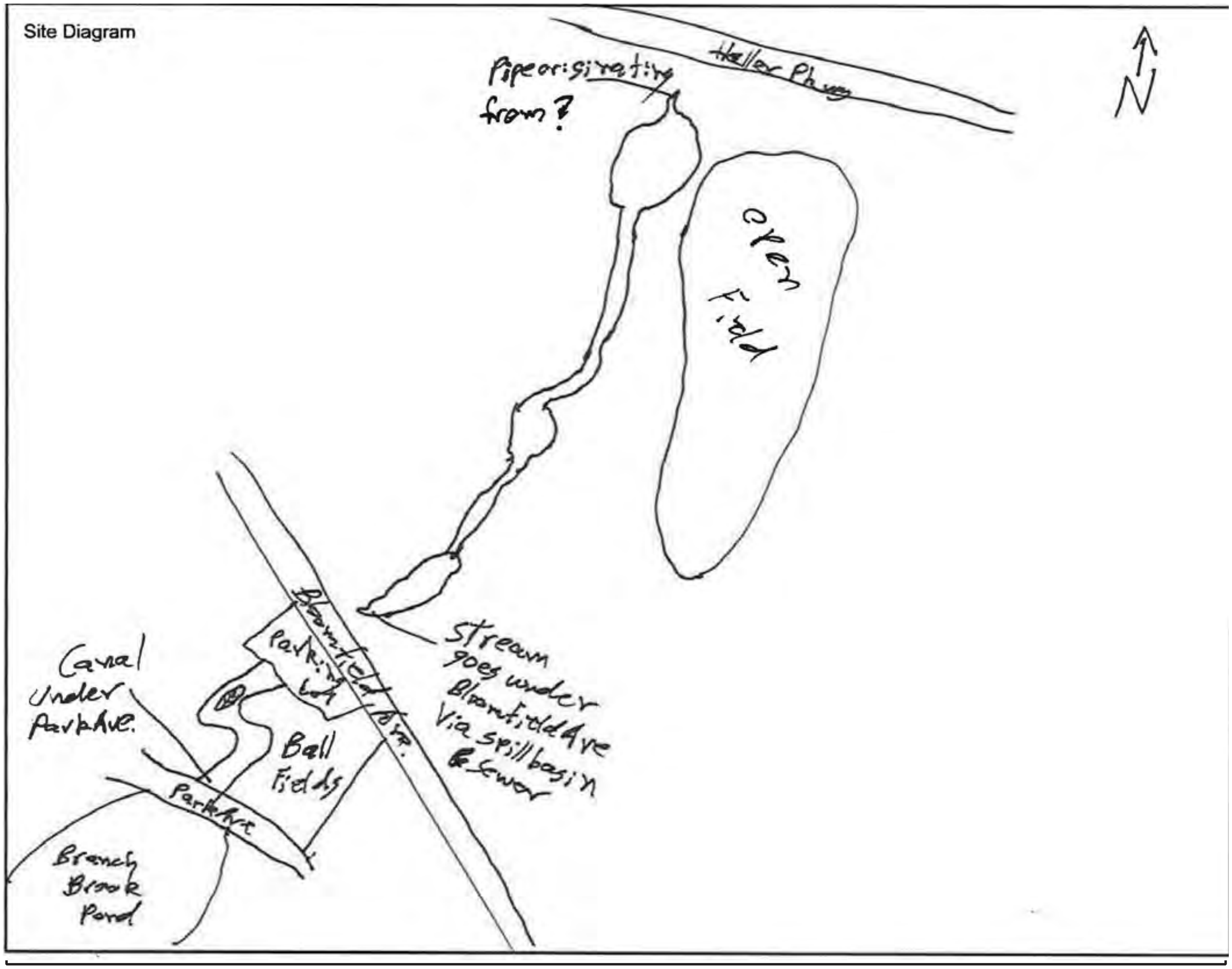
Applicable reference site ____

Land use within drainage (%): row crop ____ hayland ____ grazing/pasture ____ forest 5 residential 95

confined animal feeding operations ____ Cons. Reserve ____ industrial ____ Other: ____

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ____ gravel ____ sand ____ silt X mud X



## Assessment Scores

| | | | |
|---|---|---|---|
| Channel condition | 3 | Pools | 3 |
| Hydrologic alteration | 3 | Invertebrate habitat | 7 |
| Riparian zone | 5 | | |
| Bank stability | 7 | | |
| Water appearance | 3 | | |
| Nutrient enrichment | 3 | | |
| Barriers to fish movement | 3 | | |
| Instream fish cover | 5 | | |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 1- Alternative C

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

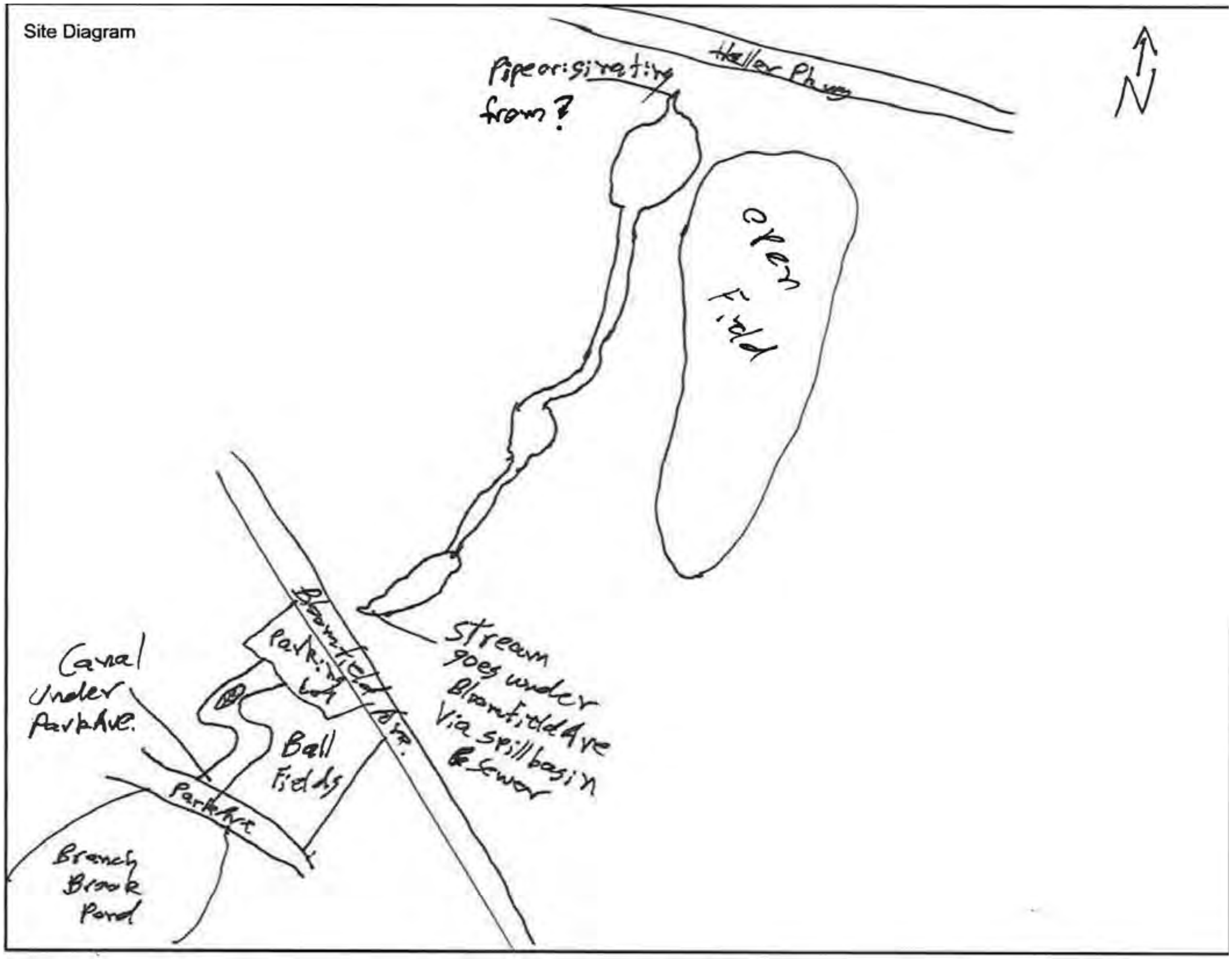
Applicable reference site ______

Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 20- Alternative A

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ____

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ____

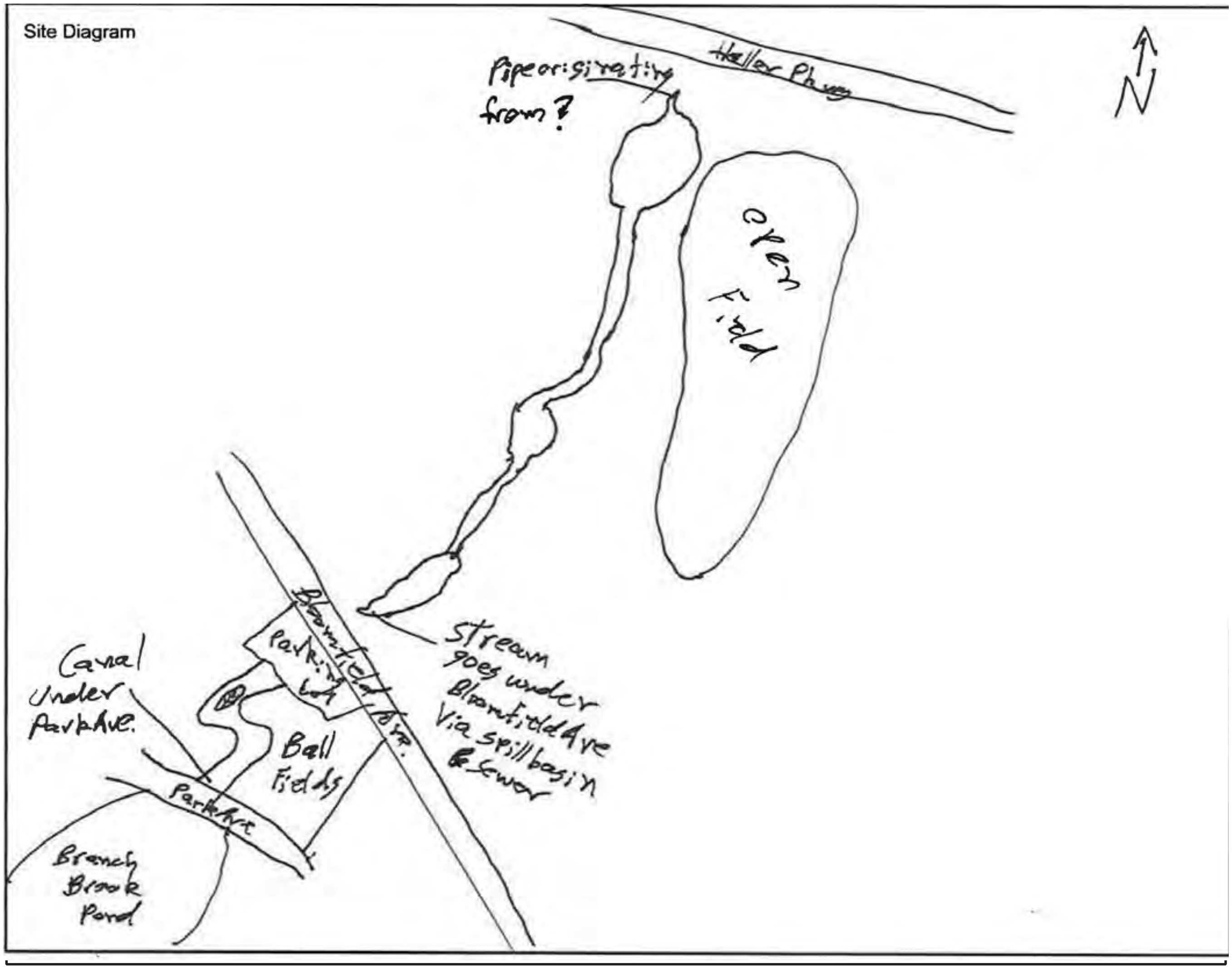
Land use within drainage (%): row crop ____ hayland ____ grazing/pasture ____ forest 5 residential 95

confined animal feeding operations ____ Cons. Reserve ____ industrial ____ Other: ____

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ____ gravel ____ sand ____ silt X mud X

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | ☐ |
| Salinity | ☐ |
| Riffle embeddedness | ☐ |
| Marcroinvertebrates Observed (optional) | ☐ |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 20- Alternative B

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ______

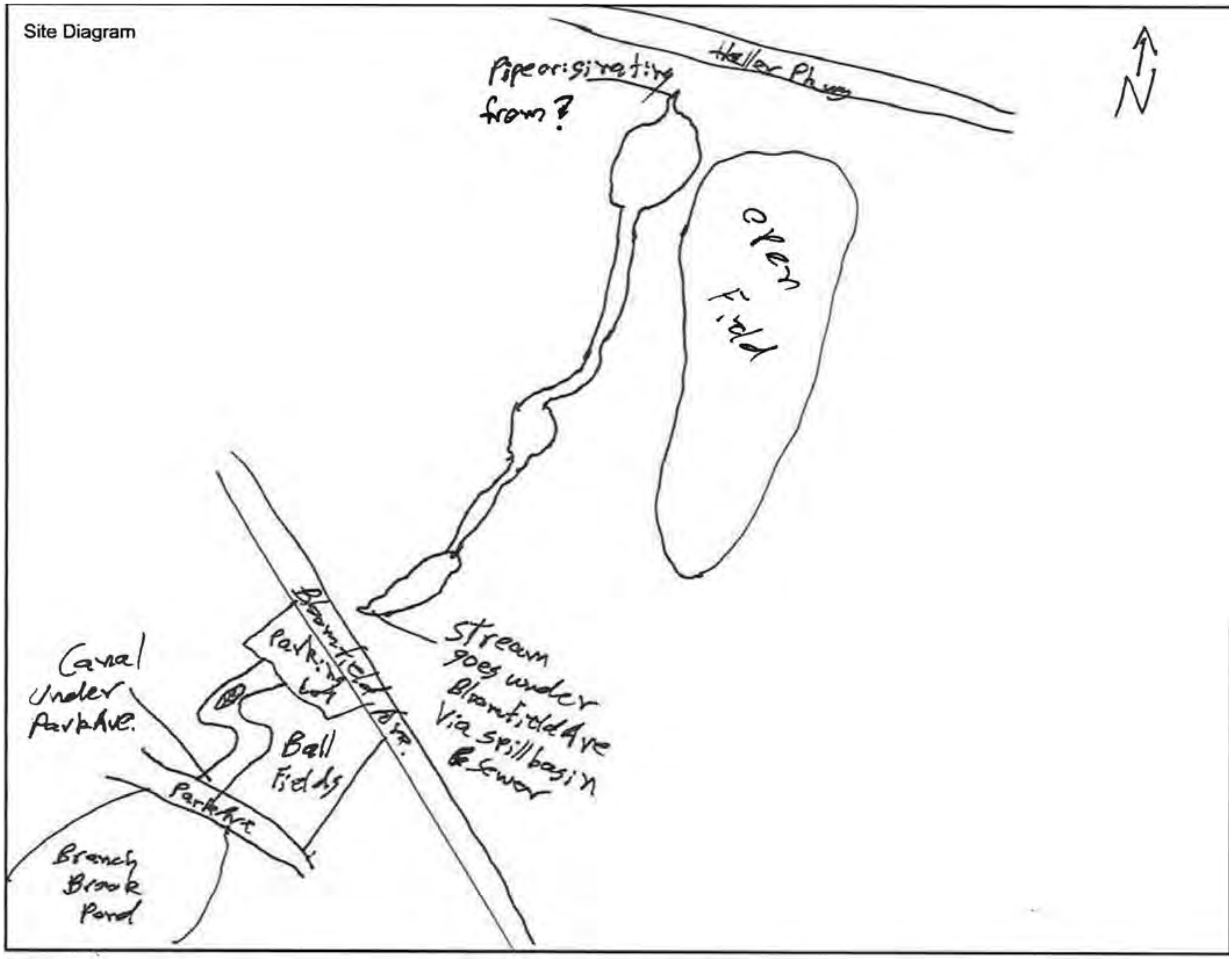
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X

Site Diagram



## Assessment Scores

| | | | |
|---|---|---|---|
| Channel condition | 3 | Pools | 3 |
| Hydrologic alteration | 3 | Invertebrate habitat | 7 |
| Riparian zone | 5 | | |
| Bank stability | 7 | | |
| Water appearance | 3 | | |
| Nutrient enrichment | 3 | | |
| Barriers to fish movement | 3 | | |
| Instream fish cover | 5 | | |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ______

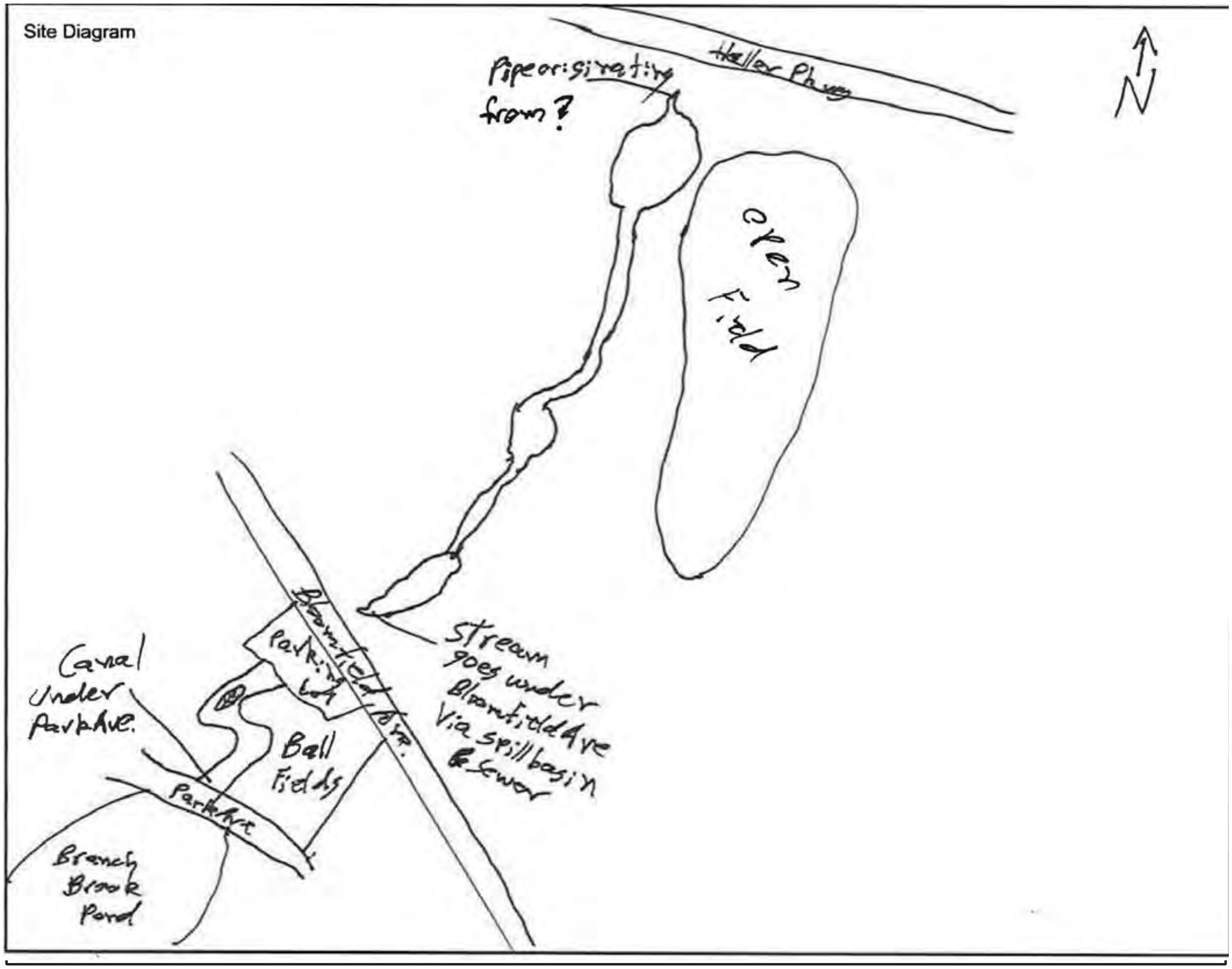
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 50- Alternative A

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

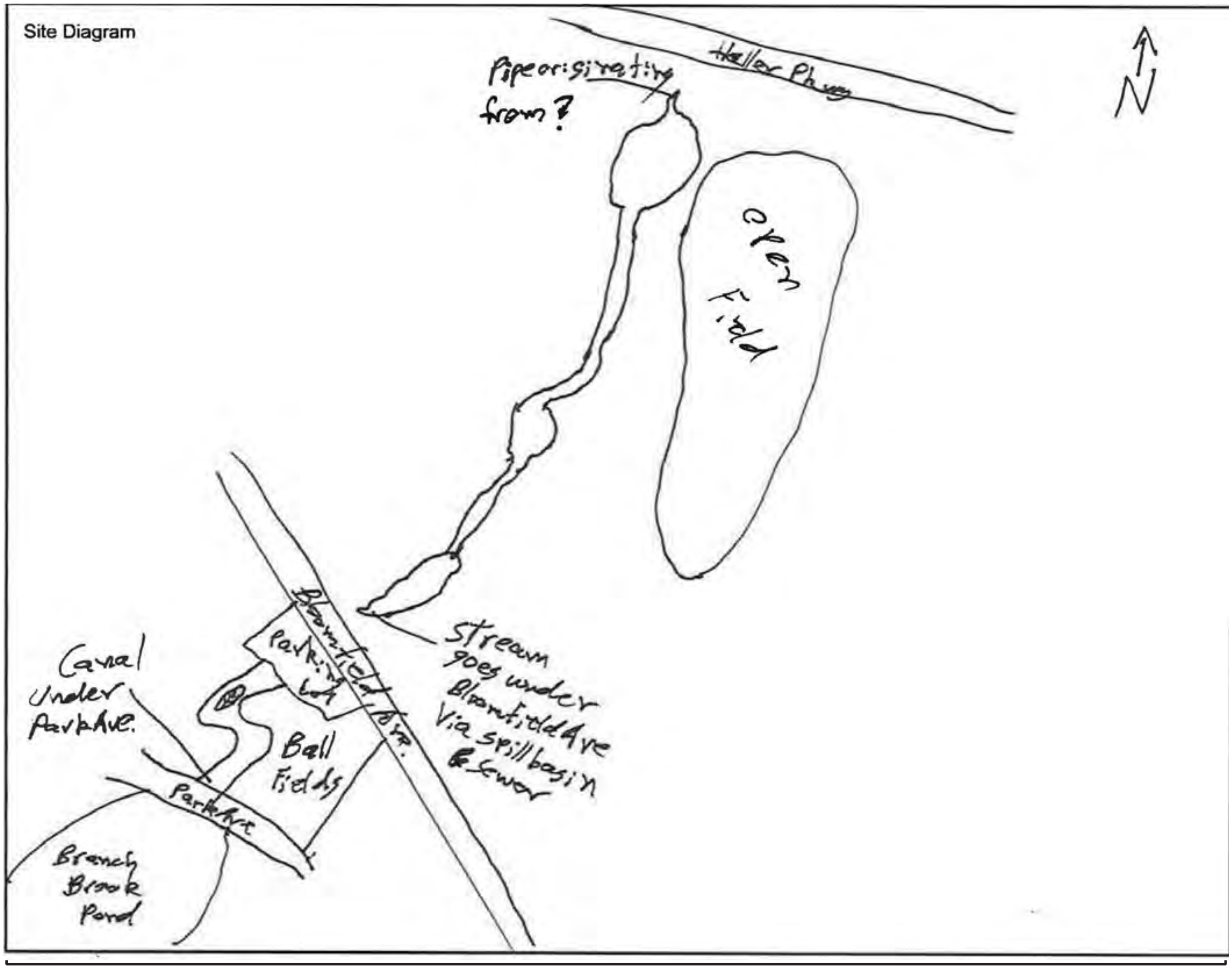
Applicable reference site ______

Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X



## Assessment Scores

| | | | |
|---|---|---|---|
| Channel condition | 3 | Pools | 3 |
| Hydrologic alteration | 3 | Invertebrate habitat | 7 |
| Riparian zone | 5 | | |
| Bank stability | 7 | | |
| Water appearance | 3 | | |
| Nutrient enrichment | 3 | | |
| Barriers to fish movement | 3 | | |
| Instream fish cover | 5 | | |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | ☐ |
| Salinity | ☐ |
| Riffle embeddedness | ☐ |
| Marcroinvertebrates Observed (optional) | ☐ |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ______

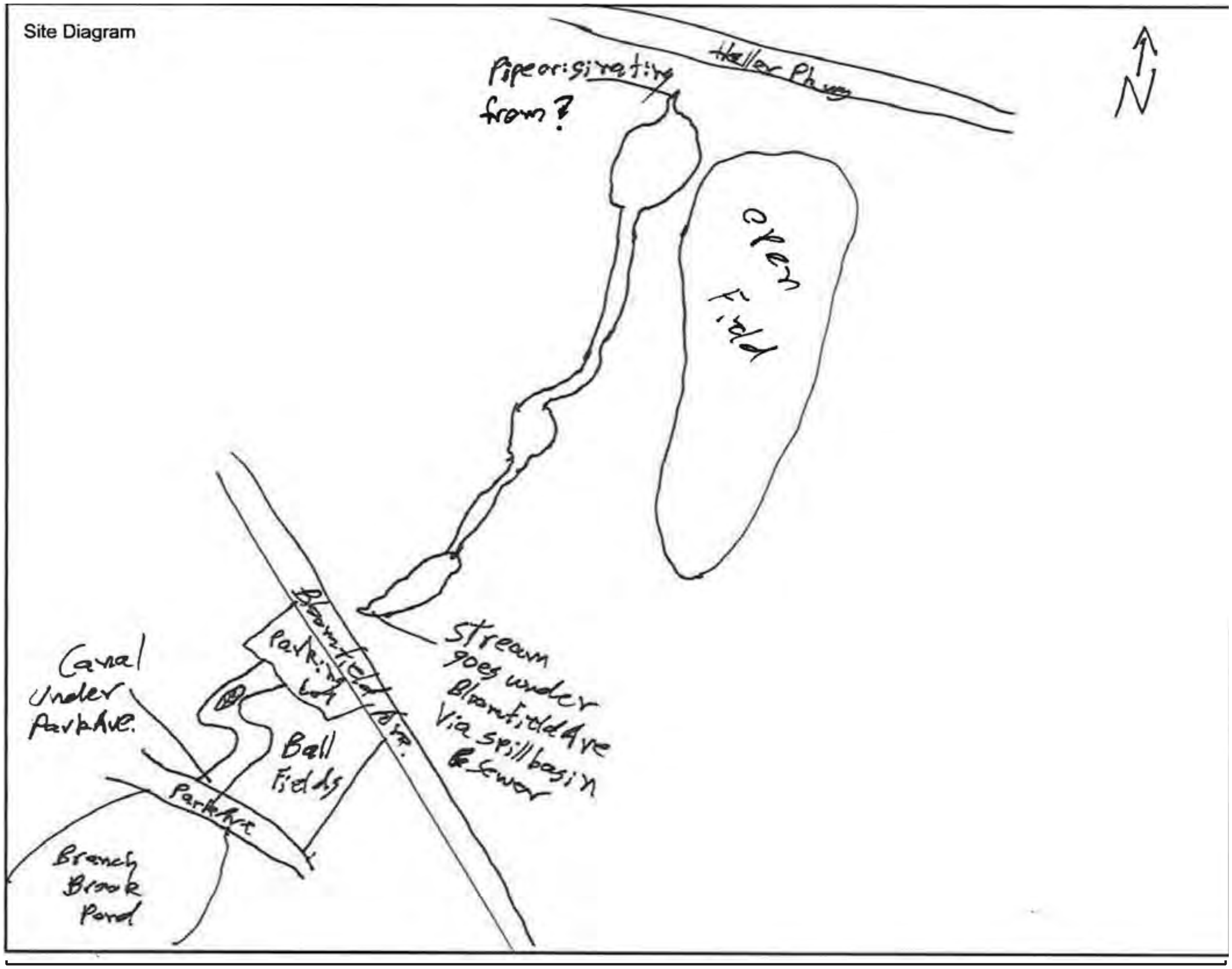
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 September2015

Stream name Branch Brook Waterbody ID number ______

Reach location Essex County Branch Brook Park

Ecoregion Glaciated Triassic Lowlands Drainage area 255.35 acres Gradient <0.5%

Applicable reference site ______

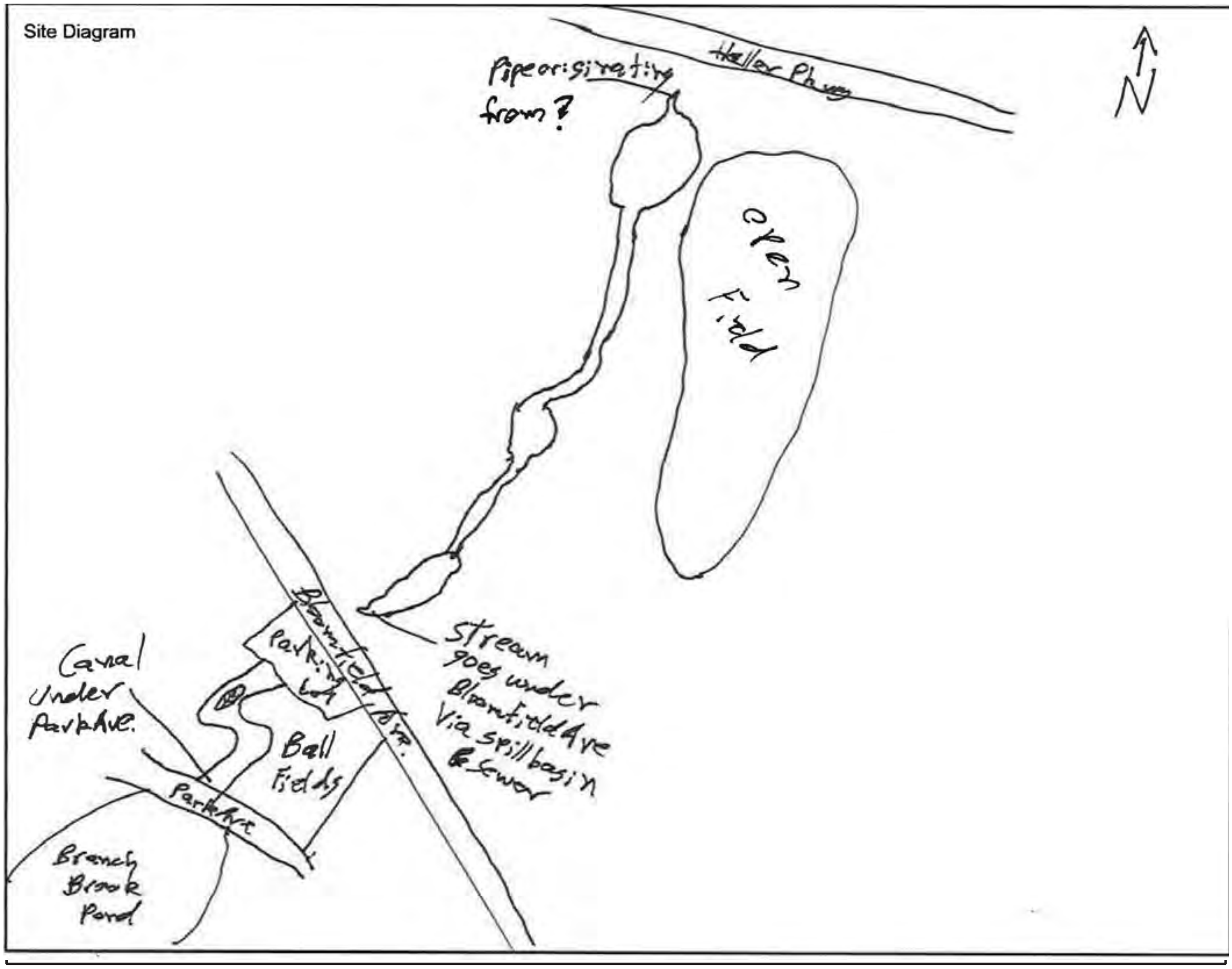
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 5 residential 95

confined animal feeding operations ______ Cons. Reserve ______ industrial ______ Other: ______

Weather conditions-today 85, scattered clouds Past 2-5 days 65 - 80, sunny

Active channel width 8 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt X mud X

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Site 719 - Meadowlark Marsh

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number ______

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site ______

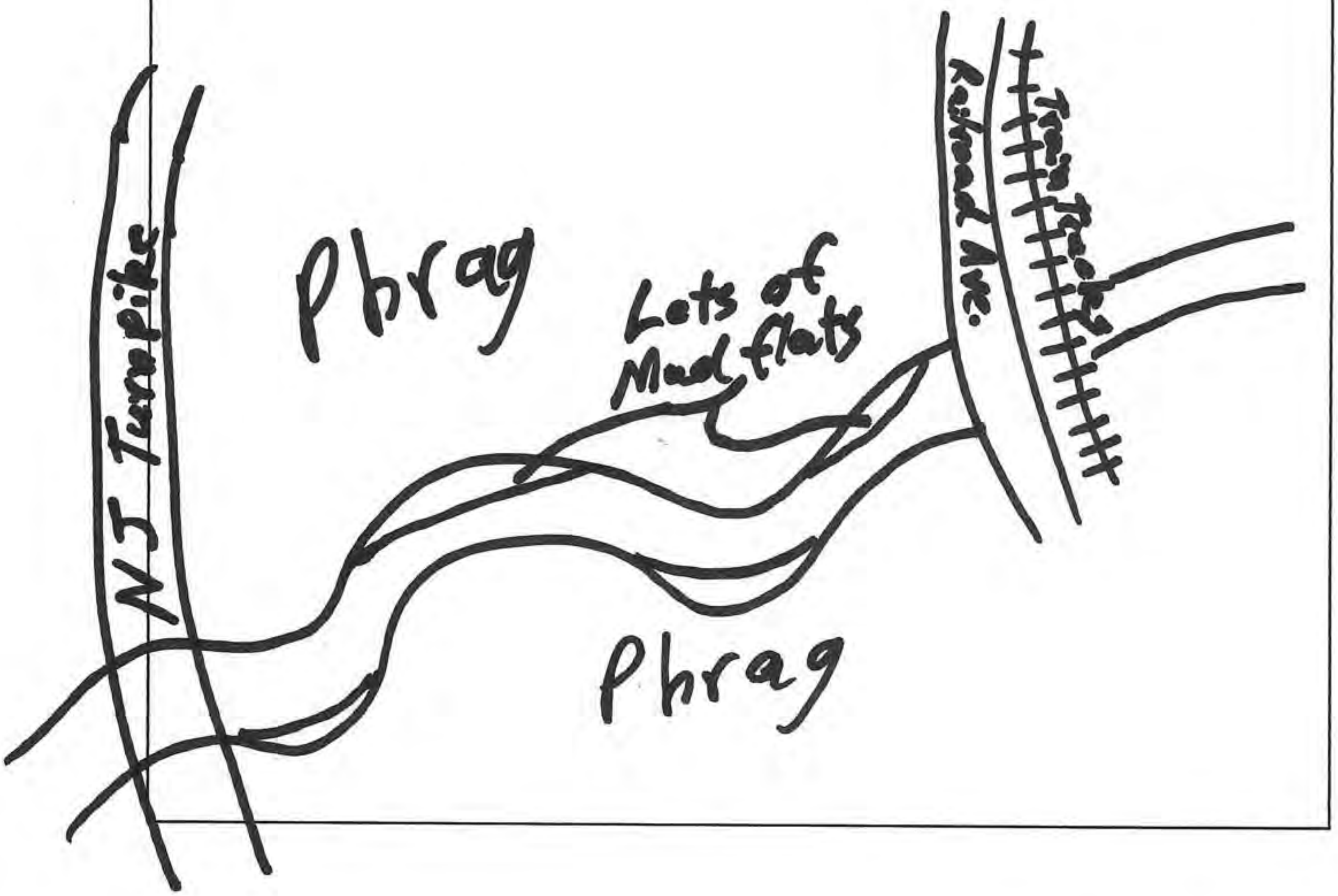
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x

Site Diagram



## Assessment Scores

|  |  |  |  |
|---|---|---|---|
| Channel condition | 3 | Pools | 3 |
| Hydrologic alteration | 3 | Invertebrate habitat | 7 |
| Riparian zone | 5 | ***Score only if applicable*** |  |
| Bank stability | 7 | Canopy cover | 7 |
| Water appearance | 3 | Manure presence |  |
| Nutrient enrichment | 3 | Salinity |  |
| Barriers to fish movement | 3 | Riffle embeddedness |  |
| Instream fish cover | 5 | Marcroinvertebrates Observed (optional) |  |

**Overall score**
(Total divided by number scored) 4.45

|  |  |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems
Urban stream; semi-protected within reach because located within park.
Impervious surface within watershed causes heavy flows and water
quality issues.

Recommendations

Year 1- Alternative A

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number ______

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site ______

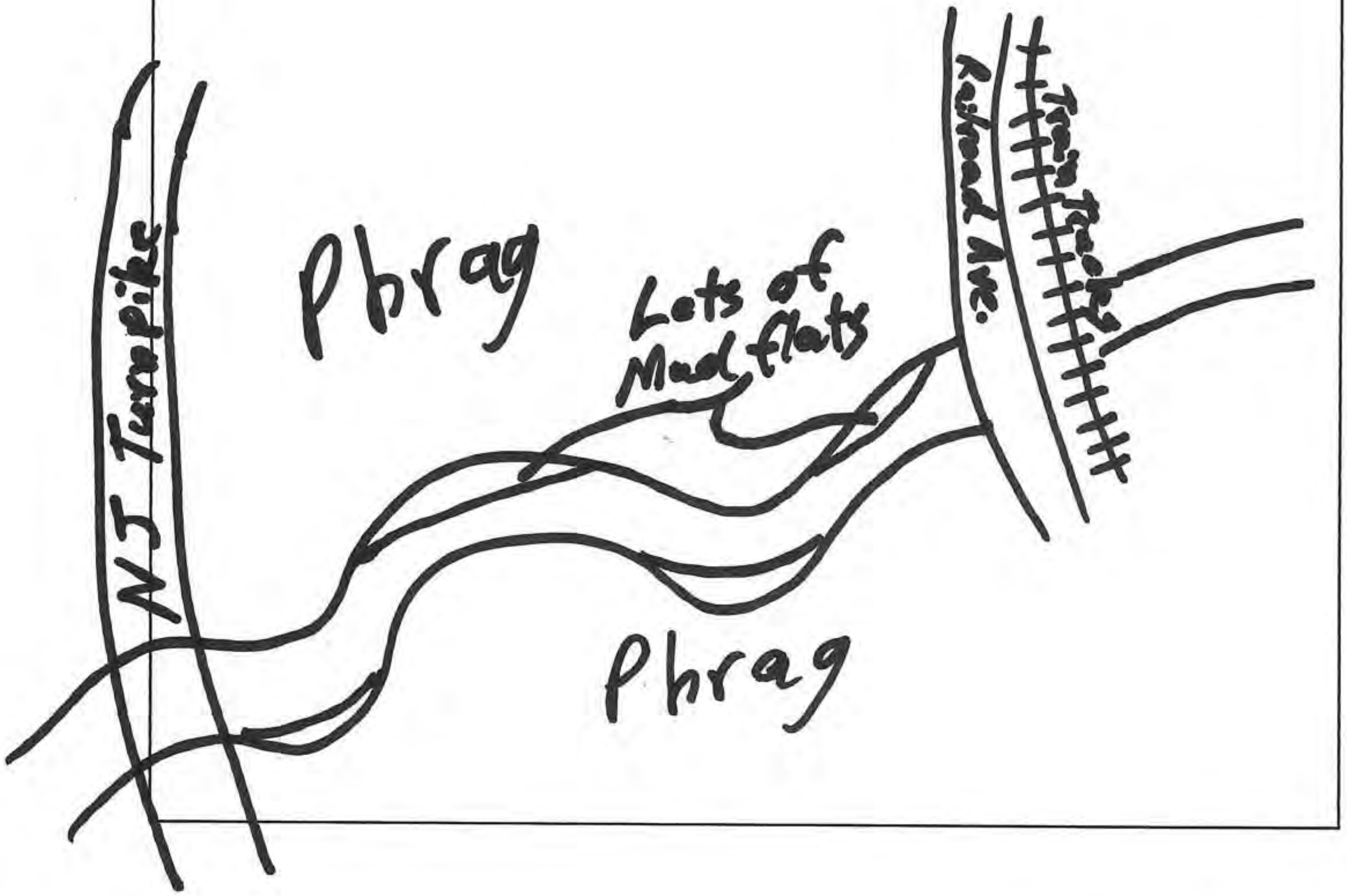
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 1- Alternative B

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number ______

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site ______

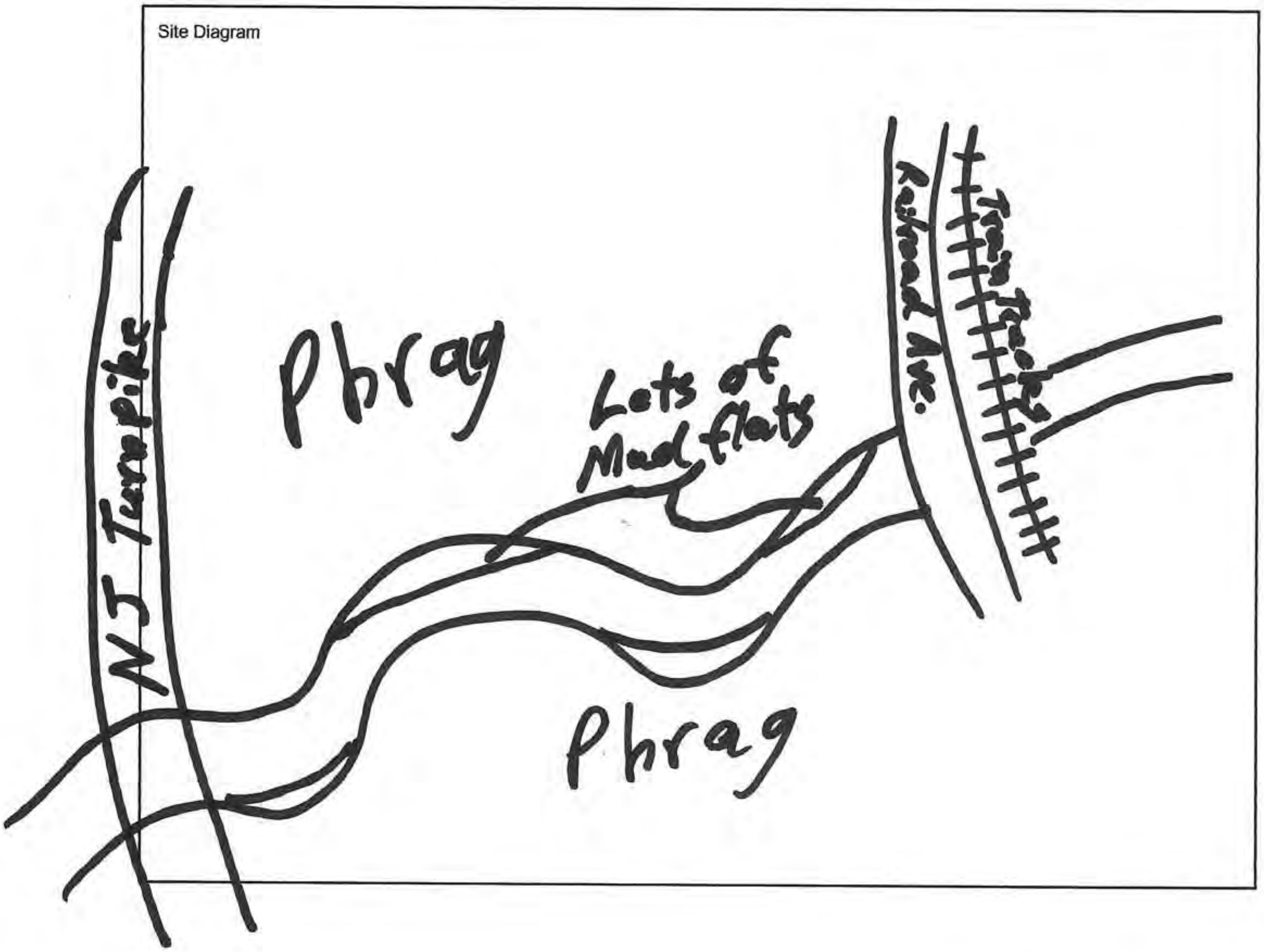
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | ☐ |
| Salinity | ☐ |
| Riffle embeddedness | ☐ |
| Marcroinvertebrates Observed (optional) | ☐ |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park.
Impervious surface within watershed causes heavy flows and water
quality issues.

Recommendations

Year 1- Alternative C

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site

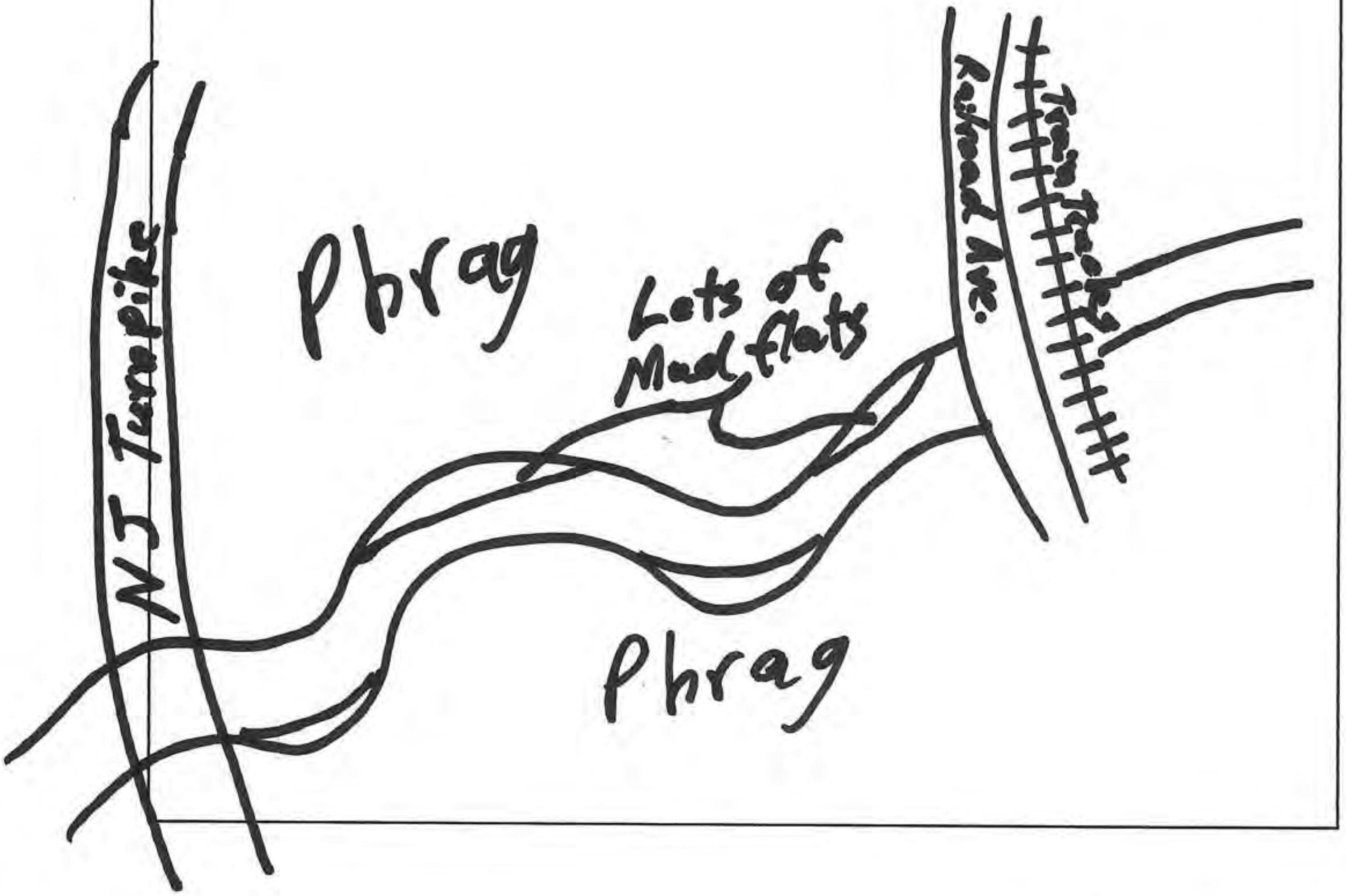
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x

Site Diagram



## Assessment Scores

| | | | |
|---|---|---|---|
| Channel condition | 3 | Pools | 3 |
| Hydrologic alteration | 3 | Invertebrate habitat | 7 |
| Riparian zone | 5 | | |
| Bank stability | 7 | | |
| Water appearance | 3 | | |
| Nutrient enrichment | 3 | | |
| Barriers to fish movement | 3 | | |
| Instream fish cover | 5 | | |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 20- Alternative A

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site

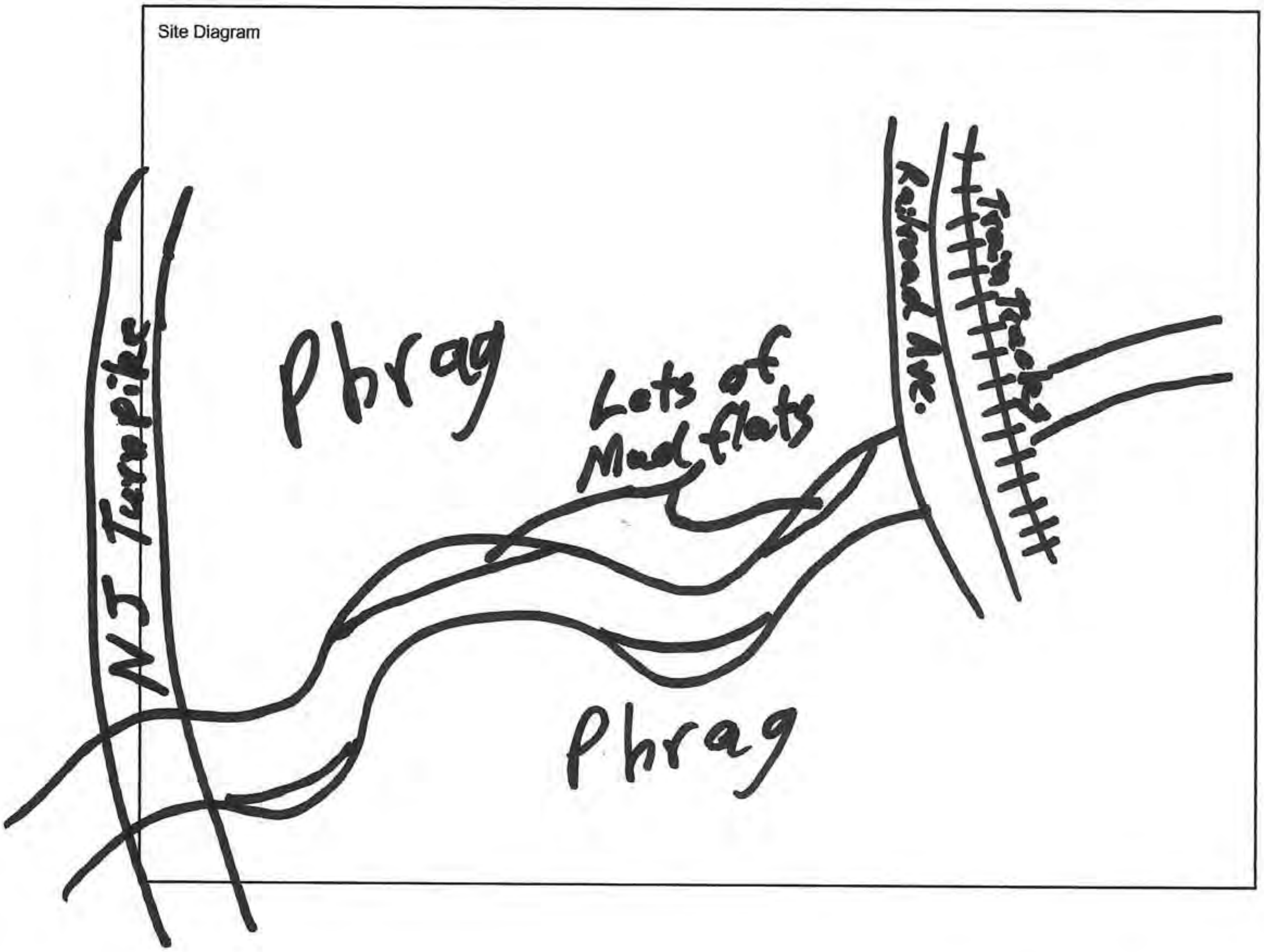
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | ☐ |
| Salinity | ☐ |
| Riffle embeddedness | ☐ |
| Marcroinvertebrates Observed (optional) | ☐ |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 20- Alternative B

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site

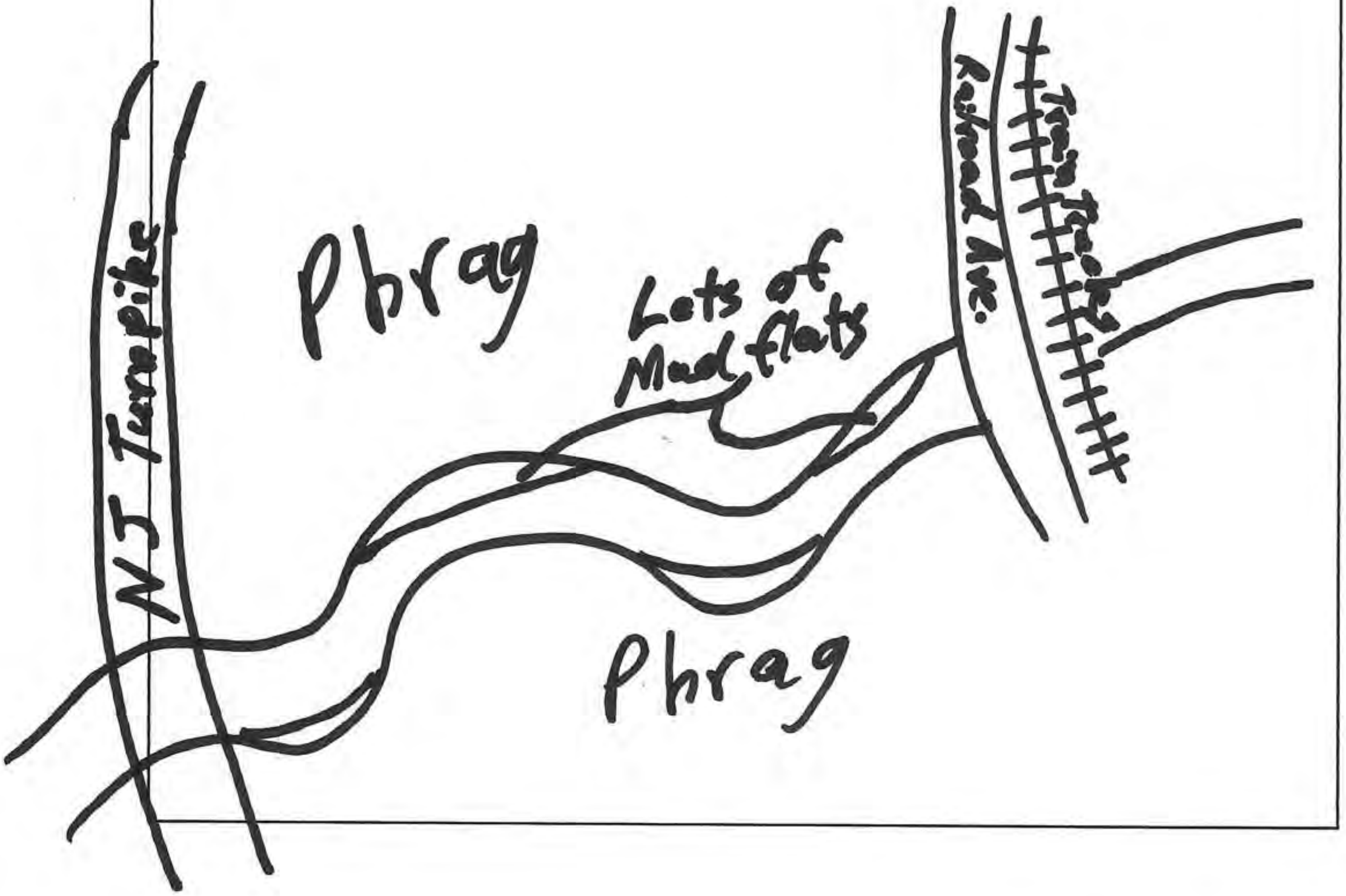
Land use within drainage (%): row crop hayland grazing/pasture forest 2 residential 65

confined animal feeding operations Cons. Reserve industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder gravel sand silt mud x

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 20- Alternative C

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number ______

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site ______

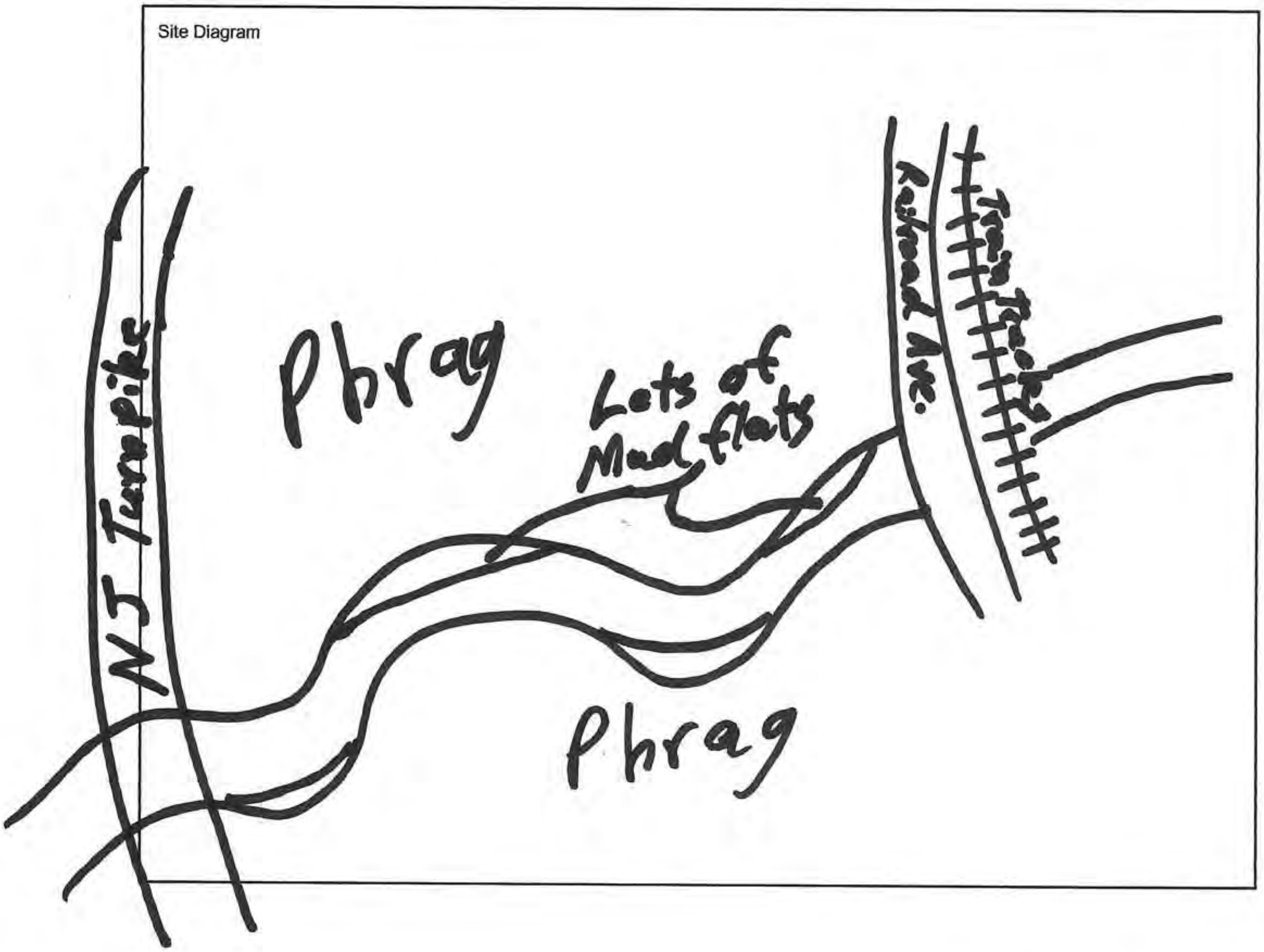
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 50- Alternative A

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site

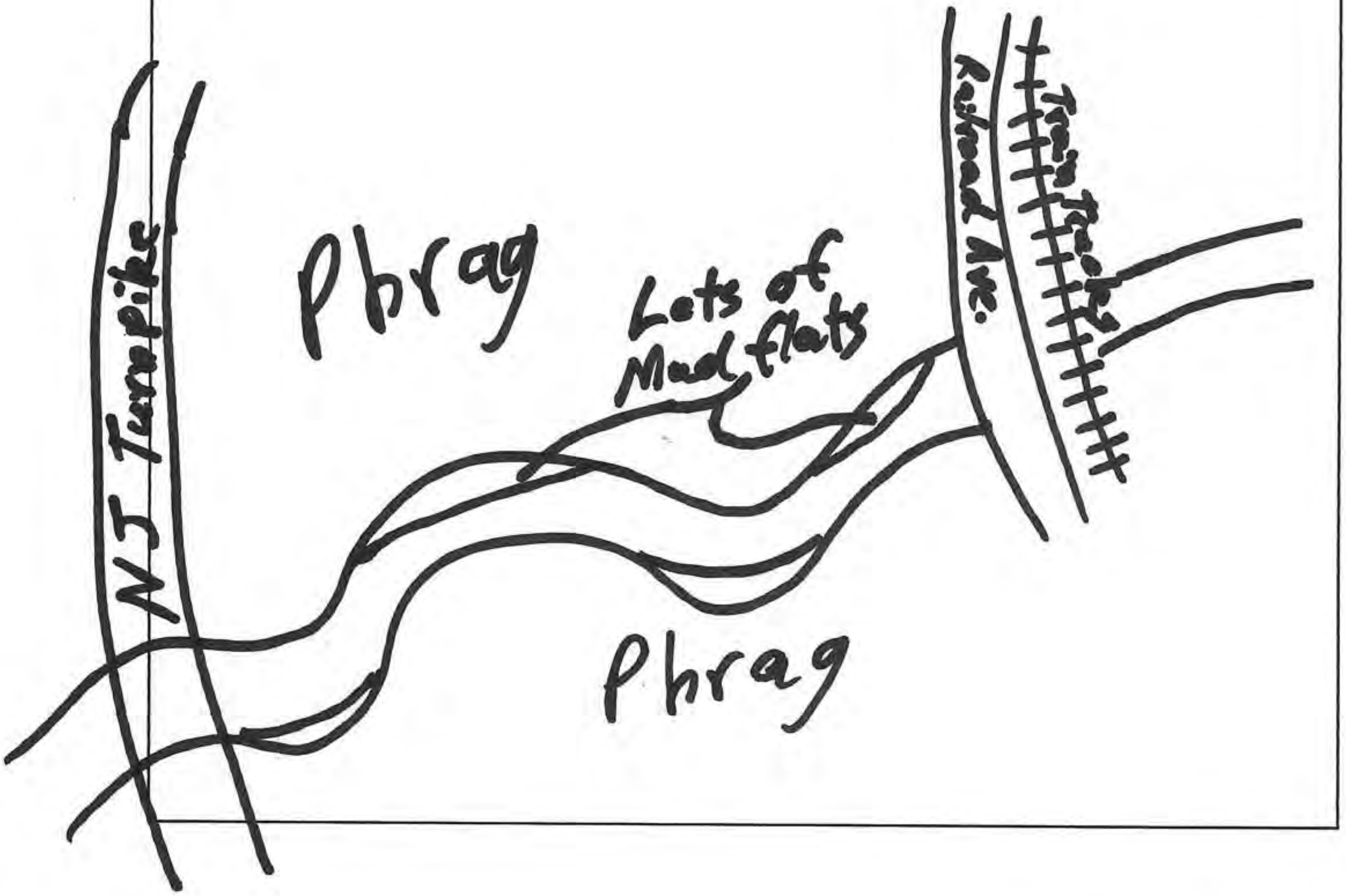
Land use within drainage (%): row crop ___ hayland ___ grazing/pasture ___ forest 2 residential 65

confined animal feeding operations ___ Cons. Reserve ___ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ___ gravel ___ sand ___ silt ___ mud x

Site Diagram



(NWCC Technical Note 99–1, Stream Visual Assessment Protocol, December 1998)

## Assessment Scores

| | | | |
|---|---|---|---|
| Channel condition | 3 | Pools | 3 |
| Hydrologic alteration | 3 | Invertebrate habitat | 7 |
| Riparian zone | 5 | | |
| Bank stability | 7 | | |
| Water appearance | 3 | | |
| Nutrient enrichment | 3 | | |
| Barriers to fish movement | 3 | | |
| Instream fish cover | 5 | | |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | ☐ |
| Salinity | ☐ |
| Riffle embeddedness | ☐ |
| Marcroinvertebrates Observed (optional) | ☐ |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 50- Alternative B

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number ______

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

Applicable reference site ______

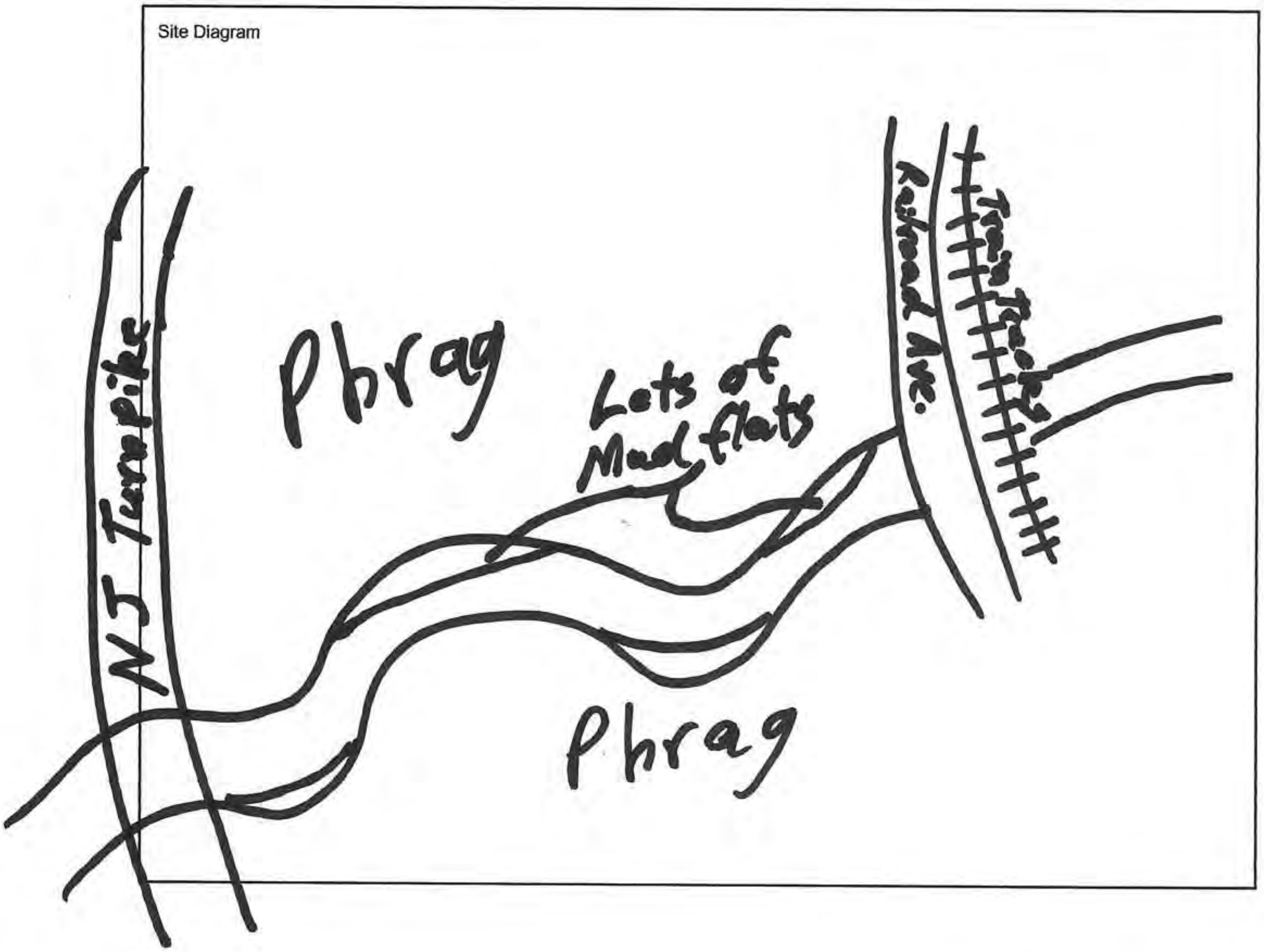
Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud X

Site Diagram



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |

| | |
|---|---|
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | ☐ |
| Salinity | ☐ |
| Riffle embeddedness | ☐ |
| Marcroinvertebrates Observed (optional) | ☐ |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems
Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

Year 50- Alternative C

# Stream Visual Assessment Protocol

Owners name USACE HRE Evaluator's name J. Baker Date 21 May 2015

Stream name Bellman's Creek Waterbody ID number ______

Reach location Site 719 - Meadowlark Marsh, Ridgefield, NJ

Ecoregion Hackensack Meadows Drainage area 4,619 acres Gradient <0.5%

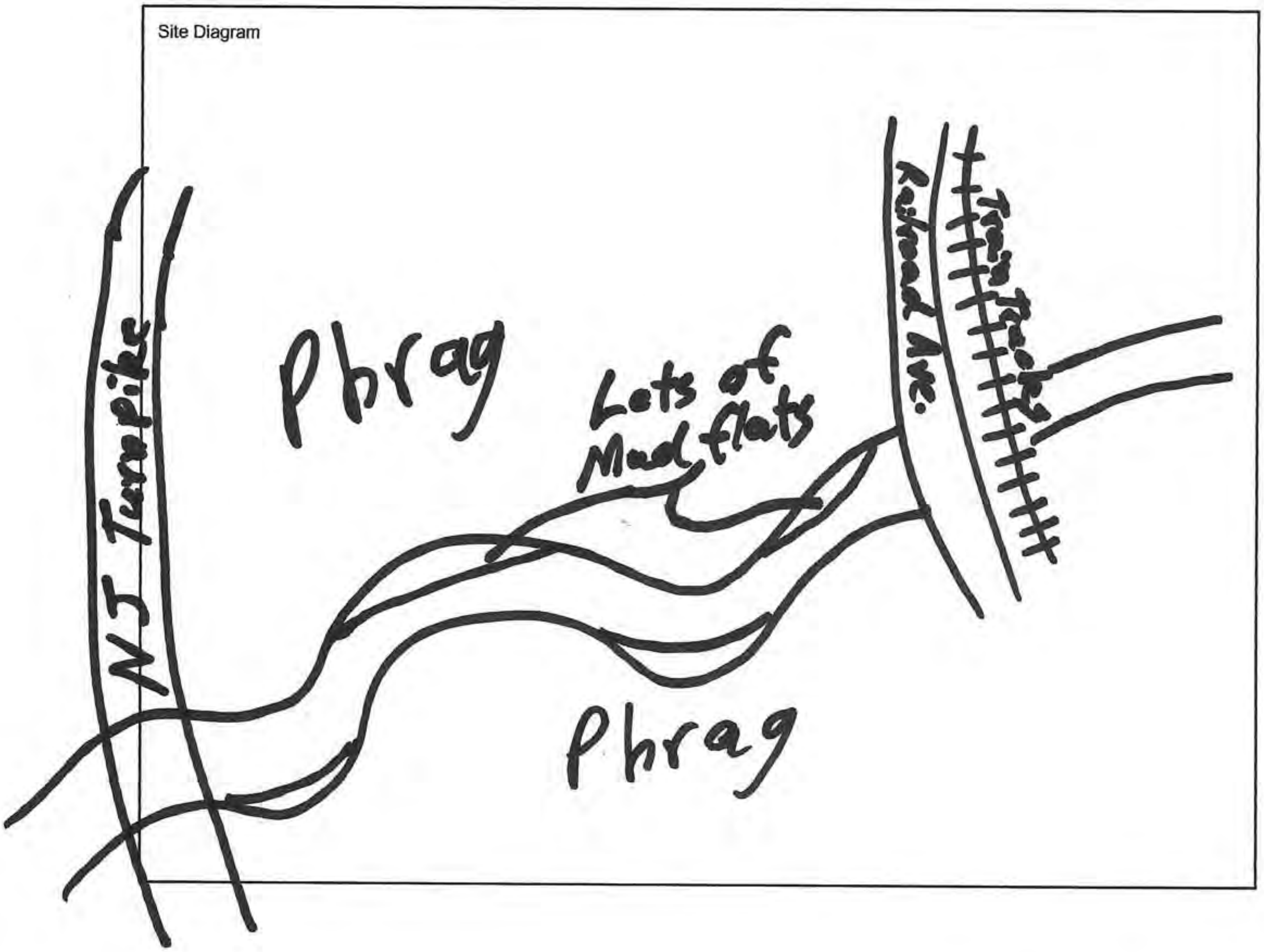
Applicable reference site ______

Land use within drainage (%): row crop ______ hayland ______ grazing/pasture ______ forest 2 residential 65

confined animal feeding operations ______ Cons. Reserve ______ industrial 28 Other: unvegetated wetland - 5

Weather conditions-today 62, cloudy Past 2-5 days 70-85, rain, cloudy

Active channel width 50 feet Dominant substrate: boulder ______ gravel ______ sand ______ silt ______ mud x



## Assessment Scores

| | |
|---|---|
| Channel condition | 3 |
| Hydrologic alteration | 3 |
| Riparian zone | 5 |
| Bank stability | 7 |
| Water appearance | 3 |
| Nutrient enrichment | 3 |
| Barriers to fish movement | 3 |
| Instream fish cover | 5 |
| Pools | 3 |
| Invertebrate habitat | 7 |

***Score only if applicable***

| | |
|---|---|
| Canopy cover | 7 |
| Manure presence | |
| Salinity | |
| Riffle embeddedness | |
| Marcroinvertebrates Observed (optional) | |

**Overall score**
(Total divided by number scored) 4.45

| | |
|---|---|
| <6.0 | **Poor** |
| 6.1-7.4 | **Fair** |
| 7.5-8.9 | **Good** |
| >9.0 | **Excellent** |

Suspected causes of observed problems

Urban stream; semi-protected within reach because located within park. Impervious surface within watershed causes heavy flows and water quality issues.

Recommendations

# Attachment D

# Upland Buffer Data Sheets

# Site 902 - Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Site Name:  Site 902. Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve
Date: 5/6/15
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Ian Nesbitt (e4sciences), Josephine Durand (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score |
|---|---|
| 1. Physical Characteristics | |
| 1a. Does the buffer have distinct vegetation zones | |
| a. two or more distinct zones are present and well vegetated | |
| b. no distinct zones are present, area is well vegetated | ✓ |
| c. no distinct zones, poor vegetation | |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | |
| What is the percent cover of each vegetation type within each distinct strip? | |
| a. <25% | |
| b. 25%-50% | |
| c. 51%-75% invasive trees and shrubs | |
| d. >75% deciduous riapraian upland forest | |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | |
| What is the percent of cover within each strip? (basal cover) | |
| a. <25% | |
| b. 25%-50% forested, invasives | |
| c. 51%-75% | |
| d. >75% Lawn | |
| 1d. What is the width of the buffer? | |
| Buffer vegetation extends | |
| a. 100% of the active channel width on each side | |
| b. 51%-75% of the active channel width on each side | |
| c. 25%-50% of the active channel width on each side | ✓ |
| d. <25% of the active channel width on each side | |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | |
| a. Wetland (emergent) | ✓ |
| b. Open water | ✓ |
| c. Wet meadow (seasonally mowed lawn) | |
| d. Forest/scrub shrub community | |
| e. Anthropogenic development | ✓ |

| Element | Score |
|---|---|
| 2b. What is the continuity of the buffer? | |
| Upland buffer provides: | |
| a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | |
| d. <25% coverage of the project area and/or comprises part of a matrix of habitats | |
| 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| Surface Runoff: | |
| a. Surface runoff is minimal because of infiltration and drainage control | |
| b. surface runoff is moderate | ✓ |
| c. Surface runoff is substantial | |
| Adjacent anthropogenic land use (pick all that apply) | |
| a. Parkway or heavy use road *(four lanes or greater?) | ✓ |
| b. Light use road (three lanes or less?) | |
| c. Parking lot | ✓ |
| d. Paved path or service road | ✓ |
| e. Commercial buildings/apartment | ✓ |
| f. Single family houses | |
| g. Railroad | |

# Site 900 - Dundee Island Park/Pulaski Park

Site Name: Site 900. Dundee Island Park/ Pulaski Park
Date: 9/21/16
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Matt Art (e4sciences), Dave Heron (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score |
|---|---|
| 1. Physical Characteristics | |
| 1a. Does the buffer have distinct vegetation zones | |
| a. two or more distinct zones are present and well vegetated | |
| b. no distinct zones are present, area is well vegetated | |
| c. no distinct zones, poor vegetation | ✓ |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | |
| What is the percent cover of each vegetation type within each distinct strip? | |
| a. <25% trees, shrubs, invasive exotics | ✓ |
| b. 25%-50% | |
| c. 51%-75% | |
| d. >75% | |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | |
| What is the percent of cover within each strip? (basal cover) | |
| a. <25% trees and shrubs | |
| b. 25%-50% | |
| c. 51%-75% | |
| d. >75% Lawn | |
| 1d. What is the width of the buffer? | |
| Buffer vegetation extends | |
| a. 100% of the active channel width on each side | |
| b. 51%-75% of the active channel width on each side | |
| c. 25%-50% of the active channel width on each side | |
| d. <25% of the active channel width on each side | ✓ |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | |
| a. Wetland (emergent) | |
| b. Open water | ✓ |
| c. Wet meadow (seasonally mowed lawn) | |
| d. Forest/scrub shrub community | |
| e. Anthropogenic development | ✓ |

| Element | Score |
|---|---|
| 2b. What is the continuity of the buffer? | |
| Upland buffer provides: | |
| a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | |
| c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| d. <25% coverage of the project area and/or comprises part of a matrix of habitats | |
| 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| Surface Runoff: | |
| a. Surface runoff is minimal because of infiltration and drainage control | |
| b. surface runoff is moderate | ✓ |
| c. Surface runoff is substantial | |
| Adjacent anthropogenic land use (pick all that apply) | |
| a. Parkway or heavy use road *(four lanes or greater?) | |
| b. Light use road (three lanes or less?) | |
| c. Parking lot | ✓ |
| d. Paved path or service road | |
| e. Commercial buildings/apartment | ✓ |
| f. Single family houses | |
| g. Railroad | ✓ |

# Site 887- Essex County Branch Brook Park

Site Name: 887. Essex County Branch Brook Park
Date: 9/21/16
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Matt Art (e4sciences), Dave Heron (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score | Element | Score |
|---|---|---|---|
| 1. Physical Characteristics | | 2b. What is the continuity of the buffer? | |
| 1a. Does the buffer have distinct vegetation zones | | Upland buffer provides: | |
| a. two or more distinct zones are present and well vegetated | ✓ | a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. no distinct zones are present, area is well vegetated | | b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| c. no distinct zones, poor vegetation | | c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | | d. <25% coverage of the project area and/or comprises part of a matrix of habitats | |
| What is the percent cover of each vegetation type within each distinct strip? | | 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| a. <25% | | 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| b. 25%-50% mixed hardwood forest | ✓ | Surface Runoff: | |
| c. 51%-75% grassland | ✓ | a. Surface runoff is minimal because of infiltration and drainage control | |
| d. >75% | | b. surface runoff is moderate | ✓ |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | | c. Surface runoff is substantial | |
| What is the percent of cover within each strip? (basal cover) | | Adjacent anthropogenic land use (pick all that apply) | |
| a. <25% | | a. Parkway or heavy use road *(four lanes or greater?) | |
| b. 25%-50% | | b. Light use road (three lanes or less?) | ✓ |
| c. 51%-75% | ✓ | c. Parking lot | |
| d. >75% Lawn | | d. Paved path or service road | ✓ |
| 1d. What is the width of the buffer? | | e. Commercial buildings/apartment | ✓ |
| Buffer vegetation extends | | f. Single family houses | ✓ |
| a. 100% of the active channel width on each side | | g. Railroad | |
| b. 51%-75% of the active channel width on each side | ✓ | | |
| c. 25%-50% of the active channel width on each side | | | |
| d. <25% of the active channel width on each side | | | |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | | | |
| a. Wetland (emergent) | ✓ | | |
| b. Open water | ✓ | | |
| c. Wet meadow (seasonally mowed lawn) | | | |
| d. Forest/scrub shrub community | | | |
| e. Anthropogenic development | ✓ | | |

# Site 865 - Kearny Point

Site Name: Site 865 - Kearny Point
Date: 5/19/15
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Matt Art (e4sciences), Dave Heron (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score |
|---|---|
| 1. Physical Characteristics | |
| 1a. Does the buffer have distinct vegetation zones | |
| a. two or more distinct zones are present and well vegetated | |
| b. no distinct zones are present, area is well vegetated | ✓ |
| c. no distinct zones, poor vegetation | ✓ |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | |
| What is the percent cover of each vegetation type within each distinct strip? | |
| a. <25% | |
| b. 25%-50% gravel/earth sorting, mixed hardwood, invasive exotics | ✓ |
| c. 51%-75% | |
| d. >75% | |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | |
| What is the percent of cover within each strip? (basal cover) | |
| a. <25% | ✓ |
| b. 25%-50% | |
| c. 51%-75% | |
| d. >75% Lawn | |
| 1d. What is the width of the buffer? | |
| Buffer vegetation extends | |
| a. 100% of the active channel width on each side | |
| b. 51%-75% of the active channel width on each side | |
| c. 25%-50% of the active channel width on each side | |
| d. <25% of the active channel width on each side | ✓ |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | |
| a. Wetland (emergent) | |
| b. Open water | ✓ |
| c. Wet meadow (seasonally mowed lawn) | |
| d. Forest/scrub shrub community | ✓ |
| e. Anthropogenic development | ✓ |

| Element | Score |
|---|---|
| 2b. What is the continuity of the buffer? | |
| Upland buffer provides: | |
| a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | |
| c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | |
| d. <25% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| Surface Runoff: | |
| a. Surface runoff is minimal because of infiltration and drainage control | |
| b. surface runoff is moderate | ✓ |
| c. Surface runoff is substantial | |
| Adjacent anthropogenic land use (pick all that apply) | |
| a. Parkway or heavy use road *(four lanes or greater?) | |
| b. Light use road (three lanes or less?) | |
| c. Parking lot | ✓ |
| d. Paved path or service road | ✓ |
| e. Commercial buildings/apartment | ✓ |
| f. Single family houses | |
| g. Railroad | |

# Site 866 - Oak Island Yards

Site Name: Site 866. Oak Island Yards
Date: 5/19/15
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Matt Art (e4sciences), Dave Heron (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score |
|---|---|
| 1. Physical Characteristics | |
| 1a. Does the buffer have distinct vegetation zones | |
| a. two or more distinct zones are present and well vegetated | |
| b. no distinct zones are present, area is well vegetated | |
| c. no distinct zones, poor vegetation | ✓ |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | |
| What is the percent cover of each vegetation type within each distinct strip? | |
| a. <25% | ✓ |
| b. 25%-50% | |
| c. 51%-75% | |
| d. >75% | |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | |
| What is the percent of cover within each strip? (basal cover) | |
| a. <25% | ✓ |
| b. 25%-50% | |
| c. 51%-75% | |
| d. >75% Lawn | |
| 1d. What is the width of the buffer? | |
| Buffer vegetation extends | |
| a. 100% of the active channel width on each side | |
| b. 51%-75% of the active channel width on each side | |
| c. 25%-50% of the active channel width on each side | |
| d. <25% of the active channel width on each side | ✓ |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | |
| a. Wetland (emergent) | |
| b. Open water | ✓ |
| c. Wet meadow (seasonally mowed lawn) | |
| d. Forest/scrub shrub community | ✓ |
| e. Anthropogenic development | ✓ |

| Element | Score |
|---|---|
| 2b. What is the continuity of the buffer? | |
| Upland buffer provides: | |
| a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | |
| c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | |
| d. <25% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| Surface Runoff: | |
| a. Surface runoff is minimal because of infiltration and drainage control | |
| b. surface runoff is moderate | |
| c. Surface runoff is substantial | ✓ |
| Adjacent anthropogenic land use (pick all that apply) | |
| a. Parkway or heavy use road *(four lanes or greater?) | |
| b. Light use road (three lanes or less?) | ✓ |
| c. Parking lot | ✓ |
| d. Paved path or service road | |
| e. Commercial buildings/apartment | ✓ |
| f. Single family houses | |
| g. Railroad | ✓ |

# Site 719 - Meadowlark Marsh

Site Name: Site 719. Meadowlark Marsh
Date: 5/21/15
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Ian Nesbitt (e4 sciences), Dave Herron (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score |
|---|---|
| 1. Physical Characteristics | |
| 1a. Does the buffer have distinct vegetation zones | |
| a. two or more distinct zones are present and well vegetated | |
| b. no distinct zones are present, area is well vegetated | ✓ |
| c. no distinct zones, poor vegetation | |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | |
| What is the percent cover of each vegetation type within each distinct strip? | |
| a. <25% | |
| b. 25%-50% grassland, shrubland | ✓ |
| c. 51%-75% mixed hardwood | ✓ |
| d. >75% | |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | |
| What is the percent of cover within each strip? (basal cover) | |
| a. <25% | |
| b. 25%-50% | |
| c. 51%-75% | ✓ |
| d. >75% Lawn | |
| 1d. What is the width of the buffer? | |
| Buffer vegetation extends | |
| a. 100% of the active channel width on each side | |
| b. 51%-75% of the active channel width on each side | |
| c. 25%-50% of the active channel width on each side | |
| d. <25% of the active channel width on each side | |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | |
| a. Wetland (emergent) | ✓ |
| b. Open water | |
| c. Wet meadow (seasonally mowed lawn) | |
| d. Forest/scrub shrub community | |
| e. Anthropogenic development | ✓ |

| Element | Score |
|---|---|
| 2b. What is the continuity of the buffer? | |
| Upland buffer provides: | |
| a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | |
| c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | |
| d. <25% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| Surface Runoff: | |
| a. Surface runoff is minimal because of infiltration and drainage control | |
| b. surface runoff is moderate | ✓ |
| c. Surface runoff is substantial | |
| Adjacent anthropogenic land use (pick all that apply) | |
| a. Parkway or heavy use road *(four lanes or greater?) | ✓ |
| b. Light use road (three lanes or less?) | |
| c. Parking lot | |
| d. Paved path or service road | ✓ |
| e. Commercial buildings/apartment | |
| f. Single family houses | |
| g. Railroad | ✓ |

# Site 721 - Metro Media Tract

Site Name: Site 721. Metromedia Tract
Date: 5/21/15
People: Gregory Russo (Louis Berger), Justin Baker (Louis Berger), Tom Shinskey (Louis Berger), Ian Nesbitt (e4 sciences), Dave Herron (e4sciences)
Weather Condition:

## Upland Buffer

| Element | Score |
|---|---|
| 1. Physical Characteristics | |
| 1a. Does the buffer have distinct vegetation zones | |
| a. two or more distinct zones are present and well vegetated | |
| b. no distinct zones are present, area is well vegetated | |
| c. no distinct zones, poor vegetation | ✓ |
| 1b. Is the vegetation in the buffer strip native or non-native/ invasive. | |
| What is the percent cover of each vegetation type within each distinct strip? | |
| a. <25% | ✓ |
| b. 25%-50% | |
| c. 51%-75% | |
| d. >75% | |
| 1c. Is the vegetation dense enough at ground level to provide filtration and help spread the water coming from the upland, or does water running from uplands? | |
| What is the percent of cover within each strip? (basal cover) | |
| a. <25% | |
| b. 25%-50% grassland, shrubland | ✓ |
| c. 51%-75% | |
| d. >75% Lawn | |
| 1d. What is the width of the buffer? | |
| Buffer vegetation extends | |
| a. 100% of the active channel width on each side | |
| b. 51%-75% of the active channel width on each side | |
| c. 25%-50% of the active channel width on each side | |
| d. <25% of the active channel width on each side | ✓ |
| 2. Temporal Characteristics:<br>2a. What is the location and makeup of adjacent habitat? | |
| a. Wetland (emergent) | ✓ |
| b. Open water | ✓ |
| c. Wet meadow (seasonally mowed lawn) | |
| d. Forest/scrub shrub community | |
| e. Anthropogenic development | ✓ |

| Element | Score |
|---|---|
| 2b. What is the continuity of the buffer? | |
| Upland buffer provides: | |
| a. 100% continuous coverage of the project area and/or comprises part of a matrix of habitats. | |
| b. 51-75% coverage of the project area and/or comprises part of a matrix of habitats | |
| c. 25-50% coverage of the project area and/or comprises part of a matrix of habitats | |
| d. <25% coverage of the project area and/or comprises part of a matrix of habitats | ✓ |
| 3. Water Quality: Sources and Filtering Ability of Non-point Source Pollution | |
| 3a. Proximity of buffer strip to source of NPSP? To be determined through visual evidence at the site (i.e. concrete, culverts, bare ground) | |
| Surface Runoff: | |
| a. Surface runoff is minimal because of infiltration and drainage control | ✓ |
| b. surface runoff is moderate | |
| c. Surface runoff is substantial | |
| Adjacent anthropogenic land use (pick all that apply) | |
| a. Parkway or heavy use road *(four lanes or greater?) | |
| b. Light use road (three lanes or less?) | |
| c. Parking lot | ✓ |
| d. Paved path or service road | |
| e. Commercial buildings/apartment | |
| f. Single family houses | |
| g. Railroad | |

# Attachment E

# Baseline Assessment Maps

Figure 1: Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve Baseline EPW Assessment Area, Clifton, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

▭ SITE BOUNDARY

▨ INVASIVE SPECIES

WETLAND ASSESSMENT AREA

🟩 TREES - BROAD-LEAVED DECIDUOUS

🟩 EMERGENT - SHORT PERSISTENT

🟦 NON-VEGETATIVE - OPEN WATER

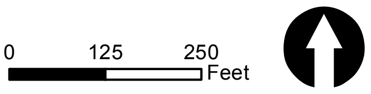
▨ NON-VEGETATIVE - COBBLE-GRAVEL

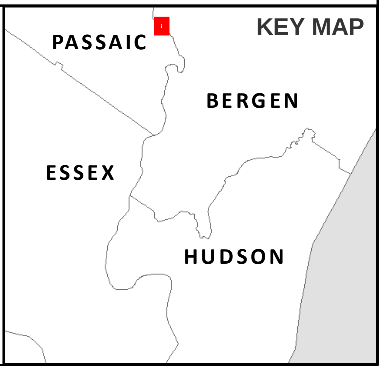
UPLAND ASSESSMENT AREA

🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS

🟥 NON-VEGETATIVE - COBBLE-GRAVEL

⬜ NON-VEGETATIVE - RUBBLE





## Figure 2: Dundee Island Park/Pulaski Park Baseline EPW Assessment Area, Passaic, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

▭ SITE BOUNDARY

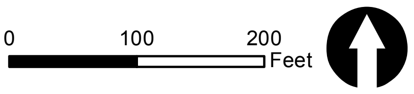
▨ INVASIVE SPECIES

WETLAND ASSESSMENT AREA

- 🟩 TREES - BROAD-LEAVED DECIDUOUS
- 🟦 NON-VEGETATIVE - OPEN WATER

UPLAND ASSESSMENT AREA

- 🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS
- 🟫 SHRUBLAND - TALL DECIDUOUS
- 🟩 GRASSLAND - SHORT PERSISTANT
- 🟨 NON-VEGETATED BARE GROUND
- 🟥 NON-VEGETATED COBBLE-GRAVEL
- 🟨 NON-VEGETATED SAND



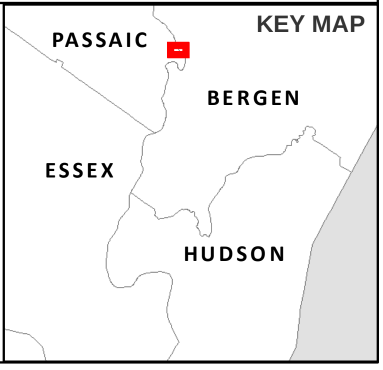


Figure 3: Essex County Branch Brook Park
Baseline EPW Assessment Area, Newark, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

▭ SITE BOUNDARY

▨ INVASIVE SPECIES

WETLAND ASSESSMENT AREA

🟩 TREES - BROAD LEAVED DECIDUOUS

🟩 EMERGENT - TALL PERSISTANT

🟦 NON-VEGETATIVE - OPEN WATER

UPLAND ASSESSMENT AREA

🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS

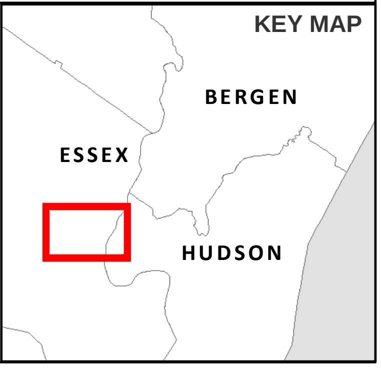
🟫 SHRUBLAND - TALL DECIDUOUS

🟩 GRASSLAND - SHORT PERSISTANT

⬛ NON-VEGETATIVE PAVEMENT

0 500 1,000 Feet

KEY MAP



Source: NJGIN NJ 2015 Orthoimagery

## Figure 4: Kearny Point
## Baseline EPW Assessment Area, Kearny, New Jersey (Deferred Site)

▭ SITE BOUNDARY

▨ INVASIVE SPECIES

WETLAND ASSESSMENT AREA
- 🟩 TREES - BROAD-LEAVED DECIDUOUS
- 🟩 EMERGENT - SHORT PERSISTENT
- 🟩 EMERGENT - TALL PERSISTENT
- 🟦 NON-VEGETATIVE - OPEN WATER

UPLAND ASSESSMENT AREA
- 🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS
- 🟩 GRASSLAND - SHORT PERSISTENT
- 🟥 NON-VEGETATIVE - COBBLE-GRAVEL

0 200 400
Feet

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

KEY MAP

Figure 5: Oak Island Yards
Baseline EPW Assessment Area, Newark, New Jersey (Deferred Site)

Source: NJGIN NJ 2015 Orthoimagery

▭ SITE BOUNDARY

WETLAND ASSESSMENT AREA
- 🟩 TREES - BROAD-LEAVED DECIDUOUS
- 🟩 EMERGENT - SHORT PERSISTENT
- 🟩 EMERGENT - TALL PERSISTENT
- 🟧 SCRUB-SHRUB - BUSHY DECIDUOUS
- 🟨 NON-VEGETATIVE - SAND
- 🟦 NON-VEGETATIVE - OPEN WATER

▨ INVASIVE SPECIES

UPLAND ASSESSMENT AREA
- ⬜ NON-VEGETATIVE - RUBBLE
- 🟥 NON-VEGETATIVE - COBBLE-GRAVEL

0 100 200
Feet

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

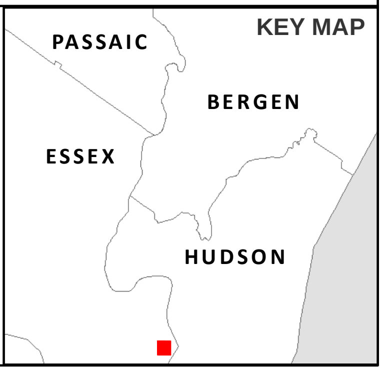


Figure 6: Harrison Marsh
Baseline EPW Assessment Area, Harrison, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

▭ SITE BOUNDARY

WETLAND ASSESSMENT AREA

🟨 SCRUB-SHRUB - BUSHY DECIDUOUS

🟩 EMERGENT - TALL PERSISTENT

🟩 EMERGENT - SHORT PERSISTENT

🟦 NON-VEGETATIVE - OPEN WATER

▤ NON-VEGETATIVE - RUBBLE

▨ INVASIVE SPECIES

UPLAND ASSESSMENT AREA

🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS

🟫 SHRUBLAND - TALL DECIDUOUS

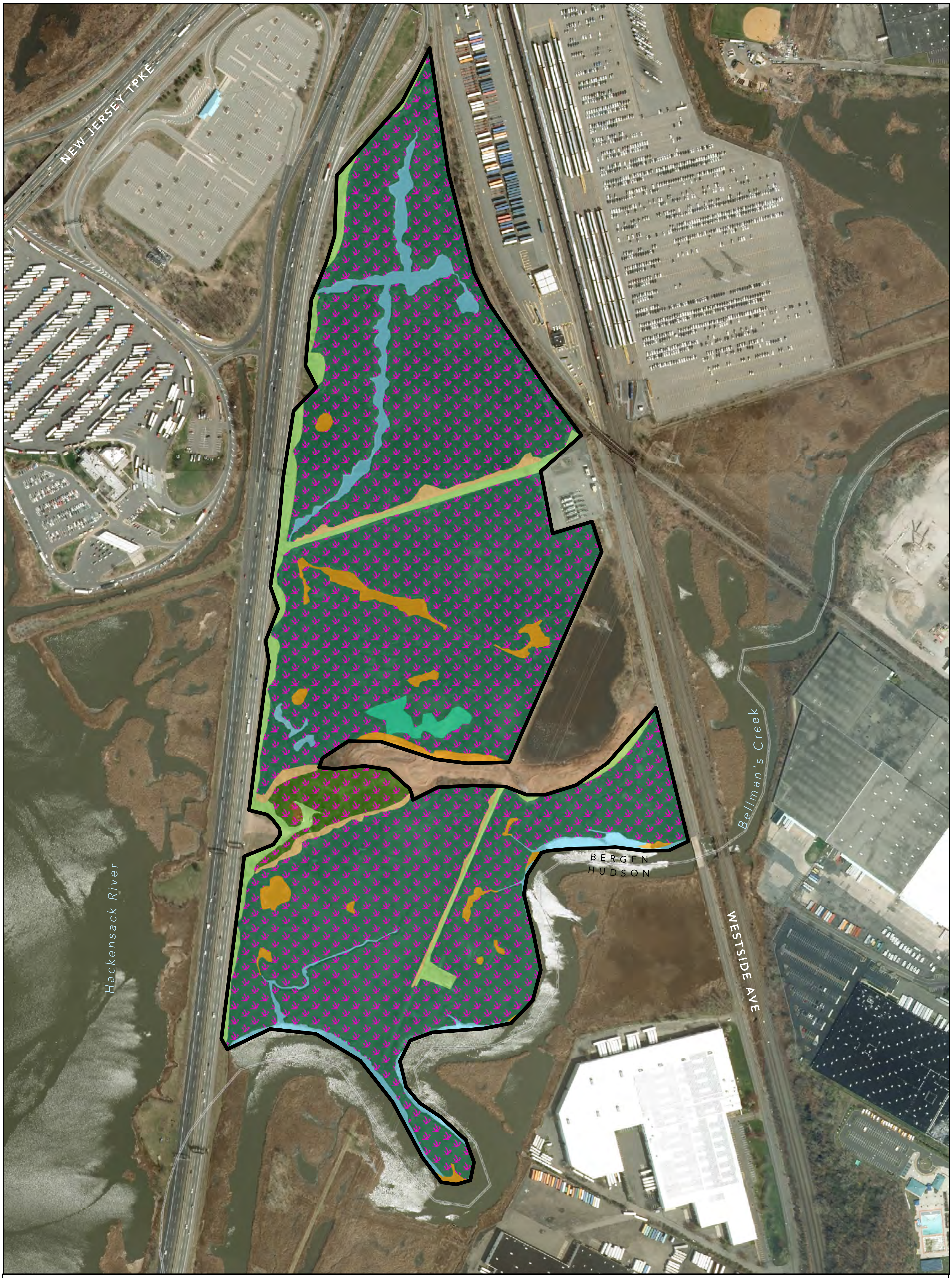
🟥 NON-VEGETATIVE - COBBLE-GRAVEL

⬛ NON-VEGETATIVE - PAVED

⬛ URBAN-RAILROAD

0 200 400 Feet

KEY MAP



## Figure 7: Meadowlark Marsh
## Baseline EPW Assessment Area, New Jersey Meadowlands

Source: NJGIN NJ 2015 Orthoimagery

▭ SITE BOUNDARY

▨ INVASIVE SPECIES

WETLAND ASSESSMENT AREA

🟩 EMERGENT - SHORT PERSISTENT

🟩 EMERGENT - TALL PERSISTENT

🟨 SCRUB-SHRUB - TALL DECIDUOUS

🟧 NON-VEGETATIVE - MUD

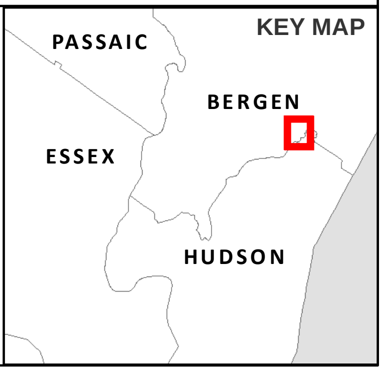
🟦 NON-VEGETATIVE - OPEN WATER

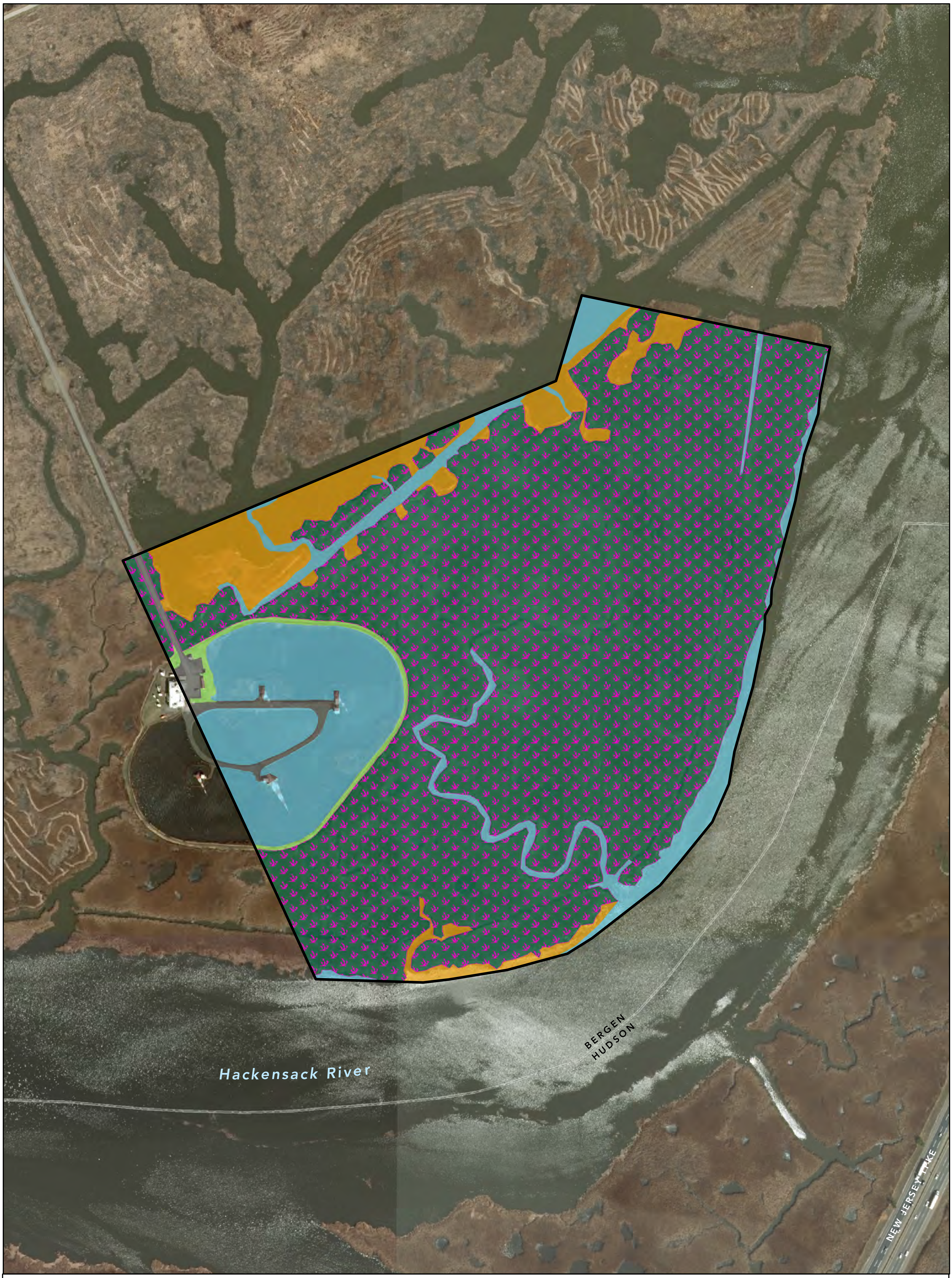
UPLAND ASSESSMENT AREA

🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS

🟩 GRASSLAND - SHORT PERSISTENT

🟫 SHRUBLAND - TALL DECIDUOUS





Source: NJGIN NJ 2015 Orthoimagery

Figure 8: Metromedia Tract
Baseline EPW Assessment Area, Carlstadt, New Jersey

▭ SITE BOUNDARY

WETLAND ASSESSMENT AREA

🟩 EMERGENT - TALL PERSISTENT

🟧 NON-VEGETATIVE MUD

🟦 NON-VEGETATIVE - OPEN WATER

▨ INVASIVE SPECIES

UPLAND ASSESSMENT AREA

🟩 GRASSLAND - SHORT PERSISTENT

⬛ NON-VEGETATIVE - PAVED

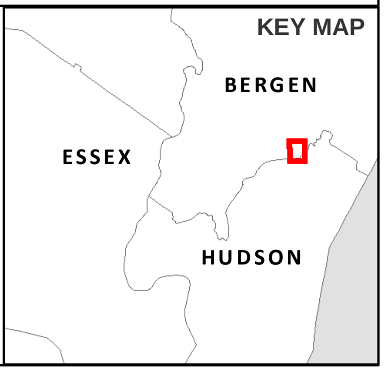


Figure 9: Marsh Resources Phase 2
Baseline EPW Assessment Area, Carlstadt, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

☐ SITE BOUNDARY

▨ INVASIVE SPECIES

WETLAND ASSESSMENT AREA

🟩 EMERGENT - TALL PERSISTENT

🟩 EMERGENT - SHORT PERSISTENT

🟦 NON-VEGETATIVE - OPEN WATER

UPLAND ASSESSMENT AREA

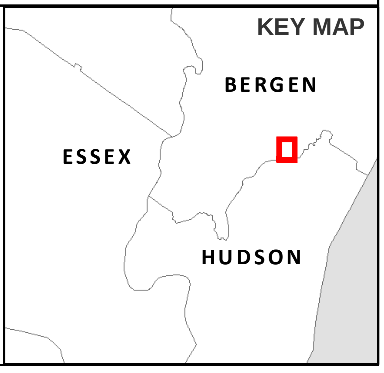
🟩 MIXED HARDWOOD FOREST - BROAD-LEAVED DECIDUOUS

🟩 GRASSLAND - SHORT PERSISTENT

🟥 NON-VEGETATIVE - COBBLE-GRAVEL

⬛ NON-VEGETATIVE - PAVED

0 200 400 Feet



# Attachment F

# Uniqueness/Heritage Site Information

# Listed Historic Districts and Properties Within Site Boundaries

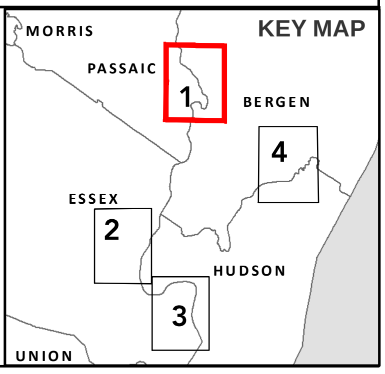
## Historic Districts and Properties

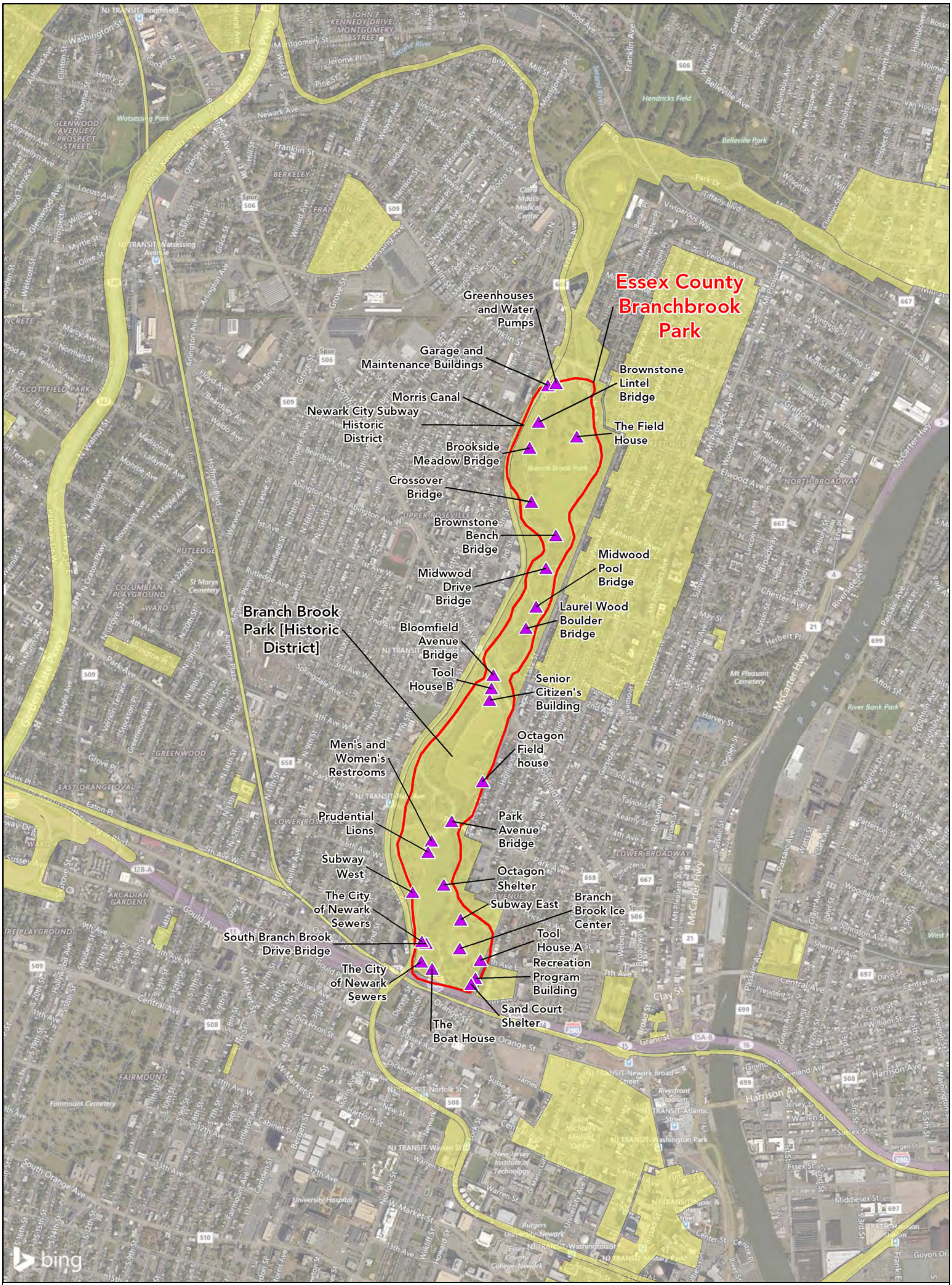
Source: ESRI BING Imagery, obtained 2017;
NJDEP, NHR, & HPO, 2015

**Sheet 1 of 4**

☐ SITE BOUNDARY
🟨 HISTORIC DISTRICT
▲ HISTORIC PROPERTY

0 0.25 0.5
Miles





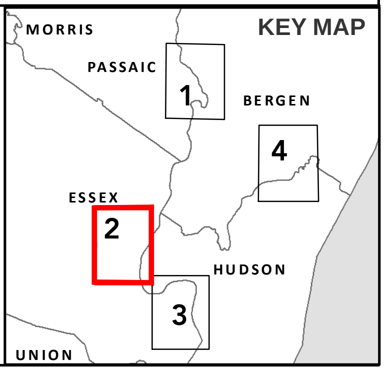
Historic Districts and Properties

Source: ESRI BING Imagery, obtained 2017;
NJDEP, NHR, & HPO, 2015

**Sheet 2 of 4**

| | |
|---|---|
| ▭ | SITE BOUNDARY |
| 🟨 | HISTORIC DISTRICT |
| ▲ | HISTORIC PROPERTY |

0 0.25 0.5
Miles



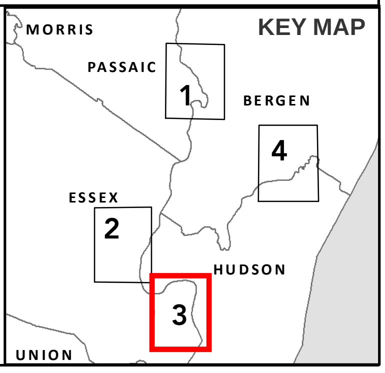
Historic Districts and Properties

Source: ESRI BING Imagery, obtained 2017;
NJDEP, NHR, & HPO, 2015

**Sheet 3 of 4**

| | |
|---|---|
| 🟥 | SITE BOUNDARY |
| 🟨 | HISTORIC DISTRICT |
| ▲ | HISTORIC PROPERTY |

0 0.25 0.5
Miles



## Historic Districts and Properties

Source: ESRI BING Imagery, obtained 2017; NJDEP, NHR, & HPO, 2015

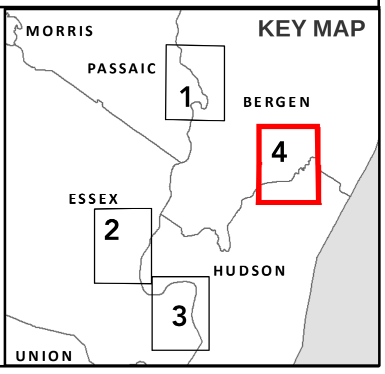
**Sheet 4 of 4**

🟥 SITE BOUNDARY

🟨 HISTORIC DISTRICT

▲ HISTORIC PROPERTY

0 0.25 0.5 Miles



| Site Label | Archeological Sites | Historic District | Historic Property |
|---|---|---|---|
| Dundee Canal Green Acres and Island Preserve | 4 | Dundee Canal Industrial Historic District | Dundee Canal |
| | | | Dundee Textile Complex |
| Dundee Island Park | 0 | N/A | N/A |
| Essex County Branch Brook Park | 0 | Branch Brook Park [Historic District] | Prudential Lions |
| | | | Branch Brook Ice Center |
| | | | The Boat House |
| | | | Senior Citizen's Building |
| | | | Greenhouses and Water Pumps |
| | | | Garage and Maintenance Buildings |
| | | | Sand Court Shelter |
| | | | Octagon Shelter |
| | | | Recreation Program Building |
| | | | Tool House A |
| | | | Tool House B |
| | | | Octagon Field house |
| | | | Men's and Women's Restrooms |
| | | | Men's and Women's Restrooms |
| | | | The Field House |
| | | | South Branch Brook Drive Bridge |
| | | | Subway East |
| | | | Subway West |
| | | | Park Avenue Bridge |
| | | | Bloomfield Avenue Bridge |
| | | | Laurel Wood Boulder Bridge |
| | | | Crossover Bridge |
| | | | Midwood Pool Bridge |
| | | | Midwwod Drive Bridge |
| | | | Brownstone Bench Bridge |
| | | | Crossover Bridge |
| | | | Brookside Meadow Bridge |
| | | | Brownstone Lintel Bridge |
| | | Branch Brook Park [Historic District], INVESTIGATE | South Branch Brook Drive Bridge |
| | | | The City of Newark Sewers |
| Harrison Marsh | 0 | | Remco Industries Office and Warehouse |
| Kearny Point | 0 | N/A | N/A |
| Oak Island Yards | 0 | N/A* | N/A* |
| Meadowlark Marsh | 0 | N/A* | N/A* |
| Metro Media Tract | 0 | N/A* | N/A* |
| Marsh Resources II | 0 | N/A | N/A |

*Cultural Resources Overview for Hudson-Raritan Estuary Comprehensive Restoration Plan: Volume II 2014; indicates resources, New Jersey Department of Environmental Protection (NJDEP), Natural and Historic Resources (NHR), Historic Preservation Office (HPO); 2015 indicate that ther are no resources at these sites.

# New Jersey Natural Heritage Program
# Threatened and Endangered Species Data

# Site 902 - Dundee Canal Green Acres and Island Preserve

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

CHRIS CHRISTIE
*Governor*

KIM GUADAGNO
*Lt. Governor*

BOB MARTIN
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Dundee Canal Green Acres and Island Preserve

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Clifton City, Passaic County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as ‘Yes’ in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as ‘Yes’ in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State’s best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE ‘CAUTIONS AND RESTRICTIONS ON NHP DATA’, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007481-7665

## *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | No | 0 pages included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

## *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | No | 0 pages included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Site 865 - Kearny Point

State of New Jersey

CHRIS CHRISTIE
*Governor*

KIM GUADAGNO
*Lt. Governor*

DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

BOB MARTIN
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Kearny Point

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Kearny Town, Hudson County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007461-7671

## *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Black-crowned Night-heron | Nycticorax nycticorax | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |

### *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Black-crowned Night-heron | Nycticorax nycticorax | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |

# Site 866 - Oak Island Yards

State of New Jersey

CHRIS CHRISTIE
*Governor*

KIM GUADAGNO
*Lt. Governor*

DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

BOB MARTIN
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Oak Island Yards

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Newark City, Essex County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as ‘Yes’ in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as ‘Yes’ in Table 2. These reports may include species that have also been documented on the project site.

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A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE ‘CAUTIONS AND RESTRICTIONS ON NHP DATA’, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007461-7672

## *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Black-crowned Night-heron | Nycticorax nycticorax | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Tricolored Heron | Egretta tricolor | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |

## *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| Report Name | Included | Number of Pages |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Black-crowned Night-heron | Nycticorax nycticorax | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Cattle Egret | Bubulcus ibis | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Tricolored Heron | Egretta tricolor | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |

# Lower Passaic River Reference Site – Harrison Marsh

State of New Jersey

CHRIS CHRISTIE
*Governor*

KIM GUADAGNO
*Lt. Governor*

DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

BOB MARTIN
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Harrison Marsh

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Harrison Town, Hudson County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007462-7670

## *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |

## *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |

# Site 719 - Meadowlark Marsh

State of New Jersey

CHRIS CHRISTIE
*Governor*

KIM GUADAGNO
*Lt. Governor*

DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

BOB MARTIN
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Meadowlark Marsh

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Ridgefield Borough, Bergen County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE ‘CAUTIONS AND RESTRICTIONS ON NHP DATA’, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007471-7675

## *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Bald Eagle | Haliaeetus leucocephalus | Foraging | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Cattle Egret | Bubulcus ibis | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Yellow-crowned Night-heron | Nyctanassa violacea | Foraging | 3 | NA | State Threatened | G5 | S2B,S2N |

## *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Bald Eagle | Haliaeetus leucocephalus | Foraging | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Bald Eagle | Haliaeetus leucocephalus | Nest | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Cattle Egret | Bubulcus ibis | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Northern Harrier | Circus cyaneus | Breeding Sighting | 4 | NA | State Endangered | G5 | S1B,S3N |
| | Northern Harrier | Circus cyaneus | Non-breeding Sighting | 2 | NA | Special Concern | G5 | S1B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Yellow-crowned Night-heron | Nyctanassa violacea | Foraging | 3 | NA | State Threatened | G5 | S2B,S2N |

# Site 721 - Metro Media Tract

State of New Jersey

Chris Christie
*Governor*

Kim Guadagno
*Lt. Governor*

Department of Environmental Protection
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

Bob Martin
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Metro Media Tract

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Carlstadt Borough, Bergen County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as ‘Yes’ in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as ‘Yes’ in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State’s best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in Explanation of Codes Used in Natural Heritage Reports, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE ‘CAUTIONS AND RESTRICTIONS ON NHP DATA’, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007471-7674

### *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Bald Eagle | Haliaeetus leucocephalus | Foraging | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Northern Harrier | Circus cyaneus | Breeding Sighting | 4 | NA | State Endangered | G5 | S1B,S3N |
| | Northern Harrier | Circus cyaneus | Non-breeding Sighting | 2 | NA | Special Concern | G5 | S1B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Yellow-crowned Night-heron | Nyctanassa violacea | Foraging | 3 | NA | State Threatened | G5 | S2B,S2N |

## *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Bald Eagle | Haliaeetus leucocephalus | Foraging | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Cattle Egret | Bubulcus ibis | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Northern Harrier | Circus cyaneus | Breeding Sighting | 4 | NA | State Endangered | G5 | S1B,S3N |
| | Northern Harrier | Circus cyaneus | Non-breeding Sighting | 2 | NA | Special Concern | G5 | S1B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Yellow-crowned Night-heron | Nyctanassa violacea | Foraging | 3 | NA | State Threatened | G5 | S2B,S2N |

# Hackensick River Reference Site – Marsh Resources Phase 2

State of New Jersey

Chris Christie
*Governor*

Kim Guadagno
*Lt. Governor*

Department of Environmental Protection
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

Bob Martin
*Commissioner*

May 21, 2015

Tara Stewart
Louis Berger
412 Mount Kemble Avenue
Morristown, NJ 07962-1946

Re: HRE Ecosystem Restoration Feasibility - Marsh Resources, Inc. Phase 2

Dear Ms. Stewart:

Thank you for your data request regarding rare species information for the above referenced project site in Carlstadt Borough, Bergen County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as ‘Yes’ in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as ‘Yes’ in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State’s best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in Explanation of Codes Used in Natural Heritage Reports, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE ‘CAUTIONS AND RESTRICTIONS ON NHP DATA’, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007471-7673

## *Table 1: On Site Data Request Search Results (7 Possible Reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 3. Natural Heritage Priority Sites On Site | No | 0 pages included |
| 4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | No | 0 pages included |

# Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Bald Eagle | Haliaeetus leucocephalus | Foraging | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Northern Harrier | Circus cyaneus | Breeding Sighting | 4 | NA | State Endangered | G5 | S1B,S3N |
| | Northern Harrier | Circus cyaneus | Non-breeding Sighting | 2 | NA | Special Concern | G5 | S1B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Yellow-crowned Night-heron | Nyctanassa violacea | Foraging | 3 | NA | State Threatened | G5 | S2B,S2N |

## *Table 2: Vicinity Data Request Search Results (6 possible reports)*

| **Report Name** | **Included** | **Number of Pages** |
|---|---|---|
| 1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database | No | 0 pages included |
| 2. Natural Heritage Priority Sites within the Vicinity | No | 0 pages included |
| 3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches | Yes | 1 page(s) included |
| 4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1 | No | 0 pages included |
| 5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File | No | 0 pages included |
| 6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program | Yes | 1 page(s) included |

# Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

| Class | Common Name | Scientific Name | Feature Type | Rank | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|---|---|---|
| ***Aves*** | | | | | | | | |
| | Bald Eagle | Haliaeetus leucocephalus | Foraging | 4 | NA | State Endangered | G5 | S1B,S2N |
| | Barn Owl | Tyto alba | Non-breeding Sighting | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Cattle Egret | Bubulcus ibis | Foraging | 3 | NA | State Threatened | G5 | S2B,S3N |
| | Glossy Ibis | Plegadis falcinellus | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Little Blue Heron | Egretta caerulea | Foraging | 2 | NA | Special Concern | G5 | S3B,S3N |
| | Northern Harrier | Circus cyaneus | Breeding Sighting | 4 | NA | State Endangered | G5 | S1B,S3N |
| | Northern Harrier | Circus cyaneus | Non-breeding Sighting | 2 | NA | Special Concern | G5 | S1B,S3N |
| | Peregrine Falcon | Falco peregrinus | Urban Nest | 4 | NA | State Endangered | G4 | S1B,S3N |
| | Snowy Egret | Egretta thula | Foraging | 2 | NA | Special Concern | G5 | S3B,S4N |
| | Yellow-crowned Night-heron | Nyctanassa violacea | Foraging | 3 | NA | State Threatened | G5 | S2B,S2N |

# Other Animal Species
# In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program

| Scientific Name | Common Name | Federal Protection Status | State Protection Status | Grank | Srank |
|---|---|---|---|---|---|
| ***Vertebrate Animals*** | | | | | |
| Malaclemys terrapin terrapin | Northern Diamondback Terrapin | | | G4T4Q | S3 |

Total number of records: 1

# USFWS Official Species Lists

# Site 902 - Dundee Canal Green Acres Purchase and Dundee Island Preserve

**United States Department of the Interior**

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0449 June 18, 2015
Event Code: 05E2NJ00-2015-E-00317
Project Name: Dundee Canal Green Acres Island Preserve

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Dundee Canal Green Acres Island Preserve

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

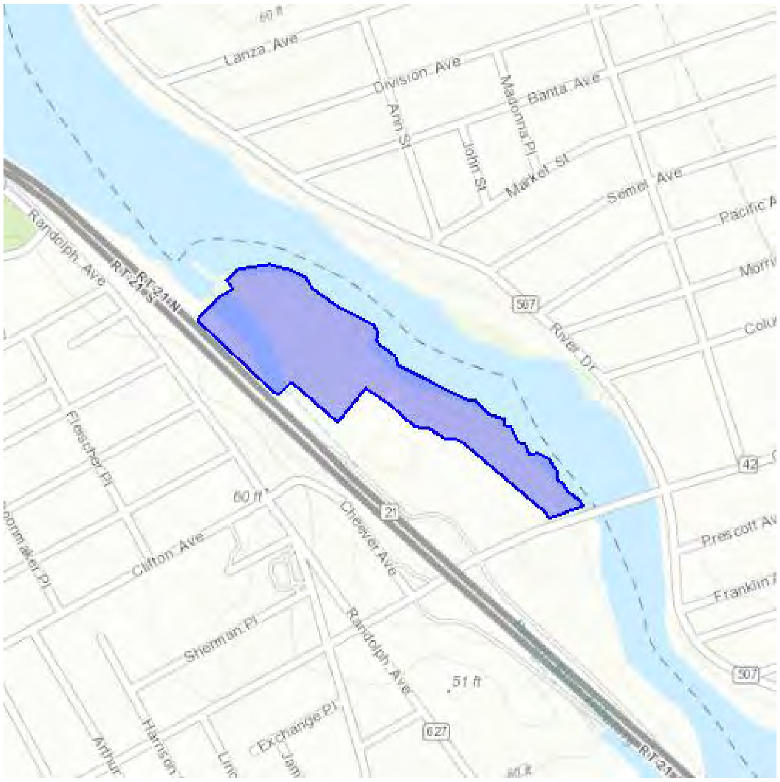
**Consultation Code:** 05E2NJ00-2015-SLI-0449
**Event Code:** 05E2NJ00-2015-E-00317

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Dundee Canal Green Acres Island Preserve
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

## Project Location Map:



**Project Coordinates:** The coordinates are too numerous to display here.

**Project Counties:** Passaic, NJ

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Site 900 – Dundee Island Park/Pulaski Park

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 08232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2016-SLI-0428 March 30, 2016
Event Code: 05E2NJ00-2016-E-00321
Project Name: Dundee Island Park/Pulaski Park

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Dundee Island Park/Pulaski Park

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 08232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

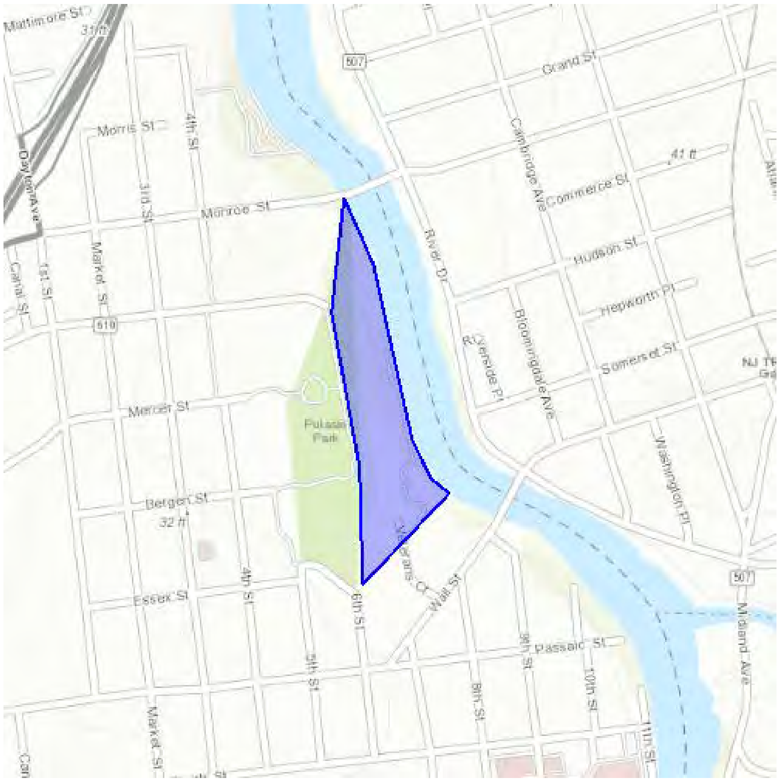
**Consultation Code:** 05E2NJ00-2016-SLI-0428
**Event Code:** 05E2NJ00-2016-E-00321

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Dundee Island Park/Pulaski Park
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

## Project Location Map:



**Project Coordinates:** MULTIPOLYGON (((-74.11291122436523 40.86867762652326, -74.11312580108643 40.86716854167582, -74.11263227462769 40.86514014765027, -74.11258935928345 40.86359852663907, -74.11108732223511 40.864783143872174, -74.1114091873169 40.86499410088275, -74.11173105239868 40.865513376815116, -74.11239624023438 40.867801387895646, -74.11291122436523 40.86867762652326)))

**Project Counties:** Passaic, NJ

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Site 887 – Essex County Branch Brook Park

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 08232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2016-SLI-0426 March 30, 2016
Event Code: 05E2NJ00-2016-E-00319
Project Name: Essex County Branch Brook Park

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*)

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 08232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

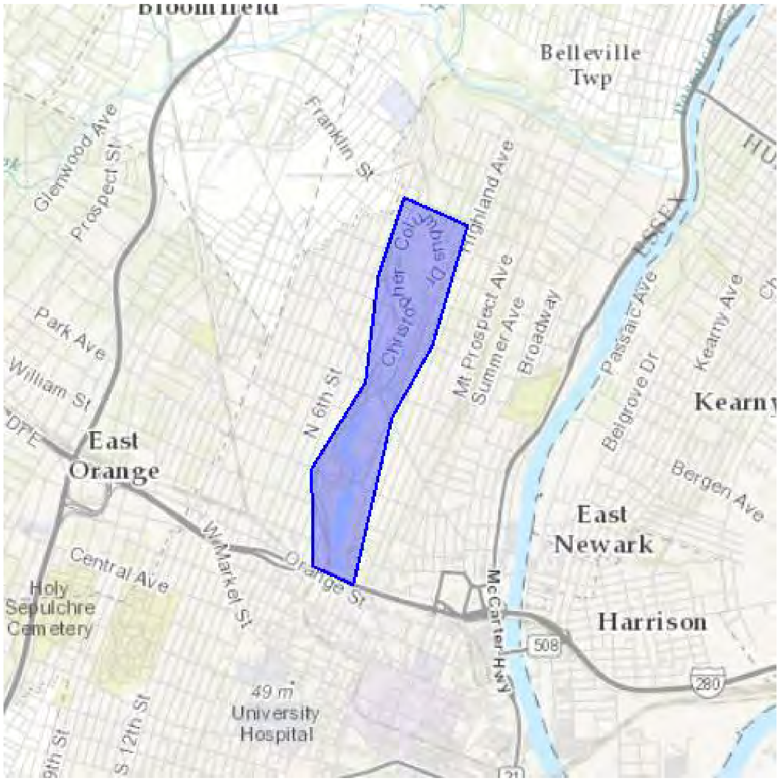
**Consultation Code:** 05E2NJ00-2016-SLI-0426
**Event Code:** 05E2NJ00-2016-E-00319

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Essex County Branch Brook Park
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

**Project Location Map:**



**Project Coordinates:** MULTIPOLYGON (((-74.17651176452637 40.778721618334295, -74.17900085449219 40.772871880045216, -74.18028831481932 40.76507142776426, -74.1855239868164 40.75863536531348, -74.18543815612793 40.75148345390278, -74.18140411376953 40.75011800153818, -74.17762756347656 40.76247107352298, -74.17376518249512 40.76767168026598, -74.17024612426758 40.77664177039938, -74.17651176452637 40.778721618334295)))

**Project Counties:** Essex, NJ

United States Department of Interior
Fish and Wildlife Service

Project name: Essex County Branch Brook Park

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Site 865 - Kearny Point

**United States Department of the Interior**

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0451 June 18, 2015
Event Code: 05E2NJ00-2015-E-00319
Project Name: Kearny Point

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Kearny Point

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

**Consultation Code:** 05E2NJ00-2015-SLI-0451
**Event Code:** 05E2NJ00-2015-E-00319

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Kearny Point
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

**Project Location Map:**

**Project Coordinates:** The coordinates are too numerous to display here.

**Project Counties:** Hudson, NJ

United States Department of Interior
Fish and Wildlife Service

Project name: Kearny Point

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list.  Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.  Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area.  See the **Critical habitats within your project area** section further below for critical habitat that lies within your project.  Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Site 866 - Oak Island Yards

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0455
Event Code: 05E2NJ00-2015-E-00323
Project Name: Oak Island Yards

June 18, 2015

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Oak Island Yards

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

**Consultation Code:** 05E2NJ00-2015-SLI-0455
**Event Code:** 05E2NJ00-2015-E-00323

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Oak Island Yards
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

**Project Location Map:**

**Project Coordinates:** The coordinates are too numerous to display here.

**Project Counties:** Essex, NJ

United States Department of Interior
Fish and Wildlife Service

Project name: Oak Island Yards

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Lower Passaic River Reference Site – Harrison Marsh

**United States Department of the Interior**

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0450 June 18, 2015
Event Code: 05E2NJ00-2015-E-00318
Project Name: Harrison Marsh

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

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- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

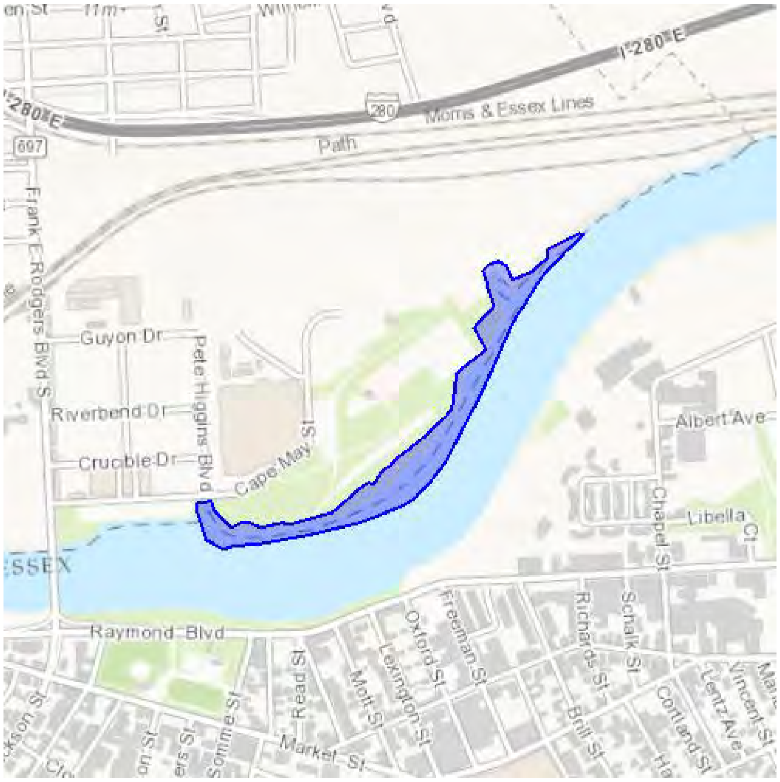
**Consultation Code:** 05E2NJ00-2015-SLI-0450
**Event Code:** 05E2NJ00-2015-E-00318

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Harrison Marsh
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

## Project Location Map:



**Project Coordinates:** The coordinates are too numerous to display here.

**Project Counties:** Hudson, NJ

United States Department of Interior
Fish and Wildlife Service

Project name: Harrison Marsh

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Site 719 - Meadowlark Marsh

**United States Department of the Interior**

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0453 June 18, 2015
Event Code: 05E2NJ00-2015-E-00321
Project Name: Meadowlark Marsh

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Meadowlark Marsh

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

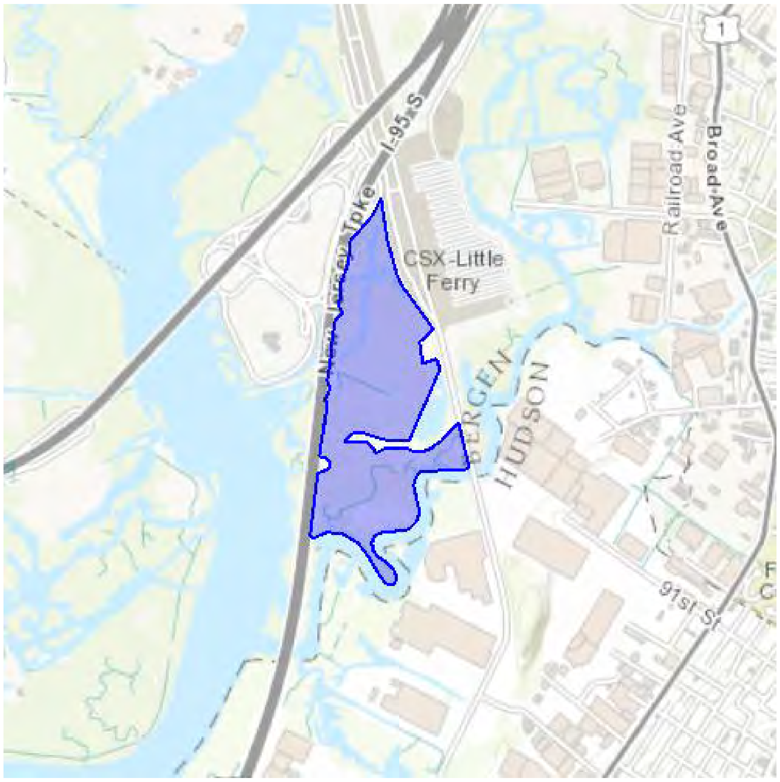
**Consultation Code:** 05E2NJ00-2015-SLI-0453
**Event Code:** 05E2NJ00-2015-E-00321

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Meadowlark Marsh
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

**Project Location Map:**



**Project Coordinates:** The coordinates are too numerous to display here.

**Project Counties:** Bergen, NJ

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Site 721 - Metro Media Tract

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0454
Event Code: 05E2NJ00-2015-E-00322
Project Name: Metro Media Tract

June 18, 2015

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.* )

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Metro Media Tract

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

**Consultation Code:** 05E2NJ00-2015-SLI-0454
**Event Code:** 05E2NJ00-2015-E-00322

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Metro Media Tract
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

**Project Location Map:**

**Project Coordinates:** MULTIPOLYGON (((-74.03289628083866 40.8144290875324, -74.03303979015413 40.8138305959053, -74.03320586076183 40.81346189814815, -74.03331105536085 40.81304748964999, -74.03358937215177 40.81225600531047, -74.03359799844884 40.812120507155726, -74.03367119157218 40.81201906722623, -74.03367622777563 40.811880295539254, -74.03381454170767 40.811378867740586, -74.03403312462893 40.810796787841525, -74.03409748640985 40.81050487959658, -74.03429564572743 40.810162729826175, -74.03491876259079 40.80959240226758, -74.03572521254847 40.809119225771724, -74.03601564680463 40.80898040102471, -74.03673221491977 40.80883213519496, -74.03773031760005 40.80871999153442, -74.03900515606307 40.80875014040669, -74.04129915393275 40.81251201711598, -74.03615275744374 40.81412465532861, -74.03584882706167 40.814894672850926, -74.03289628083866 40.8144290875324)))

**Project Counties:** Bergen, NJ

United States Department of Interior
Fish and Wildlife Service

Project name: Metro Media Tract

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Hackensick River Reference Site –
# Marsh Resources Phase 2

**United States Department of the Interior**

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
PHONE: (609)646-9310 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2015-SLI-0452 June 18, 2015
Event Code: 05E2NJ00-2015-E-00320
Project Name: Marsh Resources 2

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*)

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Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Marsh Resources 2

# Official Species List

**Provided by:**

New Jersey Ecological Services Field Office
927 NORTH MAIN STREET, BUILDING D
PLEASANTVILLE, NJ 8232
(609) 646-9310
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

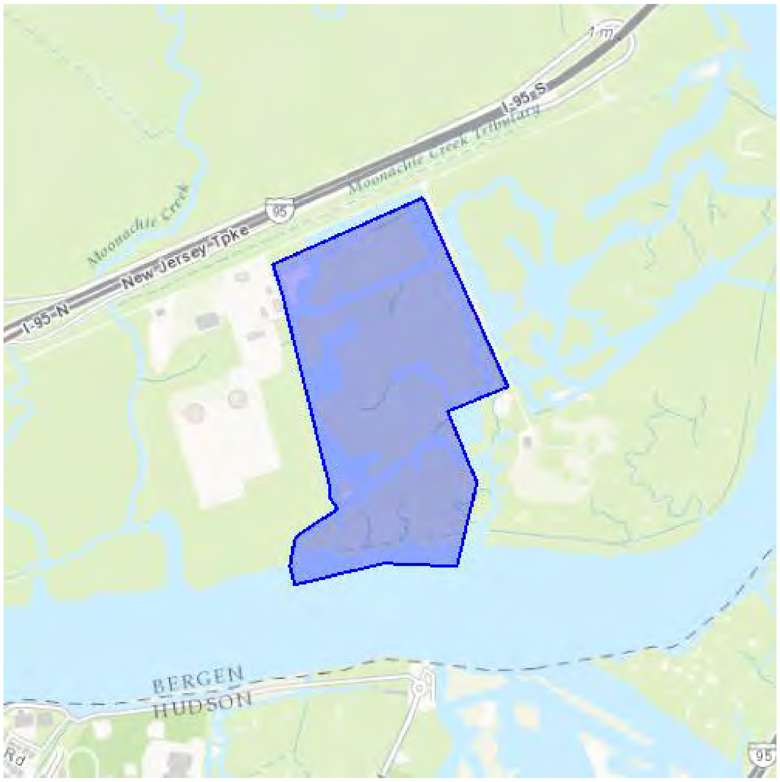
**Consultation Code:** 05E2NJ00-2015-SLI-0452
**Event Code:** 05E2NJ00-2015-E-00320

**Project Type:** LAND - RESTORATION / ENHANCEMENT

**Project Name:** Marsh Resources 2
**Project Description:** Hudson Raritan Estuary (HRE) and HRE-Lower Passaic River Ecosystem Restoration Feasibility Study

**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

## Project Location Map:



**Project Coordinates:** MULTIPOLYGON (((-74.04808853535758 40.815217964737315, -74.04366626758411 40.81671173595788, -74.04120773335018 40.81251973689638, -74.04294871201341 40.81196934011302, -74.04208820021023 40.810398080607, -74.04270497595384 40.80857389127209, -74.04482415910763 40.808631061174594, -74.04744463606107 40.80816581310182, -74.0475635884888 40.808552592628075, -74.0474299150585 40.80914652289374, -74.04734484368953 40.80923581478106, -74.04618297176671 40.80982637888434, -74.04638956492641 40.810060803363456, -74.04641210733286 40.81027427633683, -74.04780596837071 40.814570330556364, -74.04808853535758 40.815217964737315)))

**Project Counties:** Bergen, NJ

United States Department of Interior
Fish and Wildlife Service

Project name: Marsh Resources 2

# Endangered Species Act Species List

There are a total of 0 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

# Critical habitats that lie within your project area

There are no critical habitats within your project area.

# Attachment G
# Photo Logs

# Site 902 - Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

## Site 902 – Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve

Photo 1: Pedestrian path at Dundee Island Preserve, facing upstream.

Photo 2: Shore south of park and dam, looking downstream.

Photo 3: Vagrant camp located south of Dundee Island Preserve.

Photo 4: South end of site by Ackerman Ave, facing downstream.

Photo 5: Black-crowned night heron observed from the Semel Avenue & River Road Parcel and Dundee Canal Green Acres and Island Preserve sites.

# Site 900 - Dundee Island Park/Pulaski Park

## Site 900. Dundee Island Park/ Pulaski Park

Photo 6: View of playground portion of the site.

Photo 7: View of steep banks along Passaic River and dominance of invasive exotic vegetation.

Photo 8: View of bare ground and gravel road located in the center of the site.

Photo 9: View of North end of site; portion comprised of shrubland with dominance of invasive exotic vegetation.

# Site 887- Essex County Branch Brook Park

## Site 887. Essex County Branch Brook Park

Photo 10: South end of Branch Brook Lake; view from Branch Brook Park Drive.

Photo 11: East shore of Branch Brook Lake and adjacent forested habitat.

Photo 12: Southwest edge of Clark's Pond and adjacent trail and upland forested habitat.

Photo 13: View of Branch Brook located in the middle portion of the site. View of adjacent forested wetland and upland habitat.

Photo 14: View of low-flow weir located along Branch Brook; algal bloom evident.

Photo 15: View of northern section of Branch Brook with adjacent forested wetland habitat.

# Site 865 - Kearny Point

## Site 865 - Kearny Point

Photo 16: Western portion of site with spoils staging area, looking south.

Photo 17: Forested area with active bald eagle nest.

Photo 18: Eastern shoreline with *Spartina alterniflora* marsh.

# Site 866 - Oak Island Yards

## Site 866 - Oak Island Yards

Photo 19: Canal and tide gates on south side of site.

Photo 20: *Phragmites* and pond area.

Photo 21: Panne and salt marsh area at northeast corner of site.

Photo 22: Salt marsh along northeastern shore of site.

# Lower Passaic River Reference Site – Harrison Marsh

# Lower Passaic River Reference Site - Harrison Marsh

Photo 23: Invasive-dominated  upland area of the site.

Photo 24: Passaic River shoreline at high tide, facing downstream.

Photo 25: Mudflats exposed at low tide.

# Site 719 - Meadowlark Marsh

## Site 719 - Meadowlark Marsh

Photo 26: Belmans Creek below Railroad Avenue.

Photo 27: Transmission lines over *Phragmites* marsh.

Photo 28: Forested area with off-road vehicle track at center of site.

Photo 29: Native freshwater marsh located north of dirt track.

Photo 30: Deer along gas pipeline looking west towards New Jersey Turnpike.

# Site 721 - Metro Media Tract

## Site 721 – Metromedia Tract

Photo 31: *Phragmites* marsh and blue-green algae covered mudflat outside of Metromedia fenceline.

Photo 32: Osprey nest on radio tower.

Photo 33: *Phragmites* marsh at southeast corner of the site, viewed from Hackensack River.

# Hackensick River Reference Site –
# Marsh Resources Phase 2

## Hackensack River Reference Site – Marsh Resources Inc. Phase 2

Photo 34: Channel from Hackensack River at southeast corner of the site.

Photo 35: Low marsh dominated by *Spartina alterniflora*.

Photo 36: High marsh area adjacent to upland island.

# Attachment H
# Alternative Maps

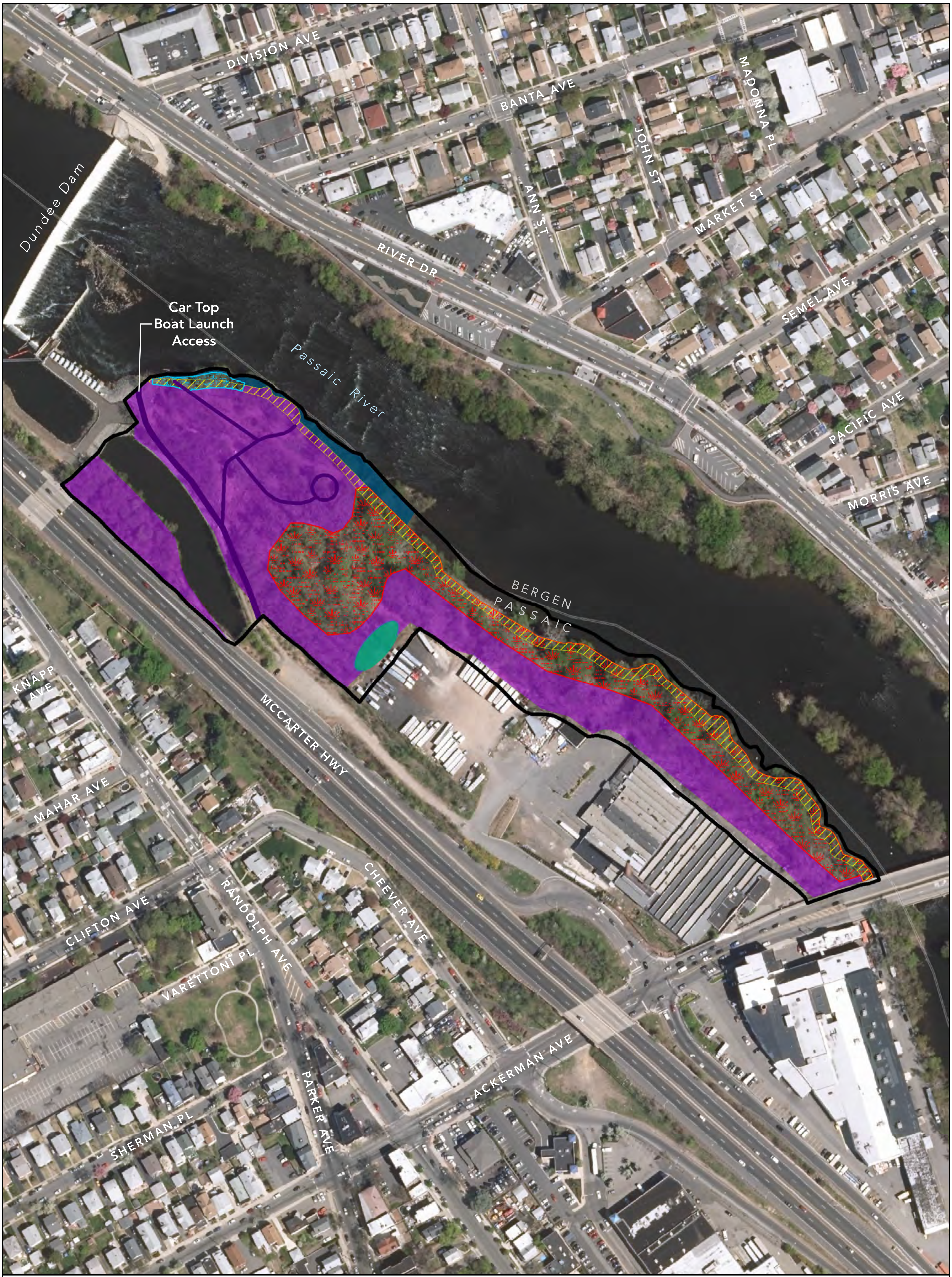


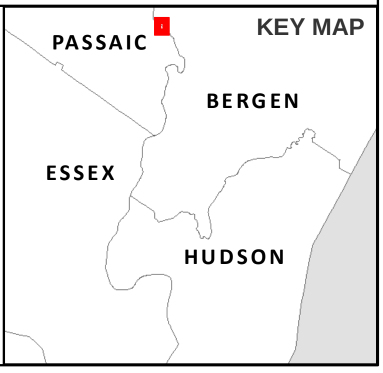
Figure 10: Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve, Alternative A
Clifton, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

| | |
|---|---|
| ▭ SITE BOUNDARY | ▨ DEBRIS REMOVAL |
| — PUBLIC ACCESS | 🟦 HABITAT FOR FISH, CRAB AND LOBSTER |
| ▨ EMERGENT WETLAND | 🟪 INVASIVE SPECIES REMOVAL WITH NATIVE PLANTINGS |
| ▨ FORESTED WETLAND & SCRUB SHRUB WETLAND | 🟩 SEDIMENT BASIN |

0 125 250
Feet



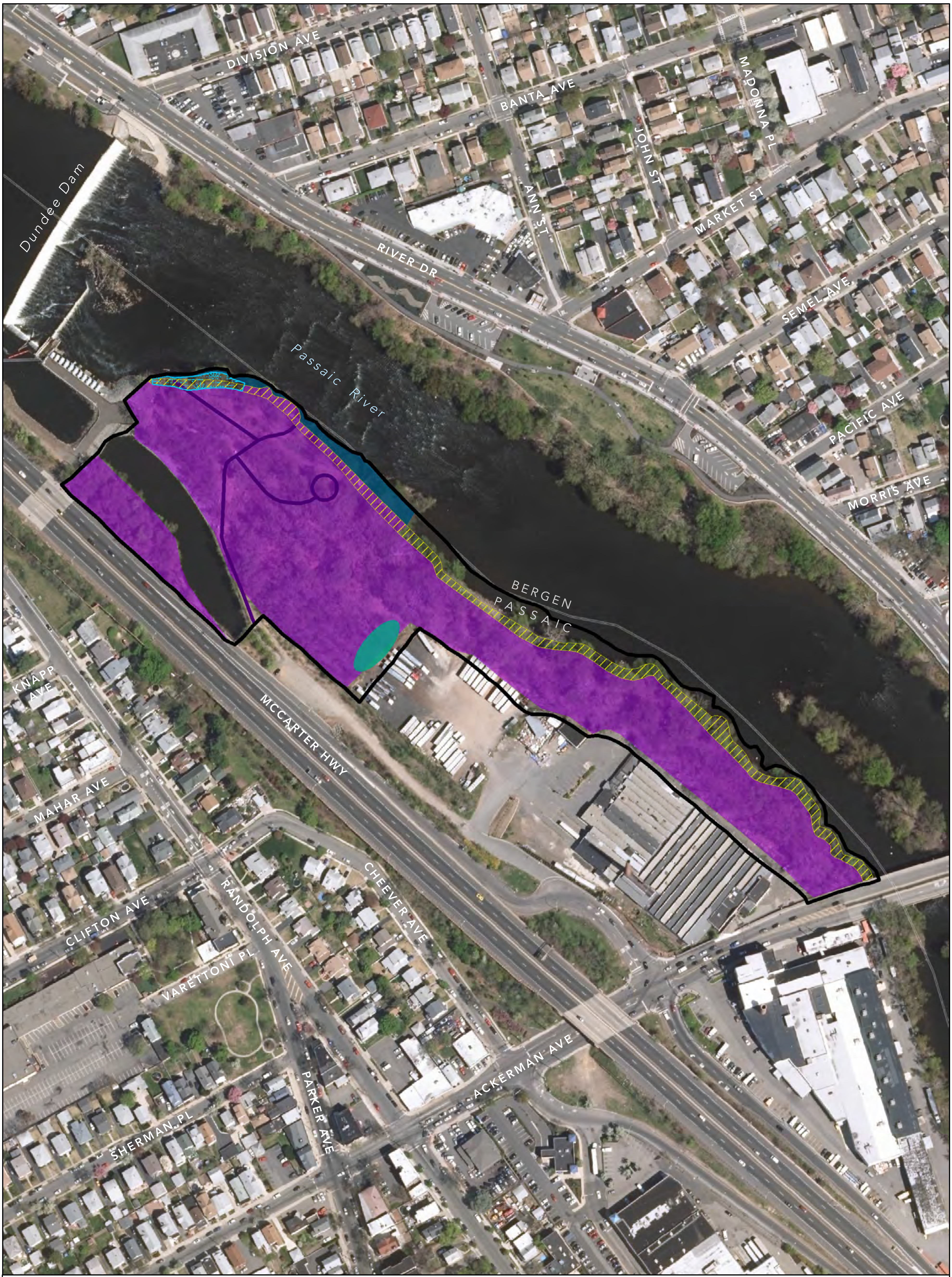


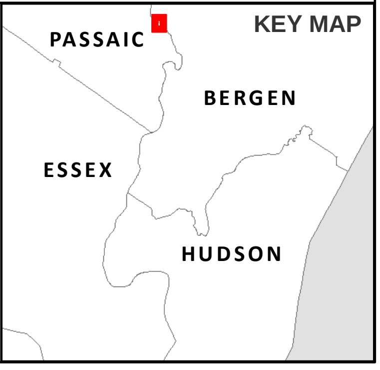
Figure 11: Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve, Alternative B
Clifton, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- — PUBLIC ACCESS
- ▨ EMERGENT WETLAND
- ▨ DEBRIS REMOVAL
- ■ HABITAT FOR FISH, CRAB AND LOBSTER
- ■ INVASIVE SPECIES REMOVAL WITH NATIVE PLANTINGS
- ■ SEDIMENT BASIN

0 125 250
Feet



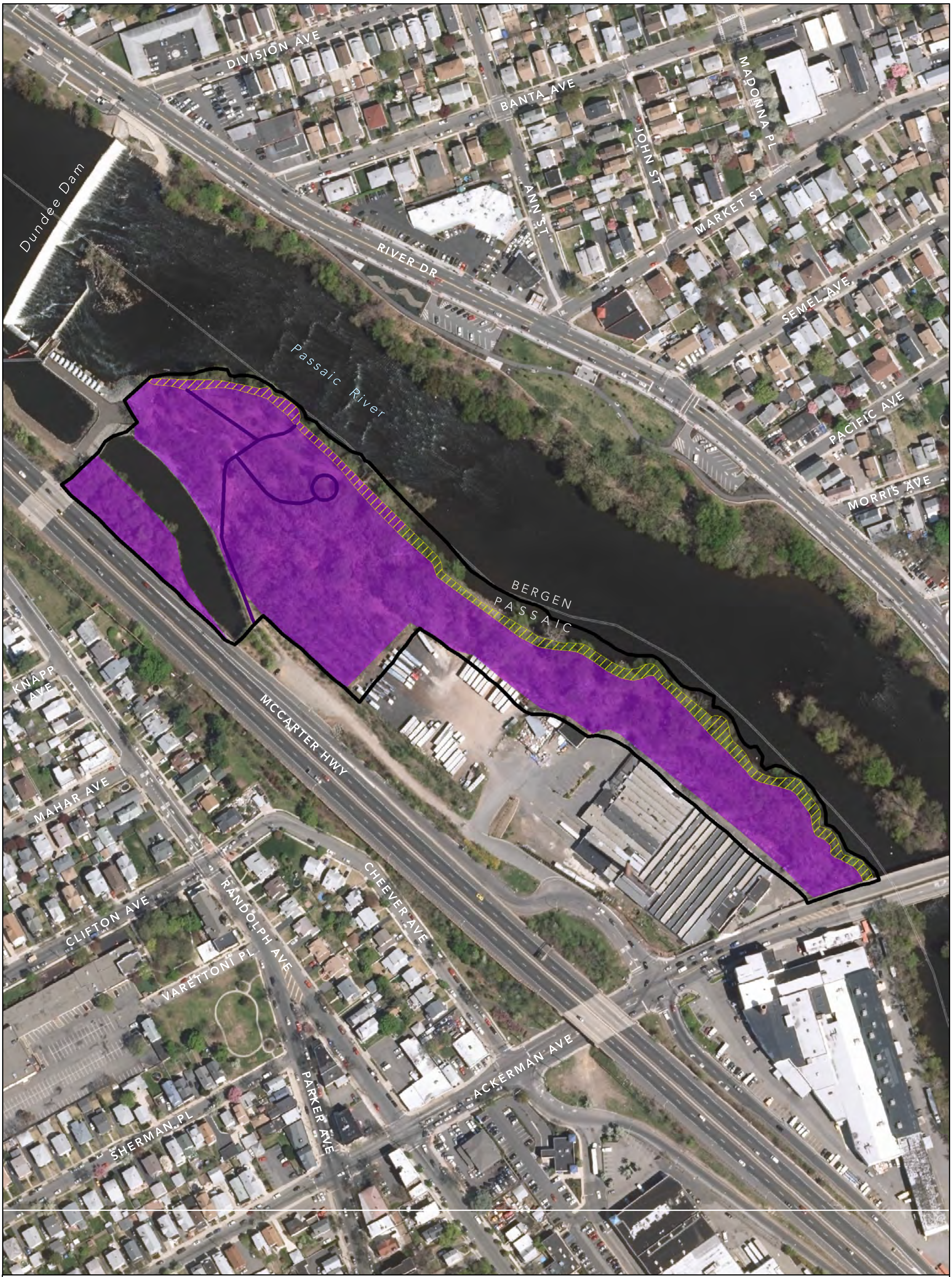


Figure 12: Clifton Dundee Canal Green Acres Purchase and Dundee Island Preserve, Alternative C
Clifton, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

▭ SITE BOUNDARY

— PUBLIC ACCESS

▨ DEBRIS REMOVAL

■ INVASIVE SPECIES REMOVAL WITH NATIVE PLANTINGS

0 125 250 Feet

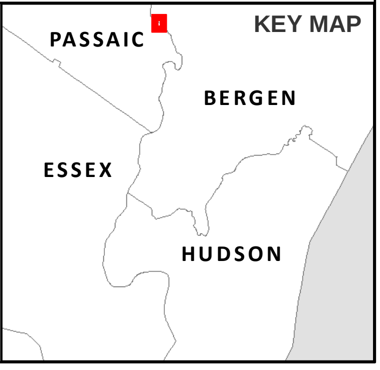


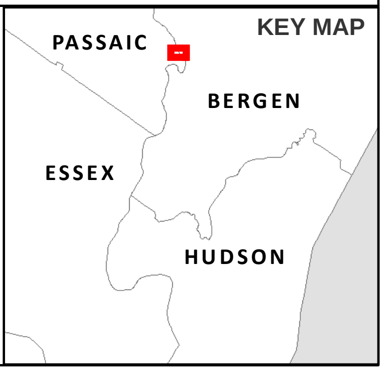
Figure 13: Dundee Island Park/Pulaski Park, Alternative A
Passaic, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

| | |
|---|---|
| ▭ | SITE BOUNDARY |
| 🟥 | BANK STABILIZATION / SHORELINE SOFTENING |
| 🟩 | SELECT NATIVE PLANTINGS |
| — | PUBLIC ACCESS |

0 100 200
Feet



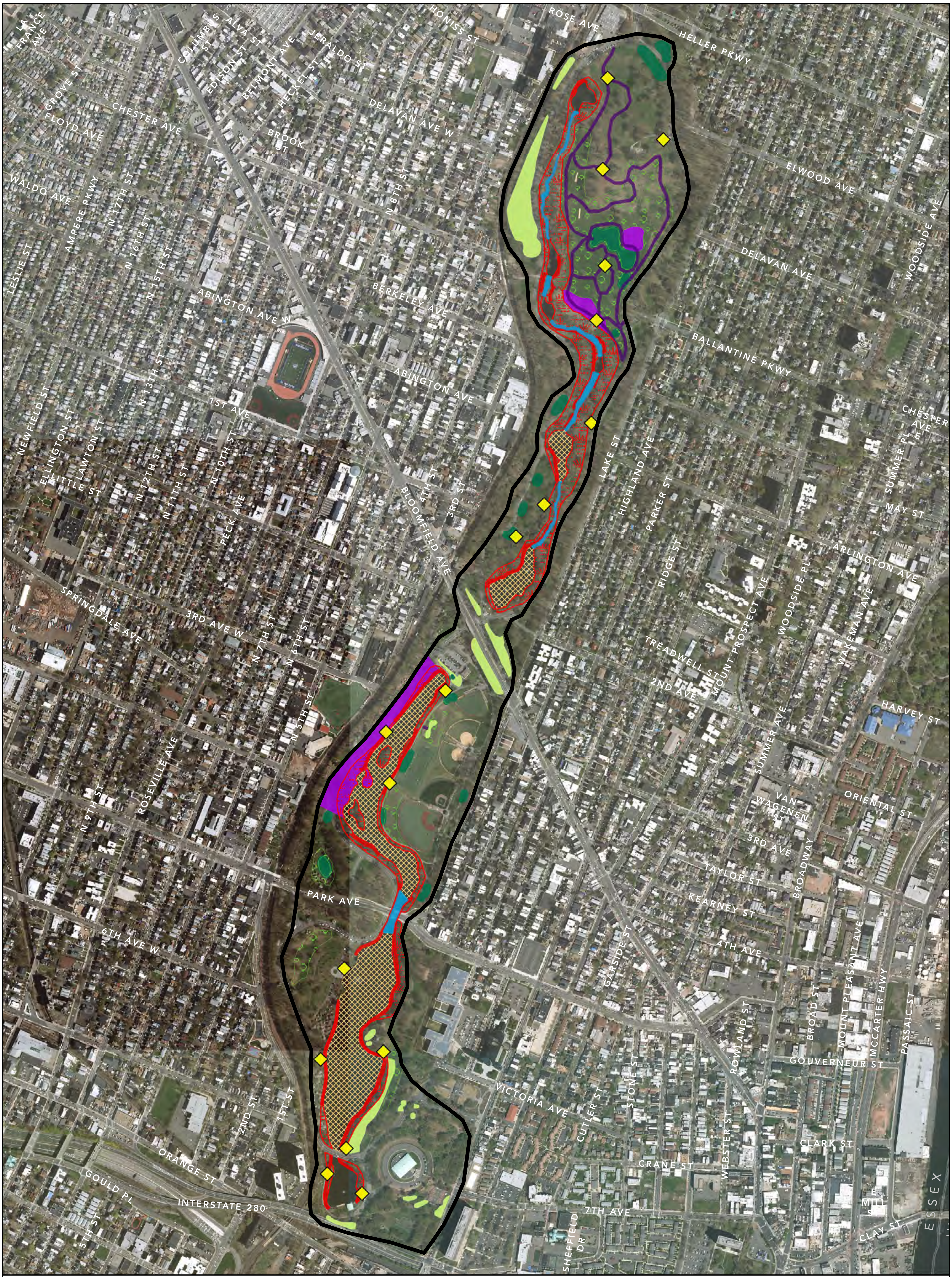


Figure 14: Essex County Branch Brook Park, Alternative A
Newark, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

| | | | |
|---|---|---|---|
| ▭ | SITE BOUNDARY | 🟪 | INVASIVE SPECIES REMOVAL WITH NATIVE PLANTINGS |
| ◆ | INTERPRETIVE SIGN | ▨ | CHANNEL DEEPENING |
| 🟥 | SHORELINE SOFTENING | 🟦 | STREAM NATURALIZATION & CLEARING |
| 🟪 | PUBLIC ACCESS | 🟩 | SEDIMENT BASIN |
| ▨ | FORESTED AND SCRUB SHRUB WETLAND | 🟩 | BANK AND SLOPE STABILIZATION |
| ▨ | SELECT NATIVE PLANTINGS | | |

0 500 1,000
Feet

KEY MAP

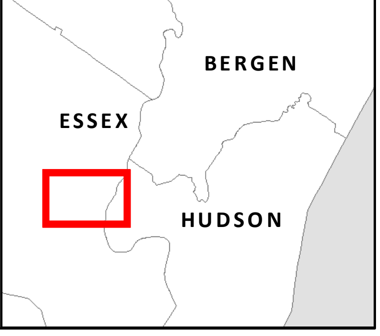
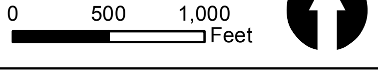


Figure 15: Essex County Branch Brook Park, Alternative B
Newark, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- ◆ INTERPRETIVE SIGNS
- ━ SHORELINE SOFTENING
- ▨ CHANNEL DEEPENING
- 🟪 INVASIVE SPECIES REMOVAL WITH NATIVE PLANTINGS
- ▭ SELECT NATIVE PLANTINGS
- ▭ EMERGENT WETLAND
- 🟩 BANK AND SLOPE STABILIZATION
- 🟩 DRAINAGE BAISIN



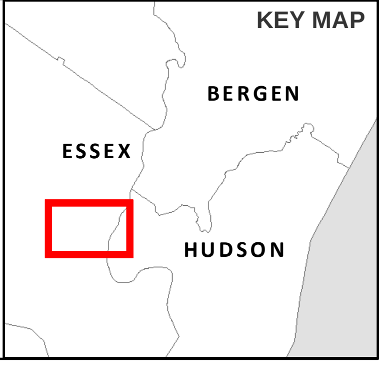


Figure 16: Essex County Branch Brook Park, Alternative C
Newark, New Jersey

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- ◆ INTERPRETIVE SIGNS
- ━ SHORELINE SOFTENING
- ▨ CHANNEL DEEPENING
- 🟪 INVASIVE SPECIES REMOVAL WITH NATIVE PLANTINGS
- ▭ SELECT NATIVE PLANTINGS

0 500 1,000
Feet

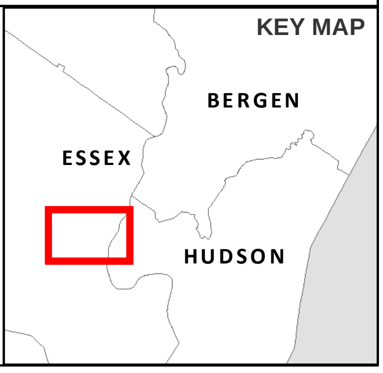


Figure 17: Kearny Point, Alternative A
Kearny, New Jersey (Deferred Site)

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- — PUBLIC ACCESS
- — BANK STABILIZATION
- ▨ FORESTED WETLAND & SCRUB SHRUB WETLAND
- 🟩 COASTAL AND MARITIME FOREST
- ▨ EMERGENT WETLAND (HIGH MARSH)
- ▨ EMERGENT WETLAND (LOW MARSH)
- ▨ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

0 200 400
Feet

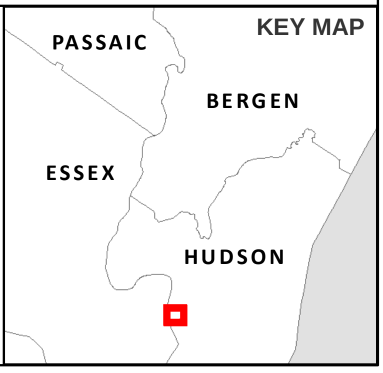


Figure 18: Kearny Point, Alternative B
Kearny, New Jersey (Deferred Site)

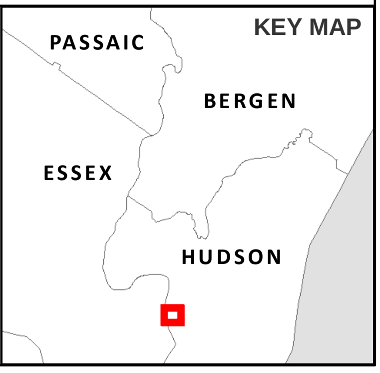
Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- — PUBLIC ACCESS
- — BANK STABILIZATION
- ▨ FORESTED WETLAND & SCRUB SHRUB WETLAND
- ▨ COASTAL AND MARITIME FOREST
- ▨ EMERGENT WETLAND (HIGH MARSH)
- ▨ EMERGENT WETLAND (LOW MARSH)
- ▨ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

0 200 400
Feet



Source: NJGIN NJ 2015 Orthoimagery

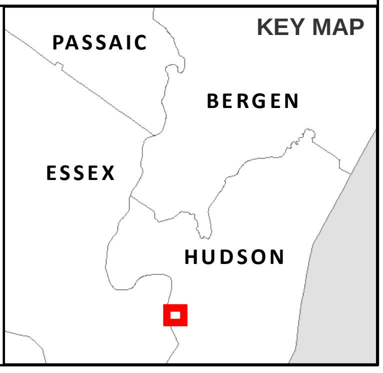
Figure 19: Kearny Point, Alternative C
Kearny, New Jersey (Deferred Site)

**PROPOSED MEASURES LEGEND**

| | |
|---|---|
| ▭ SITE BOUNDARY | ▨ EMERGENT WETLAND (HIGH MARSH) |
| ━ PUBLIC ACCESS | ▨ EMERGENT WETLAND (LOW MARSH) |
| ━ BANK STABILIZATION | ▨ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER |
| ▨ FORESTED WETLAND & SCRUB SHRUB WETLAND | ■ HABITAT FOR FISH, CRAB AND LOBSTER |
| ▩ COASTAL AND MARITIME FOREST | |

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

0 200 400 Feet



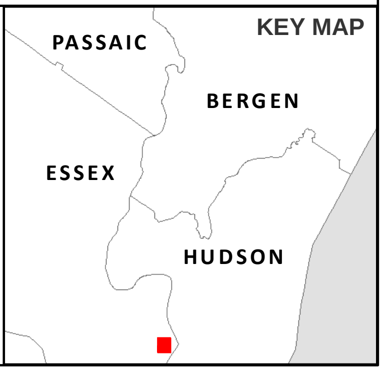
Source: NJGIN NJ 2015 Orthoimagery

Figure 20: Oak Island Yards, Alternative A
Newark, New Jersey (Deferred Site)

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- 🟥 SHORELINE STABILIZATION
- ━ PUBLIC ACCESS
- ▨ EMERGENT WETLAND (HIGH MARSH)
- ▨ EMERGENT WETLAND (LOW MARSH)
- ▨ FORESTED AND SCRUB/SHRUB WETLAND
- ▨ COASTAL AND MARITIME FOREST
- ▤ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.



Source: NJGIN NJ 2015 Orthoimagery

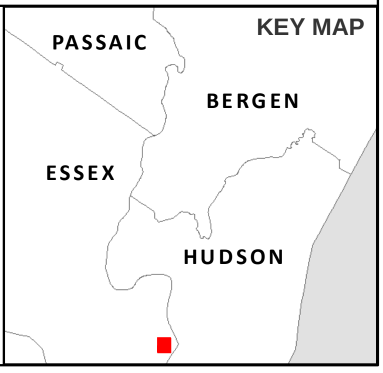
Figure 21: Oak Island Yards, Alternative B
Newark, New Jersey (Deferred Site)

**PROPOSED MEASURES LEGEND**

- ☐ SITE BOUNDARY
- 🟥 SHORELINE STABILIZATION
- — PUBLIC ACCESS
- ▨ EMERGENT WETLAND (HIGH MARSH)
- ▨ EMERGENT WETLAND (LOW MARSH)
- ▨ FORESTED AND SCRUB/SHRUB WETLAND
- ▨ COASTAL AND MARITIME FOREST
- ▤ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

0 100 200 Feet



Source: NJGIN NJ 2015 Orthoimagery

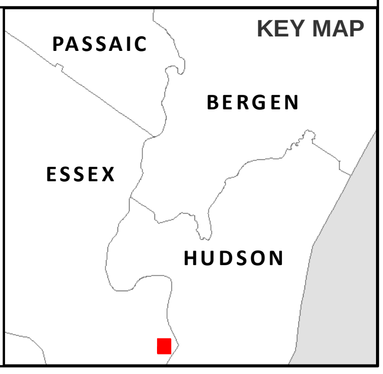
Figure 22: Oak Island Yards, Alternative C
Newark, New Jersey (Deferred Site)

**PROPOSED MEASURES LEGEND**

| | | | |
|---|---|---|---|
| ▭ | SITE BOUNDARY | ▨ | FORESTED AND SCRUB/SHRUB WETLAND |
| 🟥 | SHORELINE STABILIZATION | ▩ | COASTAL AND MARITIME FOREST |
| ─ | PUBLIC ACCESS | ▤ | EXISTING HABITAT FOR FISH, CRAB AND LOBSTER |
| ▨ | EMERGENT WETLAND (HIGH MARSH) | ■ | HABITAT FOR FISH, CRAB AND LOBSTER |
| ▨ | EMERGENT WETLAND (LOW MARSH) | | |

Note: This site is a "Deferred Site" and would be restored following remediation as outlined in US EPA's Record of Decision (11 March 2016) of dredging and capping of the lower Passaic River.

0 100 200
Feet



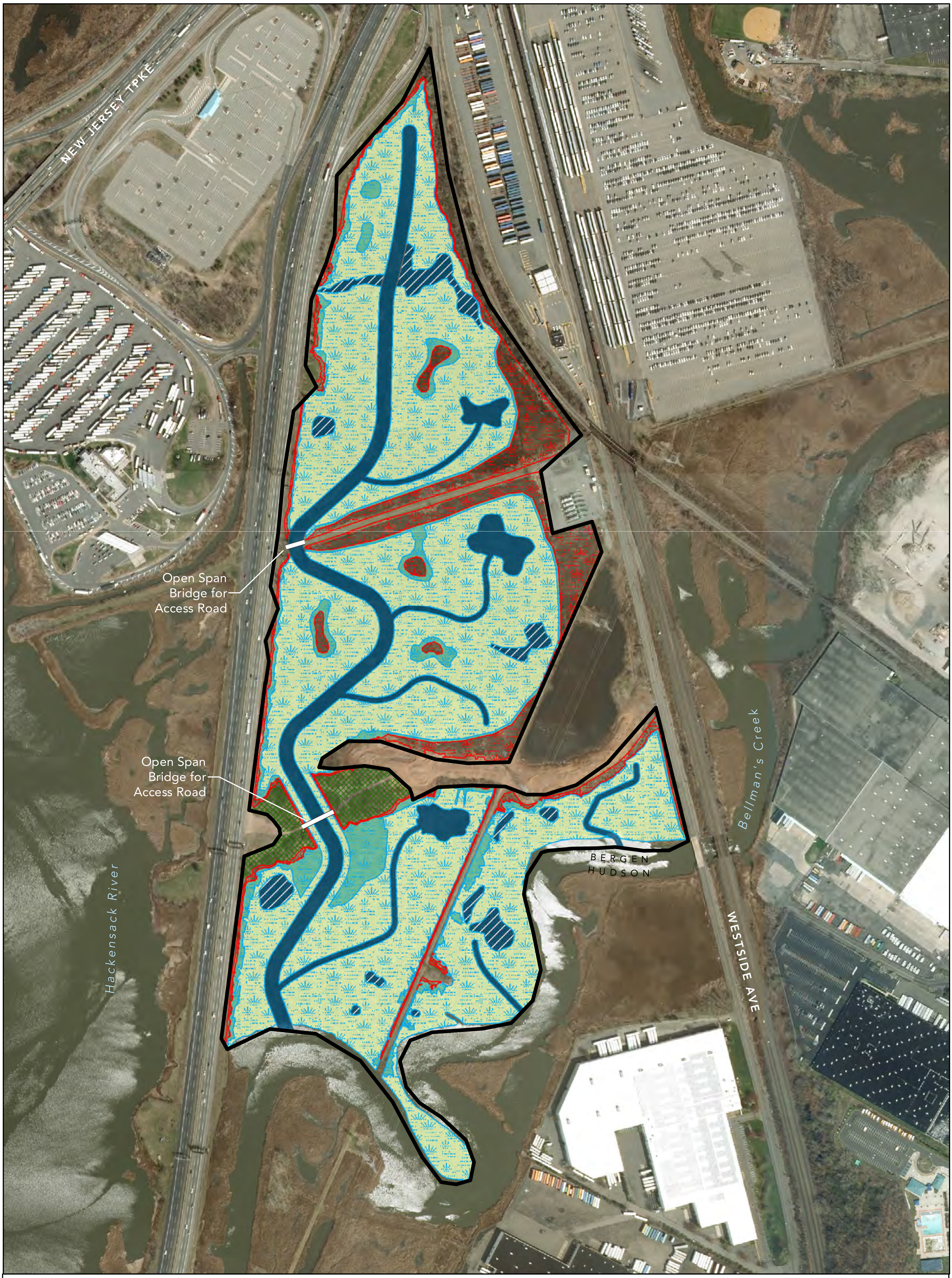


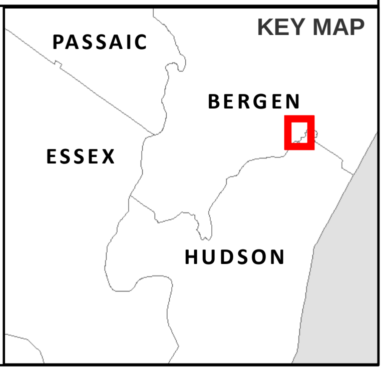
Figure 23: Meadowlark Marsh, Alternative A
New Jersey Meadowlands

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- ▨ FORESTED AND SCRUB/SHRUB WETLAND
- ▨ EMERGENT WETLAND (HIGH MARSH)
- ▨ EMERGENT WETLAND (LOW MARSH)
- ▩ COASTAL AND MARITIME FOREST
- ▨ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER

0 250 500
Feet



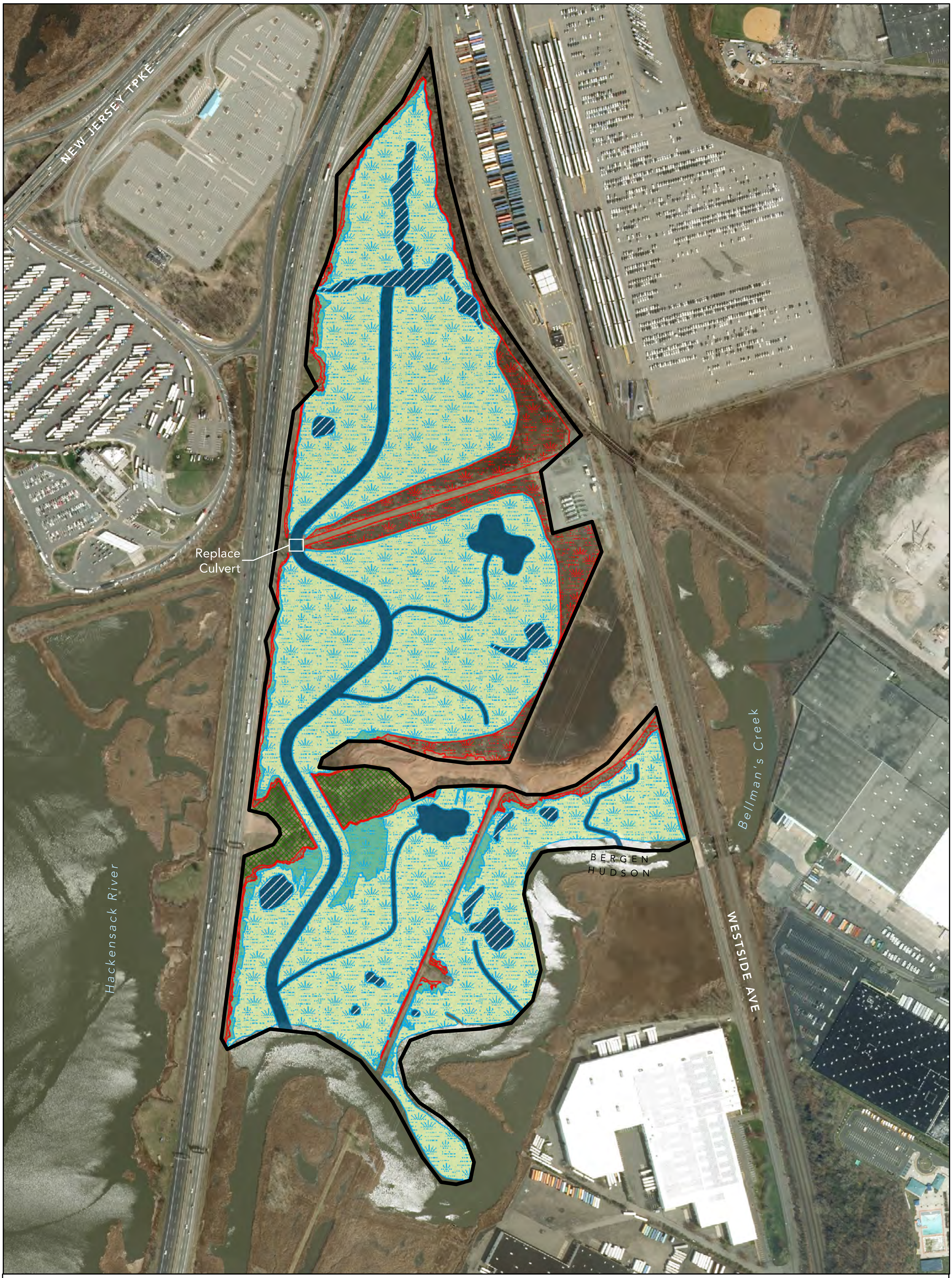


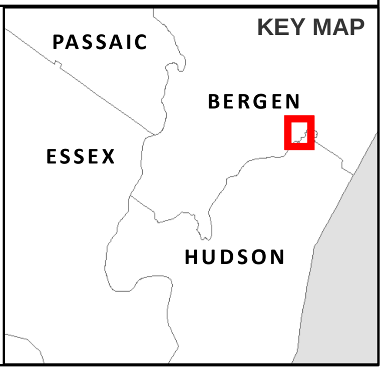
Figure 24: Meadowlark Marsh, Alternative B
New Jersey Meadowlands

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- ▨ FORESTED AND SCRUB/SHRUB WETLAND
- ▨ EMERGENT WETLAND (HIGH MARSH)
- ▨ EMERGENT WETLAND (LOW MARSH)
- ▩ COASTAL AND MARITIME FOREST
- ▨ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER

0 250 500
Feet



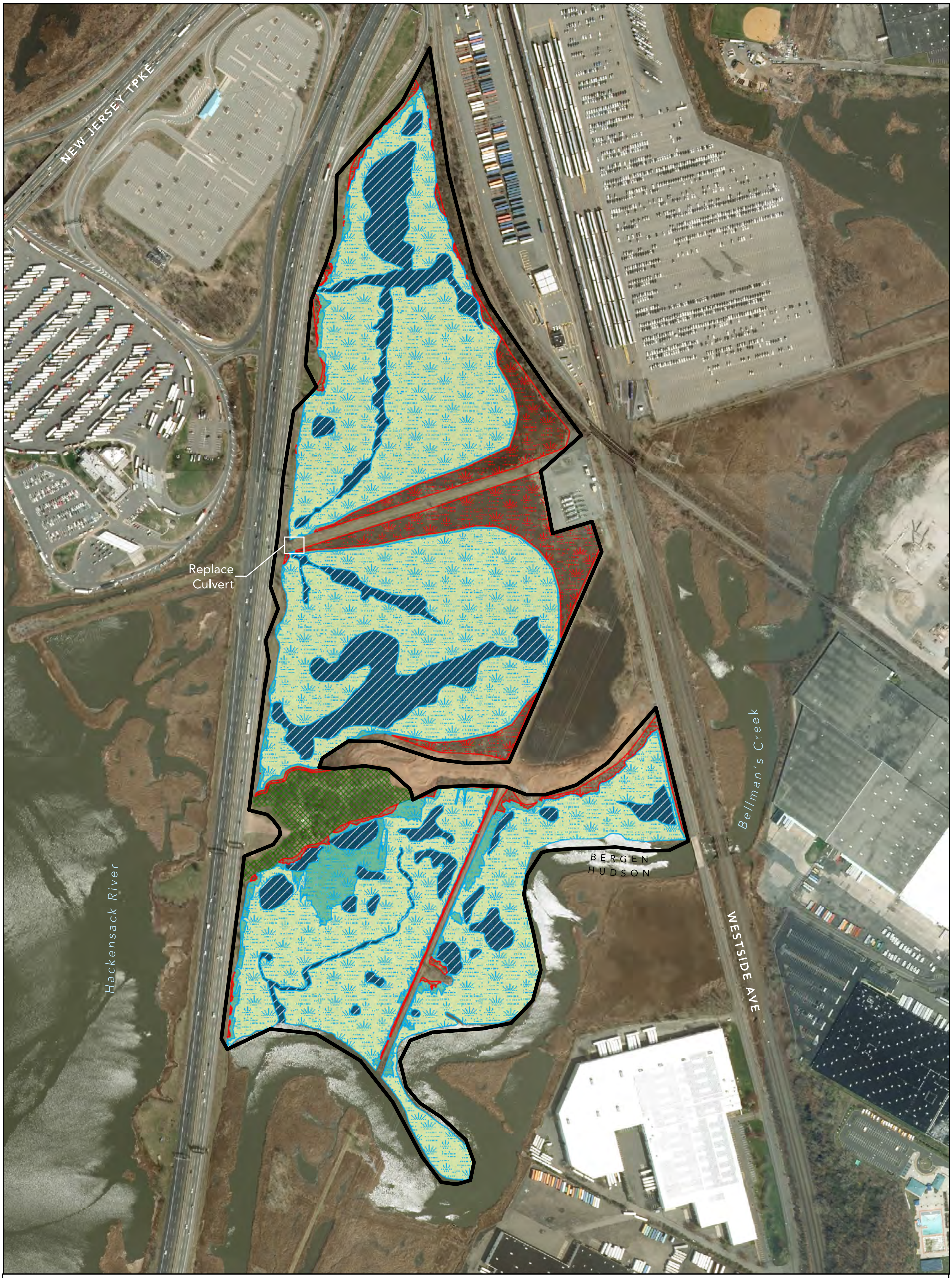
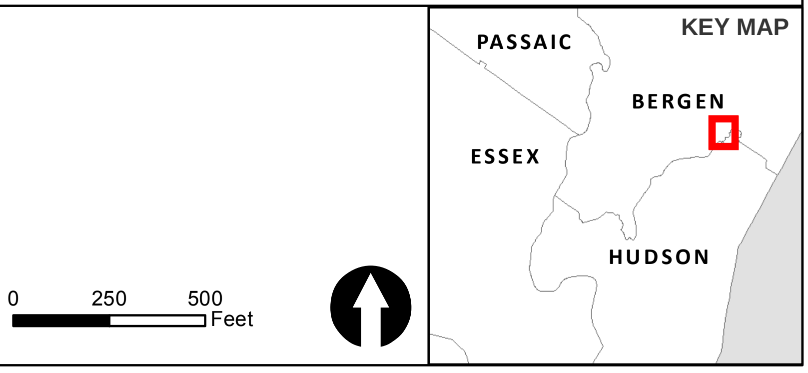


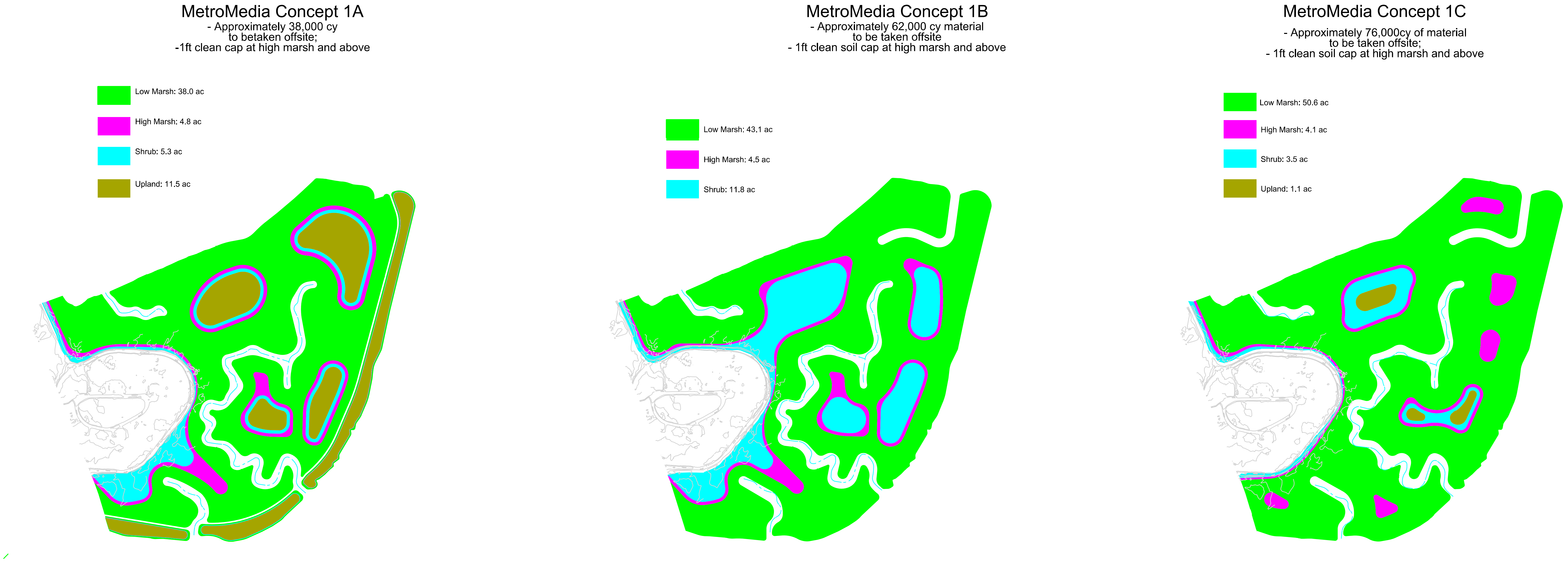
Figure 25: Meadowlark Marsh, Alternative C
New Jersey Meadowlands

Source: NJGIN NJ 2015 Orthoimagery

**PROPOSED MEASURES LEGEND**

- ▭ SITE BOUNDARY
- 🟥 FORESTED AND SCRUB/SHRUB WETLAND
- 🟦 EMERGENT WETLAND (HIGH MARSH)
- 🟩 EMERGENT WETLAND (LOW MARSH)
- ▩ COASTAL AND MARITIME FOREST
- ▨ EXISTING HABITAT FOR FISH, CRAB AND LOBSTER
- ■ HABITAT FOR FISH, CRAB AND LOBSTER





MetroMedia Concept 1A
- Approximately 38,000 cy
to betaken offsite;
-1ft clean cap at high marsh and above

MetroMedia Concept 1B
- Approximately 62,000 cy material
to be taken offsite
- 1ft clean soil cap at high marsh and above

MetroMedia Concept 1C
- Approximately 76,000cy of material
to be taken offsite;
- 1ft clean soil cap at high marsh and above

Figure 26: Metro Media Tract Alternative A, B and C
Carlstadt, New Jersey