APPENDIX P

EMISSIONS ESTIMATES

United States Army Corps of Engineers, New York District
DRAFT General Conformity Determination Notice

On October 30, 2012, New York State (DR-4085) and New Jersey State (DR-4086) declared Super Storm Sandy a Major Disaster. In response to the unprecedented breadth and scope of the damages sustained along the New York and New Jersey coastlines, the U.S. Congress passed Public Law (PL) 113-2 "Disaster Relief Appropriations Act 2013", also known as House Resolution (H.R.) 152-2 Title II which was signed into law on January 29, 2013. PL 113-2, which states "That the amounts... are designated by the Congress as being for an emergency requirement pursuant to section 251(b)(2)(A)(i) of the Balanced Budget and Emergency Deficit Control Act of 1985", provides funding for numerous projects to repair, restore and fortify the coastline in both states as a result of the continuing emergency as people and property along the coast remain in a vulnerable condition until the coastline is restored and fortified. To protect the investments by the Federal, State, local governments and individuals to rebuild damaged sites, it is imperative that these emergency disaster relief projects proceed as expeditiously as possible.

The Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay (Rockaway) study is called a General Reformulation Report, because it seeks to reexamine the Project that was originally authorized by the House of Representatives, dated 27 September 1997, as stated within the Congressional Record for the US House of Representatives. Subsequent to the original authorization, is the new authorization under Public Law 113-2 (29Jan13), The Disaster Relief Appropriations Act of 2013 (the Act), was enacted in part to "improve and streamline disaster assistance for Hurricane Sandy, and for other purposes". The Act directed the Corps of Engineers to: "…reduce future flood risk in ways that will support the long-term sustainability of the coastal ecosystem and communities and reduce the economic costs and risks associated with large-scale flood and storm events in areas along the Atlantic Coast within the boundaries of the North Atlantic Division of the Corps that were affected by Hurricane Sandy" (PL 113-2).

East Rockaway is a Reformulation Study project that is anticipated to start construction during or after October 2018 and this document represents the General Conformity Determination required under 40CFR§93.154 by the United States Army Corps of Engineers (USACE). USACE is the lead Federal agency that will contract, oversee, approve, and fund the project's work, and thus is responsible for making the General Conformity determination for this project.

USACE has coordinated this determination with the New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (EPA) Region 2. Based on the National Ambient Air Quality Standards (NAAQS), Queens, King, and Nassau County are currently classified as 'marginal' nonattainment for the 2008 8-hour ozone standard and 'maintenance' for both the 2006 particulate matter less than 2.5 microns ($PM_{2.5}$) and the 1971 carbon monoxide standards (40CFR§81.333). The counties are part of the Ozone Transport Region. Ozone is controlled through the regulation of its precursor emissions, which include oxides of nitrogen (NO_x) and volatile organic compounds (VOC). Sulfur dioxide (SO_2) is a precursor for $PM_{2.5}$.

The equipment associated with this project that is evaluated under General Conformity (40CFR§93.153) includes direct and indirect nonroad diesel sources, such as dredging equipment and support vessels operating in the back bay. The primary pollutant of concern with this type of equipment is NO_x, as VOCs, $PM_{2.5}$, SO_2, and CO are generated at significantly lower rates. The NO_x emissions associated with the project are estimated to range from nearly 92 to 274 tons per calendar year for 2018 through 2021, (see emissions estimates provided as Attachment A). The project exceeds the NO_x trigger level of 100 tons in any calendar year and as a result, the USACE is required to fully offset the NO_x emissions of this project. The project does not exceed the ozone related VOC trigger level of 50 tons (for areas in an ozone transport region) in any calendar year, nor the $PM_{2.5}$, SO_2, CO maintenance areas' related trigger levels of 100 tons in any calendar year, per pollutant.

The USACE is committed to fully offsetting the emissions generated as a result of the disaster relief and coastal protection work associated with this project. USACE recognizes that the feasibility and cost-effectiveness of each offset option is influenced by whether the emission reductions can be achieved without introducing delay to the construction schedule that would prevent timely implementation of the project to protect the coastline from future storm events.

USACE will demonstrate conformity with the New York State Implementation Plan by utilizing the emission offset options listed below. The demonstration can consist of any combination of options, and is not required to include all or any single options to meet conformity. The options for meeting general conformity requirements include the following:

a. Emission reductions from project and/or non-project related sources in an appropriately close vicinity to the project location. In assessing the potential impact of this offset option, USACE recognizes the possibility of lengthening the time period in which offsets can be generated as appropriate and allowable under the general conformity rule (40CFR§93.163 and §93.165).
b. Use of Surplus NOx Emission Offsets (SNEOs) generated under the Harbor Deepening Project (HDP). As part of the mitigation of the HDP, USACE and the Port Authority of New York & New Jersey developed emission reduction programs coordinated through the Regional Air Team (RAT). The RAT is comprised of the USACE, NYSDEC, New Jersey Department of Environmental Protection, United States Environmental Protection Agency (EPA) Region 2, and other stakeholders. SNEOs will be applied in concurrence with the agreed upon SNEO Protocols to ensure the offsets are real, surplus, and not double counted.
c. Development of a Marine Vessel Engine Repower Program (MVERP) which replaces older, more polluting marine engines with cleaner engines, the delta in emissions being used to offset project emissions. The MVERP approach worked successfully for offsetting the HDP's construction emissions. The details of the MVERP, its implementation, and tracking would be coordinated with the RAT.
d. Use of Cross-State Air Pollution Rule (CSAPR) ozone season NO_x Allowances with a distance ratio applied to allowances, similar to the one used by stationary sources.
e. Rescheduling the project by elongating the construction schedule so as not to exceed the 100 tons per year threshold for NOx in any one calendar year.

Due to unpredictable nature of dredge-related construction and the preliminary estimates of sand required to restore the integrity of the coastlines, the project emissions will be monitored as appropriate and regularly reported to the RAT to assist the USACE in ensuring that the project is fully offset.

In summary, USACE will achieve conformity for NO_x using the options outlined above, as coordinated with the NYSDEC and coordinated through the RAT.

Attachment A

General Conformity Related Emission Estimates

Emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

$$E = hrs \times LF \times EF$$

Where:

E = Emissions per period of time such as a year or the entire project.
hrs = Number of operating hours in the period of time (e.g., hours per year, hours per project).
LF = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.
EF = Emission factor, an estimate of the amount of a pollutant (such as NO_x) that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of pollutant per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

$$250 \text{ horsepower} \times 0.43 \times 1{,}000 \text{ hours} = 107{,}500 \text{ hphr}$$

The emissions from diesel engines vary with the age of an engine and, most importantly, with when it was built. Newer engines of a given size and function typically emit lower levels of pollutants than older engines. The NO_x emission factors used in these calculations assume that the equipment pre-dates most emission control requirements (known as Tier 0 engines in most cases), to provide a reasonable "upper bound" to the emission estimates. If newer engines are actually used in the work, then emissions will be lower than estimated for the same amount of work. In the example of the crane engine, a NO_x emission factor of 9.5 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$$\frac{107{,}500 \text{ hphr} \times 9.5 \text{ g } NO_x/\text{hphr}}{453.59 \text{ g/lb} \times 2{,}000 \text{ lbs/ton}} = 1.1 \text{ tons of } NO_x$$

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load factors have been obtained from various sources depending on the type of equipment. Marine engine load factors are primarily from a document associated with the New York and New Jersey Harbor Deepening Project (HDP): "Marine and Land-Based Mobile Source Emission Estimates for the Consolidated Schedule of 50-Foot Deepening Project, January 2004," and from EPA's 1998 Regulatory Impact Analysis (RIA): "EPA Regulatory Impact Analysis: Control of Commercial Marine Vessels." Land-side nonroad equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

Emission factors have also been sourced from a variety of documents and other sources depending on engine type and pollutant. The NO_x emission factors for marine engines have been developed primarily from EPA documentation for the Category 1 and 2 standards (RIA, "Control of Emission from Marine Engines, November 1999) and are consistent with emission factors used in documenting emissions from the HDP, while the VOC emission factors for marine engines are from the Port Authority of New York and New Jersey's (PANYNJ) "2014 Multi-Facility Emissions Inventory" which represent the range of marine engines operating in the New Jersey harbor and coastal region in terms of age and regulatory tier level. Nonroad equipment NO_x emission factors have been derived from EPA emission standards and documentation, while the nonroad VOC emission factors have been based on EPA's Diesel Emissions Quantifier (DEQ, accessed at: *www.epa.gov/cleandiesel/quantifier/*), run for moderately old equipment (model year 1995). On-road vehicle emission factors have also been developed from the DEQ, assuming a mixture of Class 8, Class 6, and Class 5 (the smallest covered by the DEQ) on-road trucks.

Greenhouse gas (GHG) emissions are represented as CO_2, which makes up by far the greatest amount of GHG emitted from the diesel-fueled engines that will be used on the project. GHG emissions are calculated in the same manner as the emissions discussed above, except that GHG emissions are expressed as metric tons (tonnes) instead of short tons to be consistent with standard GHG reporting methodology. The CO_2 emission factors were obtained from the most recent emissions inventory released by the PANYNJ, using the average nonroad equipment and on-road heavy-duty diesel vehicle emission factors.

As noted above, the emission factors have been chosen to be moderately conservative so as not to underestimate project emissions. Actual project emissions will be estimated and tracked during the course of the project and will be based on the characteristics and operating hours of the specific equipment chosen by the contractor to do the work.

The following pages summarize the estimated emissions of pollutants relevant to General Conformity, NO_x, VOC, $PM_{2.5}$, SO_2, and CO_2 in sum for the project and by calendar year based on the schedule information also presented (in terms of operating months per year). Following this summary information are project details including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project by piece of equipment.

USACE - New York District

NAN - GRR East Rockaway

General Conformity-Related Emission Estimates & Greenhouse Gas Estimates

Emission Estimates, East Rockaway to Rockaway Inlet **8/18/2016**

DRAFT

General Conformity-applicable emissions per calendar year based on project duration

Levees, floodwalls, groins

	Estimated Emissions, tons per year								
Pollutant	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
NO_x	31.8	47.8	47.8	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.9	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0
$PM_{2.5}$	1.1	1.7	1.7	0.0	0.0	0.0	0.0	0.0	0.0
SO_2	0.02	0.03	0.03	0.0	0.0	0.0	0.0	0.0	0.0
CO	3.8	5.7	5.7	0.0	0.0	0.0	0.0	0.0	0.0

Beach replenishment

	Estimated Emissions, tons per year								
Pollutant	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
NO_x	60.7	91.1	91.1	0.0	0.0	0.0	0.0	0.0	0.0
VOC	2.3	3.4	3.4	0.0	0.0	0.0	0.0	0.0	0.0
$PM_{2.5}$	3.1	4.7	4.7	0.0	0.0	0.0	0.0	0.0	0.0
SO_2	0.03	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0
CO	6.8	10.2	10.2	0.0	0.0	0.0	0.0	0.0	0.0

Total project emissions (assumes all components proceed concurrently)

	Estimated Emissions, tons per year								
Pollutant	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
NO_x	92.6	138.9	138.9	0.0	0.0	0.0	0.0	0.0	0.0
VOC	3.2	4.8	4.8	0.0	0.0	0.0	0.0	0.0	0.0
$PM_{2.5}$	4.3	6.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0
SO_2	0.05	0.07	0.07	0.0	0.0	0.0	0.0	0.0	0.0
CO	10.6	15.9	15.9	0.0	0.0	0.0	0.0	0.0	0.0

GHG emissions per calendar year based on project duration

	Estimated Emissions, tonnes per year								
GHG	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Levees, floodwalls, groins									
CO_2	4,106	6,158	6,158	0	0	0	0	0	0
Beach replenishment									
CO_2	911	1,366	1,366	0	0	0	0	0	0
Total project emissions (assumes all components proceed concurrently)									
CO_2	5,016	7,524	7,524	0	0	0	0	0	0

Project Duration and Working Months per Year

Activity	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total Construction Months**
Dredging	4	6	6	0	0	0	0	0	0	16

804,000 cubic yards dredging

Due to environmental and ozone season windows in place for the NY projects, there will be a maximum of 6 months of dredging per year for the NY projects

Shore-side work proceeds when dredging occurs. Combination of environmental and ozone season windows results in no dredging during April through September each year.

USACE - New York District
NAN - GRR East Rockaway
General Conformity-Related Emission Estimates & Greenhouse Gas Estimates
Supporting Information, East Rockaway to Rockaway Inlet
DRAFT
8/18/2016

Detailed equipment list

Description, off-road equipment	Category	Horsepower (approx.)	Load Factor	Hours	hphrs
Manhattan Beach					
Breakwaters and Seawalls					
Sheepshead bay floodgate					
Levees and floodwalls					
Barge mounted crane, 350 ton, 200' boom, for lifting	Crane	275	0.43	300	35,475
Marine equipment, tugs, 65 ft length, 22 ft beam, 7'6" draft, 80 ton, tow boat	Tug main	400	0.68	300	81,600
Tow boat aux	Tug aux	50	0.4	301	6,020
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	591	34,884
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	Other diesel engines	250	0.59	183	27,012
Pile hammer, single acting, pnuematic (steam/air), 19,200 ft-lbs (2655 kgf-m) (add leads, crane & 750 cfm (21 cmm) compressor)	Other diesel engines	100	0.59	5,548	327,354
Tug boat, 150-400 hp (112-298 kw)	Tug main	400	0.68	200	54,400
Tow boat aux	Tug aux	50	0.4	200	4,000
Plumb beach 9,392.07					
Levees and floodwalls 9,392.07					
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	125	7,384
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	Other diesel engines	250	0.59	3,370	497,025
Gerritsen inlet floodgate					
Levees and floodwalls					
Barge mounted crane, 350 ton, 200' boom, for lifting	Crane	275	0.43	150	17,738
Marine equipment, tugs, 65 ft length, 22 ft beam, 7'6" draft, 80 ton, tow boat	Tug main	400	0.68	150	40,800
Tow boat aux	Tug aux	50	0.4	200	4,000
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	353	20,808
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	Other diesel engines	250	0.59	112	16,554
Pile hammer, single acting, pnuematic (steam/air), 19,200 ft-lbs (2655 kgf-m) (add leads, crane & 750 cfm (21 cmm) compressor)	Other diesel engines	100	0.59	7,984	471,071
Pump, water, centrifugal, trash, hose, suction/disch, 4" (100 mm) dia x 50' (15 m) with coupling (per section)	Other diesel engines	25	0.59	26	382
Pump, water, centrifugal, trash, hose, suction/disch, 4" (102 mm) dia x 20' (6.1 m)length, w/coupling/section	Other diesel engines	25	0.59	13	191
Pump, water, diaphragm, wheel, engine drive, 4" (102 mm) dia, 4,440 gph (16,807 lph) @ 25' (7.6 m) head (add hoses)	Other diesel engines	25	0.59	13	191
Tug boat, 150-400 hp (112-298 kw)	Tug main	400	0.68	100	27,200
Tow boat aux	Tug aux	50	0.4	200	4,000
Barren island					
Levees and floodwalls					
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	1,901	112,147
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	Other diesel engines	250	0.59	3,846	567,285
Rockaway inlet hurricane barrier					
Barren island to roxbury barrier alignment					
Levees and floodwalls					
Barge mounted crane, 350 ton, 200' boom, for lifting	Crane	275	0.43	1,000	118,250
Marine equipment, tugs, 65 ft length, 22 ft beam, 7'6" draft, 80 ton, tow boat	Tug main	400	0.68	650	176,800
Tow boat aux	Tug aux	50	0.4	200	4,000
Pile hammer, double acting, diesel, 18,100 ft-lbs (2,502 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	1,828	107,837
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	1,720	101,495
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	Other diesel engines	250	0.59	718	105,943
Pile hammer, single acting, pnuematic (steam/air), 19,200 ft-lbs (2655 kgf-m) (add leads, crane & 750 cfm (21 cmm) compressor)	Other diesel engines	100	0.59	25,171	1,485,072
Pump, water, centrifugal, trash, hose, suction/disch, 4" (100 mm) dia x 50' (15 m) with coupling (per section)	Other diesel engines	25	0.59	117	1,721
Pump, water, centrifugal, trash, hose, suction/disch, 4" (102 mm) dia x 20' (6.1 m)length, w/coupling/section	Other diesel engines	25	0.59	58	860
Pump, water, diaphragm, wheel, engine drive, 4" (102 mm) dia, 4,440 gph (16,807 lph) @ 25' (7.6 m) head (add hoses)	Other diesel engines	25	0.59	58	860
Tug boat, 150-400 hp (112-298 kw)	Tug main	400	0.68	900	244,800
Tow boat aux	Tug aux	50	0.4	200	4,000
Rockaway bayside					
Beach channel drive					
Levees and floodwalls					
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	Other diesel engines	100	0.59	458	26,998
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	Other diesel engines	250	0.59	644	94,916

USACE - New York District
NAN - GRR East Rockaway
General Conformity-Related Emission Estimates & Greenhouse Gas Estimates
Supporting Information, East Rockaway to Rockaway Inlet
DRAFT
8/18/2016

Detailed equipment list

Description, off-road equipment		Category	Horsepower (approx.)	Load Factor	Hours	hphrs
Breezy north						
Levees and floodwalls						
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)		Other diesel engines	100	0.59	3,178	187,489
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)		Other diesel engines	250	0.59	4,469	659,141
Rockaway tie-in						
Levees and floodwalls						
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)		Other diesel engines	100	0.59	432	25,465
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)		Other diesel engines	250	0.59	607	89,525
17 Beach Replenishment						
Cutter suction dredge main engine		CSD primary engine	9,000	0.66	2,600	15,444,000
Cutter suction dredge secondary engine		CSD secondary engine	3,310	0.66	2,600	5,679,960
Dredge auxiliry engine		CSD aux engine	830	0.40	2,600	863,200
Work tug main engine		Tug main	250	0.68	2,600	442,000
Work tug aux engine		Tug aux	50	0.40	2,600	52,000
Crew/survey boat main engine		Tug main	100	0.68	2,600	176,800
Crew/survey boat main engine		Tug aux	40	0.40	2,600	41,600
Derrick barge main		Crane	200	0.43	2,600	223,600
Derrick barge aux		Generator	40	0.43	2,600	44,720
10 Breakwater & Seawalls						
Groin Construction Reach						
150 ton Crane Barge Offshore Crane		Crane	225	0.43	776	75,073
150 ton Crane Barge Offshore Crane		Crane	225	0.43	229	22,168
Ocean Tug Boat main engine		Tug main	1,200	0.68	139	113,729
Ocean Tug Boat aux engine		Tug aux	200	0.40	139	11,150
Ocean Tug Boat main engine		Tug main	1,200	0.68	1,254	1,023,558
Ocean Tug Boat aux engine		Tug aux	200	0.40	1,254	100,349
River Tug Boat main engine		Tug main	500	0.68	655	222,545
Tug boat aux		Tug aux	100	0.40	655	26,182
River Tug Boat		Tug main	500	0.68	465	158,200
Tug boat aux		Tug aux	100	0.40	465	18,612
Groin Construction Reach						
150 ton Crane Barge Offshore Crane		Crane	225	0.43	788	76,285
150 ton Crane Barge Offshore Crane		Crane	225	0.43	247	23,929
Ocean Tug Boat main engine		Tug main	1,200	0.68	157	128,235
Ocean Tug Boat aux engine		Tug aux	200	0.40	157	12,572
Ocean Tug Boat main engine		Tug main	1,200	0.68	1,414	1,154,118
Ocean Tug Boat aux engine		Tug aux	200	0.40	1,414	113,149
River Tug Boat		Tug main	500	0.68	657	223,319
Tug boat aux		Tug aux	100	0.40	657	26,273
River Tug Boat		Tug main	500	0.68	495	168,239
Tug boat aux		Tug aux	100	0.40	495	19,793
Groin Construction Reach						
150 ton Crane Barge Offshore Crane		Crane	225	0.43	1,221	118,087
150 ton Crane Barge Offshore Crane		Crane	225	0.43	368	35,630
Ocean Tug Boat main engine		Tug main	1,200	0.68	206	168,150
Ocean Tug Boat aux engine		Tug aux	200	0.40	206	16,485
Ocean Tug Boat main engine		Tug main	1,200	0.68	1,855	1,513,354
Ocean Tug Boat aux engine		Tug aux	200	0.40	1,855	148,368
River Tug Boat		Tug main	500	0.68	1,001	340,476
Tug boat aux		Tug aux	100	0.40	1,001	40,056
River Tug Boat		Tug main	500	0.68	740	251,695
Tug boat aux		Tug aux	100	0.40	740	29,611
	Totals by type of work	Levees and floodwalls				
		Beach Replenishment				
		Groin Construction, other				
		All work				

USACE - New York District
NAN - GRR East Rockaway
General Conformity-Related Emission Estimates & Greenhouse Gas Estimates
Supporting Information, East Rockaway to Rockaway Inlet
DRAFT
8/18/2016

Detailed equipment list

	grams per hphr						tons				metric tons	
Description, off-road equipment	**NOx**	**VOC**	**PM2.5**	**SOx**	**CO**	**CO_2**	**NO_x**	**VOC**	**$PM_{2.5}$**	**SO_x**	**CO**	**CO_2**
Manhattan Beach												
Breakwaters and Seawalls												
Sheepshead bay floodgate												
Levees and floodwalls												
Barge mounted crane, 350 ton, 200' boom, for lifting	9.5	0.183	0.16	0.005	1.21	571	0.37	0.007	0.006	0.000	0.047	20
Marine equipment, tugs, 65 ft length, 22 ft beam, 7'6" draft, 80 ton, tow boat	9.7	0.37	0.51	0.005	1.06	571	0.87	0.033	0.046	0.000	0.095	47
Tow boat aux	7.3	0.2	0.29	0.005	1.27	571	0.05	0.001	0.002	0.000	0.008	3
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.37	0.007	0.006	0.000	0.047	20
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.28	0.005	0.005	0.000	0.036	15
Pile hammer, single acting, pnuematic (steam/air), 19,200 ft-lbs (2655 kgf-m) (add leads, crane & 750 cfm (21 cr	9.5	0.183	0.16	0.005	1.21	571	3.43	0.066	0.058	0.002	0.437	187
Tug boat, 150-400 hp (112-298 kw)	9.7	0.37	0.51	0.005	1.06	571	0.58	0.022	0.031	0.000	0.064	31
Tow boat aux	7.3	0.2	0.29	0.005	1.27	571	0.03	0.001	0.001	0.000	0.006	2
Plumb beach 9,392.07												
Levees and floodwalls 9,392.07												
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.08	0.001	0.001	0.000	0.010	4
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	5.20	0.100	0.088	0.003	0.663	284
Gerritsen inlet floodgate												
Levees and floodwalls												
Barge mounted crane, 350 ton, 200' boom, for lifting	9.5	0.183	0.16	0.005	1.21	571	0.19	0.004	0.003	0.000	0.024	10
Marine equipment, tugs, 65 ft length, 22 ft beam, 7'6" draft, 80 ton, tow boat	9.7	0.37	0.51	0.005	1.06	571	0.44	0.017	0.023	0.000	0.048	23
Tow boat aux	7.3	0.2	0.29	0.005	1.27	571	0.03	0.001	0.001	0.000	0.006	2
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.22	0.004	0.004	0.000	0.028	12
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.17	0.003	0.003	0.000	0.022	9
Pile hammer, single acting, pnuematic (steam/air), 19,200 ft-lbs (2655 kgf-m) (add leads, crane & 750 cfm (21 cr	9.5	0.183	0.16	0.005	1.21	571	4.93	0.095	0.083	0.003	0.628	269
Pump, water, centrifugal, trash, hose, suction/disch, 4" (100 mm) dia x 50' (15 m) with coupling (per section)	9.5	0.183	0.16	0.005	1.21	571	0.00	0.000	0.000	0.000	0.001	0
Pump, water, centrifugal, trash, hose, suction/disch, 4" (102 mm) dia x 20' (6.1 m)length, w/coupling/section	9.5	0.183	0.16	0.005	1.21	571	0.00	0.000	0.000	0.000	0.000	0
Pump, water, diaphragm, wheel, engine drive, 4" (102 mm) dia, 4,440 gph (16,807 lph) @ 25' (7.6 m) head (add l	9.5	0.183	0.16	0.005	1.21	571	0.00	0.000	0.000	0.000	0.000	0
Tug boat, 150-400 hp (112-298 kw)	9.7	0.37	0.51	0.005	1.06	571	0.29	0.011	0.015	0.000	0.032	16
Tow boat aux	7.3	0.2	0.29	0.005	1.27	571	0.03	0.001	0.001	0.000	0.006	2
Barren island												
Levees and floodwalls												
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	1.17	0.023	0.020	0.001	0.150	64
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	5.94	0.114	0.100	0.003	0.757	324
Rockaway inlet hurricane barrier												
Barren island to roxbury barrier alignment												
Levees and floodwalls												
Barge mounted crane, 350 ton, 200' boom, for lifting	9.5	0.183	0.16	0.005	1.21	571	1.24	0.024	0.021	0.001	0.158	68
Marine equipment, tugs, 65 ft length, 22 ft beam, 7'6" draft, 80 ton, tow boat	9.7	0.37	0.51	0.005	1.06	571	1.89	0.072	0.099	0.001	0.207	101
Tow boat aux	7.3	0.2	0.29	0.005	1.27	571	0.03	0.001	0.001	0.000	0.006	2
Pile hammer, double acting, diesel, 18,100 ft-lbs (2,502 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	1.13	0.022	0.019	0.001	0.144	62
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	1.06	0.020	0.018	0.001	0.135	58
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	1.11	0.021	0.019	0.001	0.141	60
Pile hammer, single acting, pnuematic (steam/air), 19,200 ft-lbs (2655 kgf-m) (add leads, crane & 750 cfm (21 cr	9.5	0.183	0.16	0.005	1.21	571	15.55	0.300	0.262	0.008	1.981	848
Pump, water, centrifugal, trash, hose, suction/disch, 4" (100 mm) dia x 50' (15 m) with coupling (per section)	9.5	0.183	0.16	0.005	1.21	571	0.02	0.000	0.000	0.000	0.002	1
Pump, water, centrifugal, trash, hose, suction/disch, 4" (102 mm) dia x 20' (6.1 m)length, w/coupling/section	9.5	0.183	0.16	0.005	1.21	571	0.01	0.000	0.000	0.000	0.001	0
Pump, water, diaphragm, wheel, engine drive, 4" (102 mm) dia, 4,440 gph (16,807 lph) @ 25' (7.6 m) head (add l	9.5	0.183	0.16	0.005	1.21	571	0.01	0.000	0.000	0.000	0.001	0
Tug boat, 150-400 hp (112-298 kw)	9.7	0.37	0.51	0.005	1.06	571	2.62	0.100	0.138	0.001	0.286	140
Tow boat aux	7.3	0.2	0.29	0.005	1.27	571	0.03	0.001	0.001	0.000	0.006	2
Rockaway bayside												
Beach channel drive												
Levees and floodwalls												
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.28	0.005	0.005	0.000	0.036	15
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.99	0.019	0.017	0.001	0.127	54

USACE - New York District
NAN - GRR East Rockaway
General Conformity-Related Emission Estimates & Greenhouse Gas Estimates
Supporting Information, East Rockaway to Rockaway Inlet
DRAFT
8/18/2016

Detailed equipment list

	grams per hphr						tons					metric tons
Description, off-road equipment	**NOx**	**VOC**	**PM2.5**	**SOx**	**CO**	**CO_2**	**NO_x**	**VOC**	**$PM_{2.5}$**	**SO_x**	**CO**	**CO_2**
Breezy north												
Levees and floodwalls												
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	1.96	0.038	0.033	0.001	0.250	107
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	6.90	0.133	0.116	0.004	0.879	376
Rockaway tie-in												
Levees and floodwalls												
Pile hammer, double acting, diesel, 40,000 ft-lbs (5,530 kgf-m) (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.27	0.005	0.004	0.000	0.034	15
Pile hammer, driver/extractor, vibratory, 80 ton (73 mt) force drive (add leads & crane)	9.5	0.183	0.16	0.005	1.21	571	0.94	0.018	0.016	0.000	0.119	51
17 Beach Replenishment												
Cutter suction dredge main engine	9.7	0.37	0.51	0.005	1.06	571	165.13	6.299	8.682	0.085	18.046	8,819
Cutter suction dredge secondary engine	9.7	0.37	0.51	0.005	1.06	571	60.73	2.317	3.193	0.031	6.637	3,243
Dredge auxilliry engine	7.3	0.2	0.29	0.005	1.27	571	6.95	0.190	0.276	0.005	1.208	493
Work tug main engine	9.7	0.37	0.51	0.005	1.06	571	4.73	0.180	0.248	0.002	0.516	252
Work tug aux engine	7.3	0.2	0.29	0.005	1.27	571	0.42	0.011	0.017	0.000	0.073	30
Crew/survey boat main engine	9.7	0.37	0.51	0.005	1.06	571	1.89	0.072	0.099	0.001	0.207	101
Crew/survey boat main engine	7.3	0.2	0.29	0.005	1.27	571	0.33	0.009	0.013	0.000	0.058	24
Derrick barge main	9.5	0.183	0.16	0.005	1.21	571	2.34	0.045	0.039	0.001	0.298	128
Derrick barge aux	9.5	0.183	0.16	0.005	1.21	571	0.47	0.009	0.008	0.000	0.060	26
10 Breakwater & Seawalls												
Groin Construction Reach												
150 ton Crane Barge Offshore Crane	9.5	0.183	0.16	0.005	1.21	571	0.79	0.015	0.013	0.000	0.100	43
150 ton Crane Barge Offshore Crane	9.5	0.183	0.16	0.005	1.21	571	0.23	0.004	0.004	0.000	0.030	13
Ocean Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	1.22	0.046	0.064	0.001	0.133	65
Ocean Tug Boat aux engine	7.3	0.2	0.29	0.005	1.27	571	0.09	0.002	0.004	0.000	0.016	6
Ocean Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	10.94	0.417	0.575	0.006	1.196	584
Ocean Tug Boat aux engine	7.3	0.2	0.29	0.005	1.27	571	0.81	0.022	0.032	0.001	0.140	57
River Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	2.38	0.091	0.125	0.001	0.260	127
Tug boat aux	7.3	0.2	0.29	0.005	1.27	571	0.21	0.006	0.008	0.000	0.037	15
River Tug Boat	9.7	0.37	0.51	0.005	1.06	571	1.69	0.065	0.089	0.001	0.185	90
Tug boat aux	7.3	0.2	0.29	0.005	1.27	571	0.15	0.004	0.006	0.000	0.026	11
Groin Construction Reach												
150 ton Crane Barge Offshore Crane	9.5	0.183	0.16	0.005	1.21	571	0.80	0.015	0.013	0.000	0.102	44
150 ton Crane Barge Offshore Crane	9.5	0.183	0.16	0.005	1.21	571	0.25	0.005	0.004	0.000	0.032	14
Ocean Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	1.37	0.052	0.072	0.001	0.150	73
Ocean Tug Boat aux engine	7.3	0.2	0.29	0.005	1.27	571	0.10	0.003	0.004	0.000	0.018	7
Ocean Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	12.34	0.471	0.649	0.006	1.349	659
Ocean Tug Boat aux engine	7.3	0.2	0.29	0.005	1.27	571	0.91	0.025	0.036	0.001	0.158	65
River Tug Boat	9.7	0.37	0.51	0.005	1.06	571	2.39	0.091	0.126	0.001	0.261	128
Tug boat aux	7.3	0.2	0.29	0.005	1.27	571	0.21	0.006	0.008	0.000	0.037	15
River Tug Boat	9.7	0.37	0.51	0.005	1.06	571	1.80	0.069	0.095	0.001	0.197	96
Tug boat aux	7.3	0.2	0.29	0.005	1.27	571	0.16	0.004	0.006	0.000	0.028	11
Groin Construction Reach												
150 ton Crane Barge Offshore Crane	9.5	0.183	0.16	0.005	1.21	571	1.24	0.024	0.021	0.001	0.158	67
150 ton Crane Barge Offshore Crane	9.5	0.183	0.16	0.005	1.21	571	0.37	0.007	0.006	0.000	0.048	20
Ocean Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	1.80	0.069	0.095	0.001	0.196	96
Ocean Tug Boat aux engine	7.3	0.2	0.29	0.005	1.27	571	0.13	0.004	0.005	0.000	0.023	9
Ocean Tug Boat main engine	9.7	0.37	0.51	0.005	1.06	571	16.18	0.617	0.851	0.008	1.768	864
Ocean Tug Boat aux engine	7.3	0.2	0.29	0.005	1.27	571	1.19	0.033	0.047	0.001	0.208	85
River Tug Boat	9.7	0.37	0.51	0.005	1.06	571	3.64	0.139	0.191	0.002	0.398	194
Tug boat aux	7.3	0.2	0.29	0.005	1.27	571	0.32	0.009	0.013	0.000	0.056	23
River Tug Boat	9.7	0.37	0.51	0.005	1.06	571	2.69	0.103	0.141	0.001	0.294	144
Tug boat aux	7.3	0.2	0.29	0.005	1.27	571	0.24	0.007	0.009	0.000	0.041	17
							60.7	1.3	1.3	0.03	7.6	3,308
							243.0	9.1	12.6	0.13	27.1	13,115
							66.6	2.4	3.3	0.04	7.6	3,643
							370.4	**12.9**	**17.2**	**0.19**	**42.4**	**20,065**

USACE - New York District
NAN - GRR East Rockaway
General Conformity-Related Emission Estimates & Greenhouse Gas Estimates
Supporting Information, East Rockaway to Rockaway Inlet
DRAFT
8/18/2016

Calculations

Emissions calculated using the following equation:

Emissions, tons per year = (hp x hrs/day x days/yr x LF x EF)/(453.59 g/lb x 2,000 lbs/ton)

CO_2 emissions, tonnes per year = (hp x hrs/day x days/yr x LF x EF)/1,000,000 g/tonne

VOC, $PM_{2.5}$, CO emission factors:

2014 PANYNJ Emissions Inventory, marine vessel emisison factors usec
for the variety of vessels in use in the New York/New Jersey area in the ab:
regarding the vessels to be used on any specific project.

	VOC	$PM_{2.5}$	CO
Propulsion (g/kWhr) Table 5.35	0.50	0.68	1.42
Propulsion (g/hphr)	0.37	0.51	1.06
Auxiliary (g/kWhr) Table 5.35	0.27	0.39	1.70
Auxiliary (g/hphr)	0.20	0.29	1.27

Off-road: DEQ results for representative 600 hp crawler tractor (MY 1995
Default hr 936 ›rsepower: 600

Emissions, short tons per year:	0.1925	0.1667	1.2671
Estimated EF, g/hphr:*	0.183	0.16	1.21
Conversion factor	1.053	VOC/THC	
Estimated VOC EF, g/hphr:	0.19		

* Hydrocarbons provided by DEQ converted to VOC
Assumed load factor 0.59 (from PANYNJ Emissions Inventory)
Conversion factor 0.7457 kW/hp g/kWhr x kW/hp = g/hphr

SO_2 emission factors:

Quantification of emissions from ships associated with ship movements
between ports in the European Community
Final Report, July 2002, Entec UK Limited. Chapter 2

	g/kWhr	g/hphr	g S/hphr	SO2/hphr
Medium and high speed auxiliary, distillate fuel (Table 2.10)	217	162	0.0024	0.0048
Medium and high speed propulsion, distillate fuel (Table 2.09) (maneuvering)	223	166	0.0025	0.0050

ULSD as of 2014: 15 g S/1,000,000 g fuel

Land-side diesel engines exhibit similar fuel consumption characteristice as marine propulsion engines,*
so the same SO2 EFs are used.

*Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition
EPA-420-R-10-018 NR-009d July 2010
Table C1. Average Emission Test Results for 1988 to 1995 Mod‹ 0.367 lb fuel/hphr
From the text: "Due to lack of data, the brake-specific fuel consumption (BSFC) for the 1988-and-later pre-control (Tier 0) engines is used for all engines, both earlier pre-control engines and later engines subject to emissions standards."
Converted to g/hphr: 167 g/hphr

CO_2 emission factors

Nonroad 571 g/hphr The nonroad engine CO_2 emission factor is the average of nonroad equipment in the PANYNJ 2014 emissions inventory, representative of nonroad engines in general.

DRAFT

MARINE VESSEL ENGINE REPLACEMENT PLAN

August 2016

NEW YORK DISTRICT
UNITED STATES ARMY CORPS OF ENGINEERS

Table of Contents

Section 1 – Introduction

The Marine Vessel Emissions Reduction Plan (MVERP) was one of the primary emission reduction strategies implemented by the United States Army Corps of Engineers (USACE) New York District (NAN) and the Port Authority of New York & New Jersey (PANYNJ) as part of the Harbor Deepening Project[1] (HDP) in order to meet the requirements of General Conformity.[2] The HDP MVERP was led by the non-federal sponsor, PANYNJ, and paid for engine replacements for domestic commercial vessels operating in the New York-Northern New Jersey-Long Island-Connecticut ozone nonattainment area (NYNJLICTNA). The MVERPs undertaken for the HDP were conducted under the larger Harbor Air Management Plan (HAMP) and coordinated with the Regional Air Team (RAT).

The basic concept of the strategy is to replace older, "dirtier" engines with newer, "cleaner" engines meeting higher regulatory standards established by the U.S. Environmental Protection Agency (EPA). The PANYNJ developed, awarded, and managed the MVERPs for the HDP. The evaluation and award of the vessels to be repowered was conducted through a request for proposal (RFP) process and utilized the same basic methods used by the California Air Resources Board (CARB) Carl Moyer Program[3]. The difference between the MVERP and Carl Moyer Program is the funding levels, as the Carl Moyer Program provides financial assistance while MVERP is specifically designed to undertake action to generate emissions offsets by funding 100% of the new engine costs, with the vessel owner typically paying for the destruction of the existing engine, dry dock costs (both removal and installation), and any gearing or equipment changes needed with the new engines. In return the vessel owner provides operational data and confirmation that the vessel has remained in operation in the applicable or adjacent nonattainment area on a quarter-annual basis. MVERP has been demonstrated to be one of the most cost effective strategies to reduce emissions and generate long-term emissions offsets.

The purpose of this document is to move beyond the HDP and provide the approach for evaluating the feasibility of integrating similar mitigation requirements to reduce NOx for NAN projects that trigger General Conformity, and for implementing, tracking, and coordinating with the RAT to ensure that the mitigation requirements are met for the specific project. Specifically, this report has been prepared for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay (ER) project, which is currently conducting analyses within the General Re-evaluation Report (GRR) authorized study process.

This section provides background on the project and overviews relating to General Conformity and the Regional Air Team.

[1] See: *www.nan.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/11241/Article/487407/fact-sheet-new-york-new-jersey-harbor-50-ft-deepening.aspx*
[2] 40 CFR §93 Subpart B
[3] See: *www.arb.ca.gov/msprog/moyer/source_categories/moyer_sc_marine.htm*

1.2 – Background

This section needs to recount how we got here: the NAN-EPA agreement that permitted SANDY projects to proceed to construction using reallocation of HDP offsets, with the commitment by USACE to seek authorization for two new MVERPs, etc.

1.3 – General Conformity

The General Conformity rule of the CAA applies to Federal actions, such as beach-related construction projects that occur within an EPA designated nonattainment area. A nonattainment area is a region that fails to meet one or more national standards for designated air pollutants. A State Implementation Plan (SIP) is a state-prepared, EPA-approved plan whereby the state (in this case, New York) presents their specific plans and schedules for bringing the nonattainment area into compliance with the national standards. The General Conformity rule requires that a Federal action not interfere with or hinder progress of a SIP in reaching attainment with the national standards. This is ensured by requiring mitigation of the Federal action's emissions if the action's emissions are anticipated to exceed General Conformity trigger levels,[4] unless at least one of the following conditions is met:

- The action is exempt (meets an exemption listed in 40 CFR §93.153(c)),
- The action is incorporated as a "line item" in the applicable SIP,
- The emissions from the action can be accommodated in the applicable SIP without jeopardizing the attainment of the standard.

The mitigation requirements are to fully and contemporaneously reduce emissions from the project or to offset the emissions using other strategies, such that there will be no net increase in emissions on a calendar year basis. General Conformity provides provisions for reductions in calendar years other than the year of the action provided appropriate ratios are used based on the nonattainment area's severity level and approval by the applicable State.[5]

The ER project, which is in the GRR study phase, will be undertaken in the NYNJLICTNA. The NYNJLICTNA is adjacent to the Philadelphia-Wilmington-Atlantic City ozone nonattainment area (PANJMDDENA). Due to the potential scale of the project, NAN anticipates that the project will trigger General Conformity requirements and that the applicable project emissions are not included in, nor can be accommodated by, the applicable SIP, and the project is not otherwise exempt. Therefore, the project's applicable emissions will need to be fully offset. During the implementation of the HDP, the RAT developed a number of applicable and precedent-setting policies and protocols that have been successfully utilized to ensure that a Federal action's emissions are fully offset, which is further discussed in Section 1.4. ER will utilize these policies and protocols to ensure compliance with General Conformity.

[4] 40 CFR §93.153(b)
[5] 40 CFR §93.163

1.4 – Regional Air Team

The RAT was formed in October 2001 to provide a forum for open communication and coordination between NAN, PANYNJ, and the resource agencies regarding air quality issues. Initially the RAT focused directly on General Conformity relating to the HDP, but the RAT has continued to meet regularly and has developed detailed policy protocols associated with emissions offsets and mitigation strategies. The members of the RAT include the following entities:

- EPA Region 2
- NAN (Chair)
- New Jersey Department of Environmental Protection (NJDEP), New Jersey Department Office of Marine Resources
- New York City Department of Transportation (NYCDOT)
- New York State Department of Environmental Conservation (NYSDEC)
- PANYNJ
- Philadelphia District Corps of Engineers (NAP)

The RAT is hosted and administered by NAN and other agencies, such as the New Jersey Department Office of Marine Resources, have joined and left the group as their projects have ended over time. The RAT has been the focal point for the development, review, and implementation of unique policy approaches related to General Conformity relating to the and beyond the HDP including: the Harbor Air Management Plan (HAMP), development, implementation, and reporting of various emissions reduction strategies, the development and implementation of the Surplus Nitrogen Oxides (NOx) Offset (SNEO) Protocol (see Attachment 1), and the quantification, tracking, and reporting of emissions and offsets for applicable projects in New York and New Jersey. RAT meetings are scheduled on an as-needed basis and historically occurred from monthly to quarterly. The RAT's primary responsibilities are:

- Provide technical and policy support to clarify and agree upon General Conformity requirements specific to projects by member agencies
- Provide review and comment on emission mitigation strategies and implementation
- Provide oversight to the SNEO Protocol
- Provide oversight and review to project emissions and offsets
- Support the development of implementable mitigation strategies to ensure each project meet General Conformity requirements
- Provide a forum for member agencies and other related agencies to discuss air quality issues, mitigation strategies, and related topics with the resource agencies

With the advent of the large Hurricane Sandy authorized but unconstructed (ABU) projects along the New Jersey and New York coasts, covering both NAN and NAP Districts, the sponsors of these projects jointly developed mitigation strategies and coordinated these strategies with the RAT. The projects are currently being implemented and mitigation is being reported and tracked through the RAT. One of the major policy efforts that the RAT produced was the Surplus NOx Emission Offsets (SNEO) Protocol, which was completed in May 2014 and which details a continuing emissions reduction offset program for activities that fall under General Conformity requirements and that are overseen/managed by the USACE, as allowed under 40 CFR §93.160-165. The offsets created under the SNEO protocols and their use will be coordinated through the RAT and be consistent with the applicable General Conformity requirements. The SNEO Protocol details the generation of NOx offsets, their use and limitations, their geographical extent, and the life of offset strategies.

The development and implementation of ER mitigation strategies will be coordinated with the RAT and be developed under the SNEO Protocol.

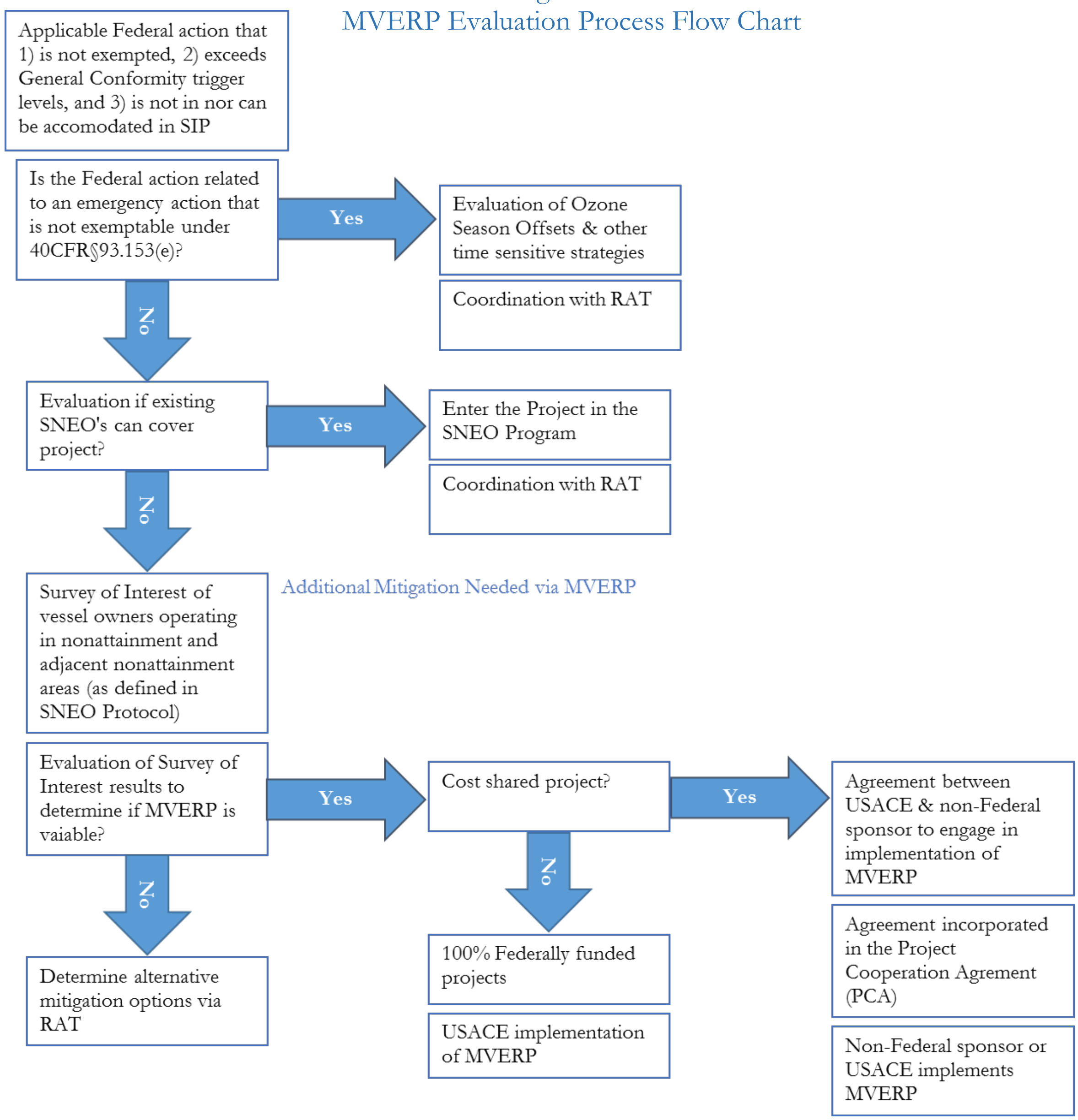
Section 2 – MVERP Methods and Protocols

This section provides an overview of the greater evaluation process to determine the viability of MVERP for a specific project, details the implementation process, identifies costing elements, and identifies overall timeline ranges for key elements.

2.1 – Evaluation of MVERP as a Viable Mitigation Strategy

The overall MVERP process builds on the experience, methods, protocols, and tools developed to track and report on the various projects that have been coordinated through the RAT. The first steps are to evaluate whether the project needs mitigation, evaluate the options, determine whether an MVERP is viable (in that a significant amount of offsets can be generated), and then implement the MVERP (Figure 1).

Figure 1 –
MVERP Evaluation Process Flow Chart



In general, applicable Federal actions[6] undertaken by the USACE that exceed the General Conformity trigger levels, and are not included in nor can be accommodated in the applicable SIP, will require mitigation. If the applicable Federal action is taken in response to a continuing emergency but does not meet the definition of "Emergency Action[7]," similar to the extended Hurricane Sandy ABUs, then the project's sponsors can evaluate the utilization of ozone season offsets and other time sensitive emissions offset strategies through coordination and agreement with the RAT. For non-emergency/longer term projects, the applicable Federal action is evaluated to determine what, if any, of its anticipated emissions can be covered under the SNEO Protocols or other emissions offset strategies. This determination would be coordinated with the RAT.

For any excess of applicable emissions beyond what can be covered by SNEOs, the USACE would need to first determine the feasibility of an MVERP by conducting a "Survey of Interest" of vessel owners in the applicable nonattainment area(s). The next step would be to evaluate the responses to determine the potential magnitude of offsets that could be generated. If the magnitude of potential offsets is significant, then an MVERP is viable. For projects that are cost shared, the USACE and the non-Federal sponsor would develop Terms and Conditions that would be entered into the Project Partnership Agreement (PPA) and either the non-Federal sponsor or USACE would implement the MVERP, as agreed in the PPA. For 100% Federally funded projects, the USACE would implement the MVERP. For projects for which an MVERP is not viable, other mitigation options would need to be discussed and evaluated through the RAT.

2.1.1 – Survey of Interest

The objective of a Survey of Interest is to determine whether an MVERP is a viable emission offset strategy for a specific project. Viable in this sense is that there are a sufficient number of applicable vessels and owners interested in repowering, such that implementing an MVERP would produce enough emission reductions to make sense as a mitigation strategy.

The steps in conducting the survey include:

1. Identify vessel owners in the applicable nonattainment area(s)
2. Develop a fact sheet outlining key points of the potential MVERP
3. Conduct the survey
4. Aggregate the responses and determine the potential number of applicable vessels

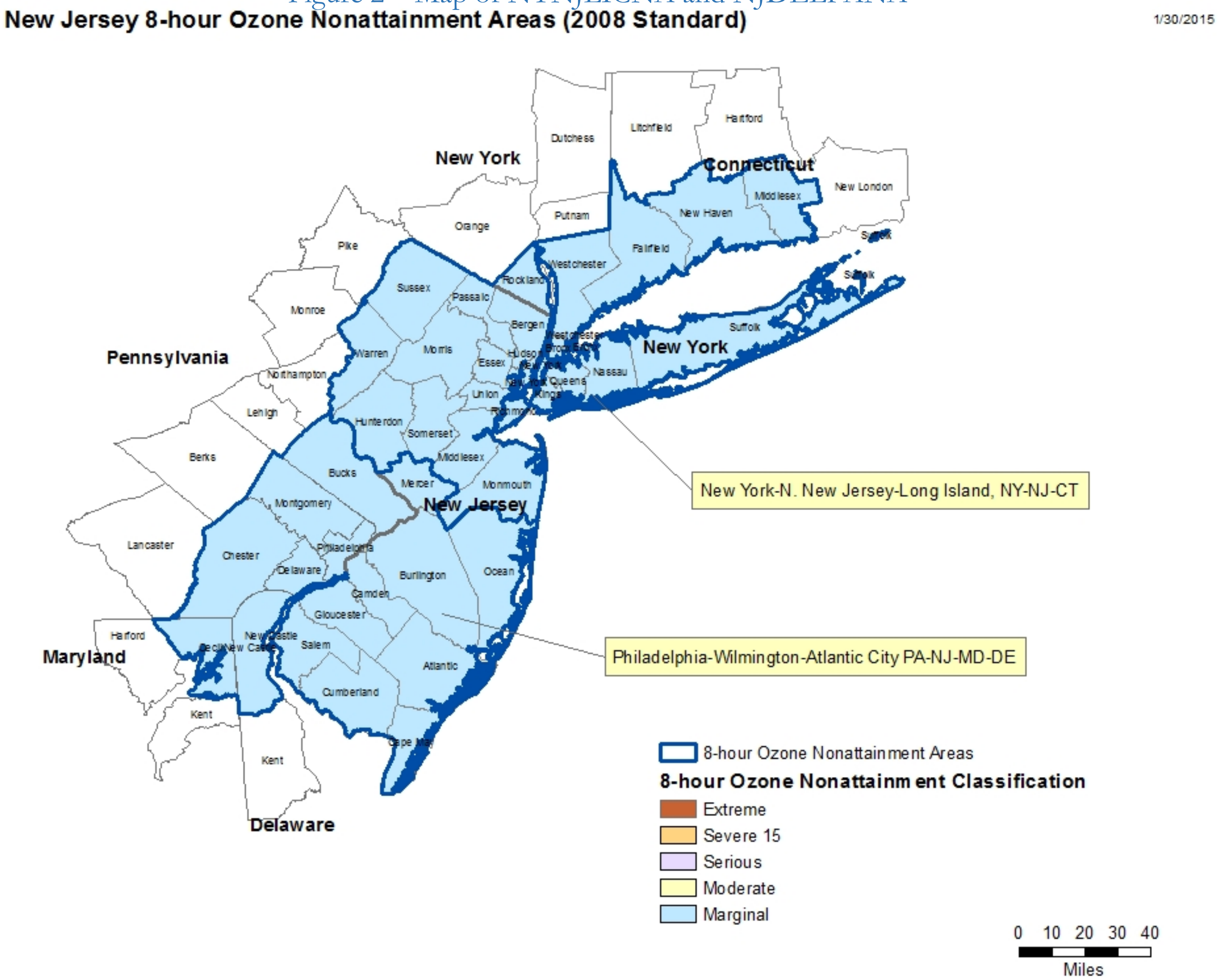
The primary data elements that need to be collected for the survey include:

1. Company name and contact information (contact name, address, phone number, email address, etc.)
2. Company vessel type(s) (tugboat, excursion, dredge, pilot boat, etc.)
3. Number of total company vessels
4. Interest in the program (yes/no/maybe)
5. Percent time operated in applicable nonattainment area(s)
6. Specific vessel information for vessels the owner is interested in repowering (name, vessel type, number of propulsion engines, number of auxiliary engines, model years, power ratings, makes and models, and average operating hours in nonattainment area(s))

[6] As defined in 40 CFR §93.152-153
[7] As defined in 40 CFR §93.153(e)

For ER, a Survey of Interest was conducted in July and August 2015. The first step to the survey was to list the names and contact phone number for vessel owners and operators in the geographic area. The Waterborne Transportation Lines of the United States, Volume 2 (Vessel Company Summary)[8] was used to identify potential vessel owners. Approximately 105 vessel owners and operators in the NYNJLICTNA and PANJMDDENA areas[9] (Figure 2) were contacted to determine interest in future repower projects.

Figure 2 – Map of NYNJLICNA and NJDELPANA



Once the contact list was completed, a fact sheet was developed (provided as Attachment 2) to introduce the program and help answer initial questions the vessel owners/operators may have. A template for collecting data was also developed to enable engine information to be collected in a uniform manner for proposed vessels and engines. The completed data template is included as Attachment 3.

[8] See: *www.navigationdatacenter.us/veslchar/veslchar.htm*
[9] See: *www.epa.gov/airquality/greenbook/nj8_2008.html*

The vessel owners/operators were contacted initially by phone and in most cases, followed up by an email and second phone call. The names of the 104 vessel owners/operators that were identified and contacted for the survey are listed below:

A&S Transportation
All Pro Marine Contracting
American RoRo Carrier
Arthur H Sulzer Associates
Atlantic Gulf Towing
Atlantic Subsea
Atlas Holding One
Bay Tours
Block Island Ferry
BMS Riverside
Boston Marine Transport
Bouchard Transportation
Breakwater Marine Construction
Bren Transp Corp
Bridgeport-Port Jeff. Steamboat
Brooklyn Marlyn Boats
Brown Thomas J & Sons
Buchanan Marine
Buck's County Riverboat
Caddel Dry Dock and Repair
Circle Line
Coastline Marine Towing
Construction & Marine
Costello Marine Contracting
Cross Sound Ferry Service
D'Onofrio General Contractors
Delaware Bay Launch Service
Delaware River & Bay Authority
Delaware River Port Authority
Disch Construction
Donjon Marine
Eastern Barge Services
Eshendfelder, Peter
Fire Island Ferries
Fischer, Frederic
Fishers Island Ferry District
Fox Marine
Gateway Towing
Gellatly & Criscione Services
Gladsky Marine
Governors Island Corp
Greater Marine Transportation
Greenwich CT, Dept Park & Rect
Harley Marine
Hays Tug & Launch Service
Henry Marine Service
Hudson Cruises
Hudson Highlands Cruises
Hueber Launch Services
Hughes Bros
Hunt Marine
Island Princess
JJC Boats
Kearny Barge Co
Ken's Booming and Boat
Kirby Offshore Marine
Lafarge Building Materials
Lehigh Maritime Corp
Liberty Fleet
Lomma Construction
Marine Environmental
Marine Oils Service of NY
Marine Steel Transport
Maritime Transport
McAllister Towing & Transportation
Metropolitan Marine Transp
Miller's Launch
Mohawk Northeast
Moran Towing
Morning Cheer
Mothers Towing
New York City
Northstar Marine
NYWT Shark and NWT Zephyr
Oceanside Marine
Pappy's Lady
Pleasure Boat Cruises
Poling & Cutler Marine
Port Imperial Ferry (NY Waterway)
Premier Yachts (Spirit Cruises)
R.B. Conway & Sons
Reinauer Transportation Co.
Reynolds Shipyard Co.
Riverboat Tours
Sea Streak
Sea Wolf Marine Transp
Seaboard Barge Corp
Skyline Cruise Lines
Specialist
Statue of Liberty
T&C Towing
Tappan Zee Constructors
Tioga Construction
Tony's Barge Service
Tucker - Roy Marine Towing
Tyler's Cruises
USS Chartering
Vane Line Bunkering
Viking Fleet
Vinik Marine
Weeks Marine
White Near Coastal Towing Co
Willis, C.G.
Willoughby Spit
Wilmington Tug
World Yacht Cruises

The response rate of the survey was 61% and the following table summarizes the general survey responses.

Table 1 - Responses

Reponses	Count	Percent
Yes, interested in repowering	49	47%
No, not interested in the program	11	11%
Not eligible	3	3%
Did not provide a response	41	39%
Owners/operators contacted	104	100%

Out of the interested vessel owners/operators that provided specific engine data, a total of 170 engines were identified. Table 2 provides summary data regarding type, count, average model year, engine rating, and operating hours in the nonattainment areas of interest. It should be noted that this is not a complete total engine count because not all of those interested provided engine data.

Table 2 – Summary of Identified Engines

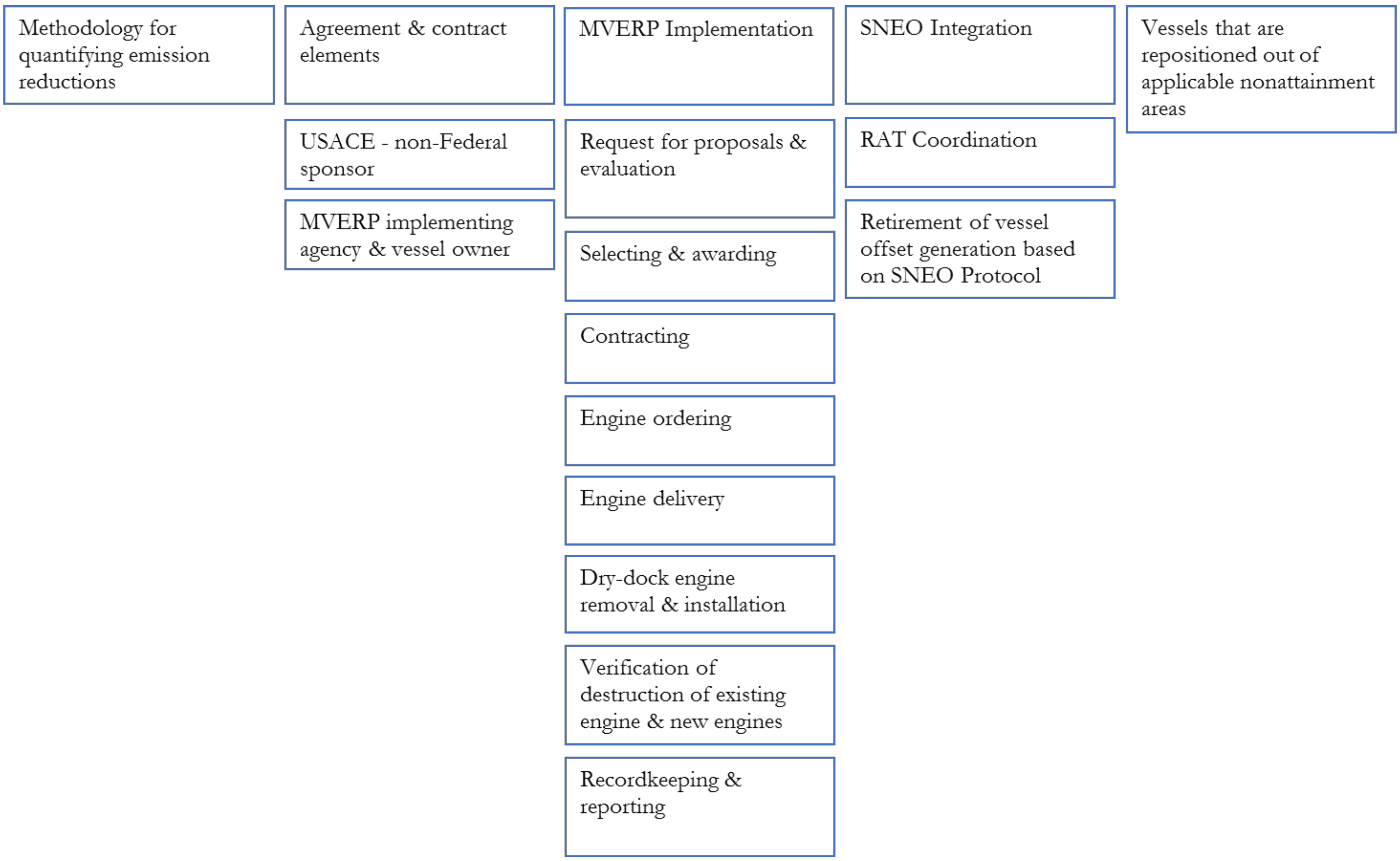
Engine Type	Count	Average Model Year	Average Engine Rating hp	Average Operating Hours
Auxiliary	71	1990	547	4,004
Propulsion	99	1985	1,447	2,989

The results from the ER-related Survey of Interest indicate that there is a substantial number of potential engine replacements that could be effectively utilized to create emissions offsets, making MVERP a viable strategy from the opportunity perspective. . An uncertainty is that the project timeline is not fully known; however, it is favorable that the project is still undergoing the GRR and the draft environmental impact statement (DEIS) processes, as the implementation of an MVERP takes time to fully implement (see Section 4).

2.2 – Elements of MVERP Implementation Process

Several major elements need to be considered and undertaken to successfully implement an MVERP. These elements are identified in Figure 3 and detailed further in the following subsections.

Figure 3 – Major Elements of MVERP



2.2.1 – Methodology for Quantifying Emission Offsets

Emission offsets are the difference between what the new engine emits while in service within the overwater boundary and what the old (replaced) engine would have emitted if it were still in service. It will be necessary to have detailed information on the old (existing) engine and on the proposed replacement engine in order to characterize their emissions on an hourly and annual basis. This information will be needed to assist in ranking the MVERP participation proposals. Details are provided in later sections.

The steps in determining potential and actual emission offset production are as follows:

1. Establish baseline emissions of the existing engine – based on tier level (or build year), horsepower, duty cycle (i.e., propulsion or auxiliary, etc.). Characterize emissions on an hourly basis (pounds per hour) and on an annual basis (tons per year) according to the average number of hours worked per year over the past five years. This will be done during MVERP proposal evaluation based on submitted information.

2. Determine potential offset production by estimating emissions from the replacement engine operating the same number of hours per year as the existing engine, and subtracting these emissions from the baseline emissions. The difference is the potential annual offset production and will be calculated during MVERP proposal evaluation as part of the ranking process.

3. Once the replacement engine is in service, the operator will track usage (hours) within the overwater boundary each month, and report quarterly on the previous three months of activity. Actual offset production will be determined by:

   a. calculating emissions from the replacement engine over the reporting period,
   b. calculating emissions that would have occurred from the original (replaced) engine, and
   c. subtracting the replacement engine's emissions from the emissions the original engine would have produced over the same period.

The calculated offsets will be available on an annual basis, with the mid-year review used as a monitoring tool to assess whether the offsets actually produced are on track to correspond with the potential offsets calculated during the proposal evaluation phase.

2.2.2 – Agreement and Contracting Elements

Several agreement and contract elements need to be completed in conjunction with implementing an MVERP. These elements include the USACE and non-Federal sponsor agreements, the contracts between the Implementing Agency and the vessel owner, the project bid package, and the project contract. This section provides details while examples, where available, are provided as attachments.

2.2.2.1 – USACE and Non-Federal Sponsor

The agreements between the USACE and the non-federal sponsor that need to reflect the implementation of an MVERP is the Project Cooperation Agreement (PCA).

2.2.2.2 –Implementing Agency & Vessel Owner

The Implementing Agency, either the non-Federal sponsor or USACE, will need to have a contract with the selected and awarded vessel owners. The contract should reference the Terms and Conditions that are required by the MVERP (Section 2.2.3.1) and provide all necessary language needed by the Implementing Agency in order to execute the transfer of funds for the purchase of new engines. An example contract from the PANYNJ MVERP is provided as Attachment 4.

2.2.2.3 –Project Bid Package Elements

The bid package for a Federal action-related project, typically a construction project, for which an MVERP is planned as a mitigation strategy to meet General Conformity requirements should contain conditions to require bidders to provide information such that emissions from performance of the project can be estimated. The information is typically provided using project-specific calculators such as have been used on HDP and Hurricane Sandy ABUs. The bidder is required, as part of a complete bid package, to submit a completed bid calculator that estimates the project emissions by calendar year. The data required includes:

1. Anticipated equipment type (e.g., backhoe, excavator, etc.) or vessel name and type (dredge, crew boat, survey boat, etc.)
2. Anticipated engine specific information (for each associated engine) such as
    a. Horsepower rating
    b. Model year
    c. EPA Tier (anticipated for the project)
    d. Number of hours, by calendar year

Language in the bid packages should require the bidder to provide a completed emissions calculator and the language should make clear that proposals that do not include a completed emissions calculator will be deemed incomplete and rejected.

Example emissions calculator bid package requirements are provided in Attachment 5.

2.2.2.4 –Project Contracting Elements

The contract for the awarded project should require the prime contractor to submit the USACE provided monthly contract emissions calculator by the 10th of each month once the project has started until the project is completed. The contract emissions calculator submittal should be certified by the contractor as accurate and auditable. The prime contractor is responsible for including all vessel and equipment engines used on the project, including equipment used by subcontractors, and submitting the calculator to the USACE Construction Division Contracting Officer Representative COR). The submitted calculator should include a list of all construction related equipment and associated vessels that worked on the project site for the preceding month, as well as the following parameters for each piece of equipment and engine:

1. Equipment identification number or vessel name
2. Equipment/vessel type (excavator, backhoe, dredge, crew boat, etc.)
3. Power rating of engine (horsepower)
4. Engine model year
5. EPA Tier, if known
6. Hours of operation for the preceding month
7. Hours of operation for the year, up to the preceding moth
8. Estimate for remaining calendar year

This data is used to track the project-related emissions and determines the actual amount of emissions offsets needed each year. The contract language should clearly require the prime contractor to submit the completed and certified calculator in a timely manner each month.

Example project emissions calculator contract requirements are provided in Attachment 5.

2.2.3 – MVERP Implementation

Implementation of a successful MVERP requires several elements to be prepared and coordinated. These elements include the Terms and Conditions; a request for proposal process; an evaluation and selection process; contracting, engine ordering, delivery, and dry dock; verification of existing engine destruction; various record keeping and reporting requirements; and coordination with the RAT. These elements are further detailed below.

2.2.3.1 – Terms and Conditions

Prior to issuing a public RFP, the USACE and non-Federal sponsor (as applicable) should agree on the Terms and Conditions of the MVERP, which should include the following, at a minimum:

1. Delineate the operational requirements. Two key elements to the effectiveness of an MVERP are the number of hours the awarded vessel operates in the nonattainment area (overwater boundary), as a percentage of the vessel's total annual operational time, and the size of the engines. Therefore, the goal is to find vessels with the largest engines that have a high percentage of their operational hours within the applicable overwater boundary.

   The operational requirements typically establish the targeted percentage of operational time within the overwater boundary. The higher the percentage of operational time in the applicable overwater boundary the higher the potential offset generation. The original PANYNJ MVERP program, set this criteria at 90% of operational time within the applicable overwater boundary and in later rounds this was reduced ultimately to 70%. Analysis can be conducted with the data provided in the Survey of Interest to develop ranges that are likely to produce the most effective candidate vessels during the RFP process. It should be noted that setting the operational limitation too high will filter out viable vessels with lower operational times in the applicable overwater boundary. Therefore, it is suggested not setting the requirement significantly higher than 70% as this allows for a broader set of vessels to apply and be evaluated, from which the ultimate selection and awards can be made.

The other key element relating to operational requirements is the term during which the vessel is required to operate within the overwater boundary, which is typically 10 years. To maximize mitigation funding, the MVERP targets vessels that work within the overwater boundary continuously, because when the vessels are outside the overwater boundary, no offsets are being generated for the funding project. Therefore, the Terms and Conditions should set a requirement of 10 years within the overwater boundary and the contract should have the same term.

2. Delineate the applicable nonattainment area(s) in which the operational requirements apply, including the overwater boundary and the seaward distance from shore. This distance is typically three nautical miles (nm), but this should be discussed and confirmed with the RAT. National Oceanic and Atmospheric Agency (NOAA) navigational charts[10] should be used and incorporated into the Terms and Conditions.

3. Specify the disposition of the existing engines once removed from the awarded vessel. Typically, certified engine destruction is required, where the engine block is cut and rendered nonfunctional/not repairable. The vessel owner should be required to provide the certificate and photographs to confirm the engines are no longer operational; this condition should be tied to the payment schedule.

   In some cases, EPA Tier 2 or Tier 3 engines may be replaced, which may provide benefits in other applications within or outside of the applicable nonattainment area(s). In anticipation of these cases, the Terms and Conditions should leave open the possibility of discussing with the RAT whether these engines can provide emissions benefits by replacing lower-tiered engines within the nonattainment area or in another area (and not be allowed to return), or whether they should be destroyed as discussed above. This case would not be known prior to issuing an RFP so the Terms and Conditions should not be written so restrictively that engine destruction is the only option.

4. Require winning bidders to provide sales invoices for the engines specified in the proposal for the vessel. This will document for the Implementing Agency that the engines in the proposal, which were the basis of the award, are actually ordered and delivered. For the latter, the vessel owner should provide proof that the invoiced engines were delivered to the shipyard performing the engine replacement. Photographs of the engines and the nameplates should be provided.

5. Require winning bidders to identify the shipyard that the vessel owner has contracted with to complete the engine replacements and provide the anticipated dates of the replacement. The vessel owner should also grant the Implementing Agency the right to visit the shipyard during the engine

[10] See: *www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml*

replacement to observe and verify that the engine replacements are consistent with the proposal.

6. Delineate recordkeeping and reporting requirements for the pre-engine replacement process, the engine replacement process, and during the operational phase to the end of the contract term. The pre-engine replacement process includes ordering the proposed engines, providing the final invoice and proof of payment, providing engine details, notification of the anticipated delivery date, dry dock schedule, and other associated elements prior to the actual engine replacement phase at the dry dock. During the engine replacement phase, information such as the dry dock schedules, start of work, date of removal of existing engines, date and certification of engine destruction, dry dock completion date, sea trial dates, results of sea trials, and when the vessel is cleared by the United States Coast Guard for full operation. The owner should be compelled to inform the Implementing Agency of any changes to these dates.

   The vessel owner must document the hours of engine operation and percent of operating time in the overwater boundary in order to quantify the generation of emission offsets. This data needs to be submitted every quarter of each year of the contracted term. The owner also must agree that the data underlying the operating hours and percent time in the overwater boundary is auditable. To confirm the time in the overwater boundary, the vessel must have an Automated Identification System (AIS) and the data from that system must be made available, as needed, to confirm the vessels time in the overwater boundary. AIS equipment is required on all commercial vessels.

7. Delineate a repayment schedule to apply if the awarded vessel is moved out of the overwater boundary prior to the completion of the term of the operational requirements. This condition is to avoid the situation of paying for new engines and then having the awarded vessel's operating area moved outside the overwater boundary. The Implementing Agency can develop this schedule keeping in mind that the goal is to keep the vessel operating within the overwater boundary for a significant portion of the term of the agreement.

8. Delineate conditions/limitations regarding the sale of the repowered vessels to ensure that the vessel either continues to provide offsets or that the company makes repayment based on item 7 above.

9. Delineate insurance requirements or other provisions for the contract term for the vessel and the repowered engines to ensure that the MVERP funding is protected if the vessel and/or repowered engines are destroyed or lost.

The Terms and Conditions, once agreed upon by the Implementing Agency and the USACE, need to be reviewed and agreed upon by the RAT.

2.2.3.2 – Request for Proposals and Evaluation

A public Request for Proposal (RFP) is used to solicit proposals for consideration for the MVERP. The RFP should be drafted by the Implementing Agency, coordinated with the USACE, and provided to the RAT for review. The RFP should include the follow informative elements, at a minimum:

1. Background on the need for and the goals of the MVERP
2. Contact information for the Implementing Agency and websites, as applicable
3. Description of what types of vessels the MVERP is targeting
4. Description of the overwater boundary
5. Provide a copy of the Terms and Conditions
6. Provide RFP related dates (when proposals are due, when awards are anticipated, etc.)
7. Provide how proposals will be ranked, selected, and how notification will be accomplished
8. Provide notification requirements to keep the Implementing Agency aware of the progress of the repowering

In addition to the informative elements above, the RFP should require the following company information to qualitatively evaluate risk, at a minimum:

Company related information:

1. Company name, contact, and contact information
2. When the company was formed and whether it has been in continual operation since its inception
3. Length of time the company has been working in the applicable overwater boundaries
4. Percentage of the company's total operations that take place within the applicable overwater boundary
5. Whether the company has filed for bankruptcy in the last 10 years
6. Certification that the company is financially stable and is not anticipating to declare bankruptcy
7. Number of employees
8. Total number of company owned vessels
9. Number of vessels proposed for MVERP
10. Anticipated dry dock facility

Repowers can be proposed for auxiliary engines, propulsion engines, or both. Typically most vessels will have two auxiliary engines and two propulsion engines. The RFP should state that if the vessel has more than one auxiliary or propulsion engine, then the proposal must be for all the engines in each service (auxiliary or propulsion). This is to avoid a partially repowered vessel being able to operate an existing engine while the repowered engine is on standby or down. For each vessel proposed to be repowered, the following information should be provided, at a minimum:

1. Vessel name and registration number
2. Date of build

3. How long the owner has had the vessel in their possession
4. Certify that the submitter has authority from the vessel owner to replace the engines, if the proposal submitter is not the vessel owner.
5. Length, width, and deadweight tonnage of the vessel
6. Vessel's U.S. state of registration
7. Type of vessel (tugboat, excursion, ferry, etc.)
8. Type of work engaged in (assist, hauling, security, passenger, etc.)
9. Vessel operating hours per year for each of the last five years (in operation whether engines are on or off)
10. Percent of vessel operational time within the overwater boundary for each of the last five years
11. List of existing engine(s) proposed for replacement and the proposed replacement engine(s)
12. For each existing engine being proposed to be replaced:
    a. Engine service type (propulsion, auxiliary, pump, etc.)
    b. Engine manufacturer
    c. Model
    d. Model year
    e. EPA Tier, if known
    f. Model number
    g. Stroke type (two/four)
    h. Indicate if the engine is turbocharged or not
    i. Engine rating (in horsepower)
    j. Emissions controls (as applicable)
    k. Indicate if the engine has been replaced or original. If replaced, when.
    l. Number of operating hours over the last five years
    m. Percent of engine operational time in the overwater boundary for the past five years
    n. Last time the engine was overhauled
    o. Anticipated next engine overhaul (without MVERP)
    p. Anticipated engine replacement (without MVERP)
13. For each replacement engine being proposed:
    a. Engine service type (propulsion, auxiliary, pump, etc.)
    b. Engine manufacturer
    c. Model
    d. Model year
    e. EPA Tier
    f. Model number
    g. Stroke type (two/four)
    h. Indicate if the engine is turbocharged or not
    i. Engine rating (in horsepower)
    j. Emissions controls (as applicable)
    k. Engine costs including delivery to the dry dock
14. Estimated costs for repower elements not covered in item 13 j above
15. Timeline for repowering including:
    a. When the engine orders will be placed
    b. Anticipated date of delivery of replacement engines to dry dock

c. Anticipated dry dock dates
d. Anticipated completion of dry dock services dates
e. Anticipated sea trials dates
f. Anticipated full operations of the repowered vessel

The RFP should be sent to the vessels owners contacted through the Survey of Interest, posted in applicable regional maritime periodicals/newsletters as identified, and notice should be provided to related maritime associations and work groups.

Evaluation of the submitted proposals should confirm that each submittal has provided the requested data, confirm the engines proposed, and then estimate the potential annual offsets by estimating the vessel's existing annual emissions and the vessel's annual emissions with the proposed replacement engines. The potential annual offsets are the annual emissions from the existing engines minus the annual emissions from the proposed engines. The cost effectiveness in cost per ton of emissions offset should be calculated for the proposed vessel over the 10-year term.

In addition, each proposed vessel should have a risk qualification that takes into account the financial health of the proposing company and other information as provided in the proposal. Finally, vessel operations can change year to year based on market conditions, so the selection process should consider a contingency, agreed upon between the Implementing Agency and the USACE, based on the risk that offsets will not be sufficient to cover General Conformity requirements.

2.2.3.3 – Selecting and Awarding

The potential annual emissions offsets and the cost effectiveness developed in 2.2.3.2 should be used to rank the proposals and selection should be based on the most cost effective solution, and the amount of offsets needed (including contingency). The mitigation budget should be allocated to maximize emissions offsets and should consider risk factors such as reposition or company bankruptcy. The selection process will be coordinated with the USACE, as applicable.

The selected owners should be notified of their award, which could be all or a portion of their proposal (in the case of multiple vessels). The vessel owner should be given up to 30 days to confirm agreement to enter into contract. If any vessel owner backs out and does not sign a confirmation letter, then another vessel should be selected from the ranked list. After all the confirmation signatures are collected, then notification should be provided to the non-awarded proposers.

A summary of the RFP process and the final results of selected of vessels to be repowered under the MVERP should be documented and provided as an information item to the RAT.

2.2.3.4 – Contracting

The contracting process should start as the awarded companies provide their signed confirmations. The Terms and Conditions need to be incorporated or appended into the contract. There should be provisions to ensure that the proposed engines are the ones actually purchased, but there should also be consideration given that if the proposed engine has a significant lead time and another engine offers the same or better emissions offset, a change in replacement engine should be allowed as long as the alternative engine is approved by the Implementing Agency before the change is made.

It is important to note that for the duration of the term of the contract, various information submittals will be required and provisions should be made in the contract to ensure that the submittals are provided in a timely and consistent fashion. This is a critical component to the contract because the data is directly linked to the quantification and verification of the generation of emissions offsets. Without the data, there are no emissions offsets. Therefore, the contract and the Terms and Conditions must be aligned and reinforce each other relating to data provisions.

The contracting should be concluded in 30 to 60 days after receipt of the confirmation letters. The RAT should be informed when the contracting process has been completed for each company and the related vessels.

2.2.3.5 – Engine Ordering

The vessel owner will order the proposed engine and provide the Implementing Agency confirmation via invoices and proof of payment. In addition, the vessel owner needs to provide the Implementing Agency the original equipment manufacturer's EPA Tier certificate, engine data sheet, and estimated date for completed engine construction and delivery to the dry dock for each engine covered by the contract. The vessel owner will need to notify the Implementing Agency promptly of any delays in the engine construction and delivery timeline.

As noted in the preceding subsection, in the situation where the proposed engine has a significant and unforeseen delay due to any of many factors, and assuming the contract is structured to allow flexibility, the vessel owner could propose an alternative engine that provides the same or greater emissions offsets or even an insignificant reduction in offsets (in some cases). The change of engine would need to have prior approval from the Implementing Agency, which would coordinate with the USACE and RAT, before the alternative engine is ordered. If this type of flexibility is to be incorporated into the MVERP, it should not be incorporated through the Terms and Conditions and addressed only through the contract.

2.2.3.6 – Engine Delivery

Upon delivery of the new engines to the dry dock, the vessel owner will notify the Implementing Agency and provide proof that the engine is the proposed engine by providing photographs of the engine onsite and pictures of the engine plate showing manufacturer, model number, identification numbers, etc.

2.2.3.7 – Dry dock

The vessel owner will notify the Implementing Agency when the vessel arrives at the dry dock yard and when the vessel is moved to dry dock. While the vessel is in dry dock, the vessel owner shall provide access for inspection during the repower process if requested by the Implementing Agency. The Implementing Agency must comply with all health and safety provision of the ship yard while onsite and not unnecessarily slow down the repower process. The vessel owner must promptly notify the Implementing Agency if there are any changes to the dry dock schedule and the nature of the delay.

2.2.3.8 – Verification of Destruction of Existing Engine

The vessel owner must notify and document the destruction the existing engine(s). The existing engines need to be decommissioned such that they are not repairable and cannot be brought back into use. The ship yard should certify the engine destruction and the owner should provide photographic evidence. The ship owner should make provisions with the ship yard to allow the Implementing Agency access to the destroyed existing engines for confirmation purposes, as necessary.

As discussed above, if the existing engines could be used beneficially in other areas to reduce emissions, then the Implementing Agency can coordinate with the RAT on how to address this issue and determine if the engines can be resold outside the area.

2.2.3.9 – Recordkeeping and Reporting

Recordkeeping and reporting requirements are separated between the three phases of the MVERP process: pre-engine repower, engine repowering at the ship yard, and operational. Several elements related to recordkeeping and reporting are noted above in the various sections and are ultimately tied to the requirements of the Terms and Conditions and the ultimate contract between the Implementing Agency and vessel owner.

As stated earlier, recordkeeping and reporting are critical elements to the MVERP process, both on the construction project (emission producing) side and the offset (emission offsetting) side. The contract and Terms and Conditions must align with each other and make it incumbent on the contractor to meet the recordkeeping and reporting requirements or the emission offsets and compliance with applicable General Conformity requirements are at risk. In addition, the Terms and Conditions and/or the contract should allow the provision that the Implementing Agency can, at the agency's discretion, audit the information and data underlying the recordkeeping requirements. Finally, a balance must be struck such that the reporting and recordkeeping provide the data needed for the MVERP to be successful, but limited beyond those provisions as not to inhibit participation because the requirements are too onerous. Examples from the PANYNJ MVERP relating to recordkeeping and reporting are provided in Attachment 4.

The Implementing Agency needs to provide MVERP updates to the RAT as detailed in the next subsection.

2.2.3.10 – Coordination with NAN and RAT

The Implementing Agency, if not NAN, needs to coordinate the implementation of the agreed upon MVERP closely with NAN. All emission calculators (bid and project) along with reductions from the repowered vessels will be coordinated with NAN for review and confirmation, prior to coordinating with the RAT. This coordination provides the Implementing Agency the experience developed by NAN over the HDP and Sandy Hurricane ABU projects related to the quantification of the offsets, emissions netting, coordination with the RAT, and ensures that the project partners are in agreement during the implementation of the MVERP, even after the specific project is completed and the MVERP is still active.

Further, the Implementing Agency needs to coordinate with the RAT. Again, if the Implementing Agency is not NAN, then coordination with the RAT is facilitated through NAN. The RAT should be viewed as a resource to the Implementing Agency and provides third-party and regulatory review, can cooperatively develop solutions to issues that arise, and assist through its advisement and support as a RAT member to ensure that the MVERP is successful.

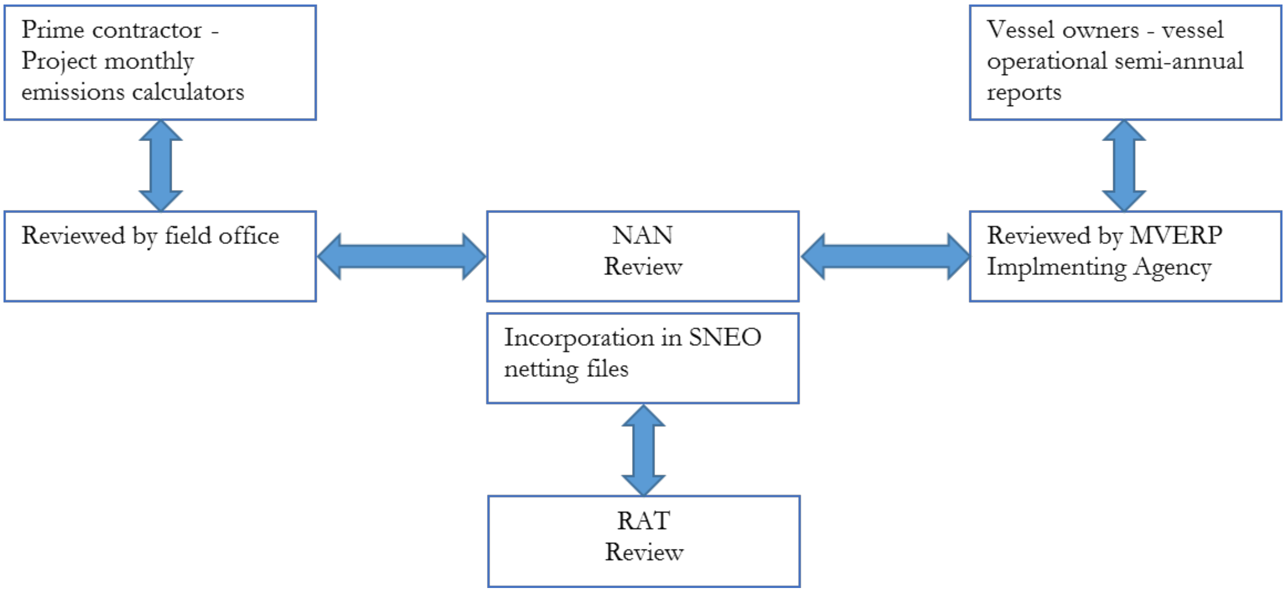
2.2.3.11 – Vessels that are Repositioned

Should a vessel operator notify the Implementing Agency that an MVERP funded vessel is to be repositioned out of the overwater boundary, the Implementing Agency will notify NAN and recover funds based on the contract conditions. As an alternative to recovering funds under the contract, the vessel operator should be provided the opportunity to propose an alternative option, such as another vessel that the operator repowers in trade for taking out the MVERP funded vessel. The proposed alternative scenario needs to be coordinated with the RAT and agreed to prior to acceptance of the alternative by the Implementing Agency. The contract should take this option into consideration when delineating the requirements for vessels that are repositioned.

2.2.4 – SNEO Integration

MVERP generated offsets will be integrated into the SNEO netting consistent with the provisions of the SNEO Protocol. NAN administers the SNEO netting and coordination and review on project-related emissions and MVERP generated offsets is required as part of integrating new MVERPs into the netting. The SNEO emissions netting is reviewed by the RAT and documents a project's compliance with applicable General Conformity mitigation requirements. The information flow for the process is illustrated in Figure 4.

Figure 4 – SNEO Integration Illustration



The project that is using the MVERP generated offsets, as stated above, needs to complete and deliver monthly project emissions calculators to the applicable USACE CO field office, which reviews them for completeness (i.e., making sure that vessels or equipment is not being left out of the calculator, that the operational hours seem reasonable, etc.) and if there are any issues the field office engages the project's prime contract for updates. Once the field office review is completed, the project monthly calculators are sent to the Clean Air Act subject matter expert (SME) technical point of contact in Planning Division, Environmental Analyses Branch (PLE) for compliance review (i.e., making sure that the calculators are complete, identifying any anomalies, confirming the calculator is in proper working order, etc.) and if there are any queries or updates need, and coordinates revisions with the CO field office. Once the project emission calculators are completed, they are incorporated into the SNEO netting tables under USACE and the appropriate District and project. This process repeats every month, with calculators typically due to NAN by the 10th of each month.

From the MVERP offset generation side, the vessel owners will log their engines' operational time and the percentage of that time in the overwater boundary. The operators will report operational parameters, for each applicable vessel and engine, on a quarterly basis, which would need to be provided 4-6 weeks after the end of each quarter to the Implementing Agency for review. The reviews by the Implementing Agency include:

- Review for completeness to ensure that each vessel and engine that was funded under the MVERP are being documented and the submittal meets the contract requirements.
- Review of the operational data to determine if the vessel is performing above or below anticipated operational levels and the factors that are effecting operations.

If there are any anomalies identified during these reviews, the Implementing Agency will coordinate with the vessel owner to make updates as needed. When the operational reports are complete, the Implementing Agency will estimate the emissions offsets for the reporting period by vessel and by engine. A summary is developed for each vessel that is participating in the MVERP that includes, at a minimum:

1. Vessel name
2. Activity indication (active or not active)
3. Repowered engines service (propulsion, auxiliary, pump, etc.)
4. Repowered engine power rating, in horsepower
5. Total operational time, for each repowered engine
6. Operational time in the overwater boundary, for each repowered engine
7. Emissions calculations for prior and repowered engine, by engine (using the methods described in 2.2.1)
8. The generated offsets, by engine (the delta between the emissions of the prior and repowered engines)
9. Any notations that relevant to the operational period (vessel was laid up for maintenance, vessel hours effected by weak demand, etc.)

The summary is provided to NAN for review and comments will be addressed by the Implementing Agency, and a final draft summary provided. NAN will distribute the final draft six month summary reports to the RAT for their review and comment will be incorporated.

Section 3 – Costing

Two costing elements typically need to be taken into account when determining the ultimate cost of implementing an MVERP: administrative costs (throughout the MVERP process) and reimbursement for capital equipment purchases (repowered engines). These cost elements are discussed below.

3.1 – Administrative Costs

Administrative costs are dependent on the scope of the MVERP, the number of vessels, and the Implementing Agency's approach to the administrative elements of the MVERP (fully self-administer, contract out portions or all of the administration, etc.). The anticipated administrative costs can be grouped into the following:

- Costs associated with developing and finalizing the agreements between the Implementing Agency and NAN in order to implement the MVERP.
- Initial cost associated with the development and implementation of the RFP process including development of the RFP package, development of public notices, conducting outreach, review and evaluation of proposals, selection, awarding, contracting, and coordination with NAN and the RAT. For the PANYNJ MVERP 2 the estimate for the initial costs were approximately $75,000; however, that was building off the previous MVERPs. Therefore, for costing purposes the initial costs are anticipated to range from $75,000 to $150,000.
- Operational costs associated with oversight and audit of contractual requirements relating to the purchase of the new engines; delivery, dry dock, and commissioning schedules; reporting to NAN; confirming the existing engines have been destroyed, semi-annual operational reports once the MVERP funded vessel is commissioned, estimates of the emissions offsets, coordination with vessel operator, auditing, and coordination with NAN and the RAT for the duration of the MVERP. For the PANYNJ MVERP 2 the estimate for the annual operational costs were approximately $25,000. Again, these costs were benefited by implementing earlier programs. Therefore for costing purposes the operational costs are anticipated to range from $25,000 to $35,000 per year for the life of the MVERP.
- Costs of NAN's labor related to support, coordination, facilitation, and incorporation of offsets into the SNEO netting tables.

3.2 – Reimbursement for Capital Purchases

The costs associated with the repowered engines should include only the costs of the engines as proposed and the costs of delivering the engine to the ship yard where the dry dock or engine replacement will take place. These costs should be validated through the final invoice from the engine original equipment manufacturer to the vessel owner.

Engine costs range significantly depending on the rated power and EPA engine tier. From the PANYNJ MVERPs, the following engine costs were funded:

- MVERP1
  - Total cost: $2.44 million
  - Number of vessels: 12
  - Average cost per vessel: $271,500
  - Average annual reductions: 90.1 tons NOx
  - Total reduction: 827.5 tons NOx
  - Cost effectiveness: $2,950/ton NOx reduced
- MVERP2
  - Total cost: $1.71 million
  - Number of vessels: 8
  - Average cost per vessel: $189,700
  - Average annual reductions: 250.0 tons NOx
  - Total reduction: 2,035 tons (estimated)
  - Cost effectiveness: $840/ton NOx reduced

It should be noted the future repowers to the higher EPA engine tiers will increase the costs of the engine purchases and the potential emissions reductions.

3.3 – Planning Cost Estimate

To estimate the administrative and repower costs for developing and implementing an MVERP for ER, for planning purposes, the following assumptions are made:

1. ER MVERP assumed to be cost weighted average of MVERP 1 & 2
2. Duration of ER MVERP 10 years; operational costs based on PANYNJ data
3. Estimated highest annual offsets of 60 tpy NOx

The estimated cost for the scenario above is:

1. Administrative Costs		
a. Agreements		$25,000
b. Initial Costs		$135,000
c. Operational Costs ($30,000 x 10 years)		$300,000
	Subtotal	$460,000
2. Capital Reimbursement Costs		
a. Engine repowers (with contingency)		$875,000
3. Total Planning Costs (with contingency)		$1,335,000

Section 4 – MVERP Timeline

Planning and implementing an MVERP strategy is quite an involved and up-front intensive effort. Getting the proper agreements negotiated, planning, request for proposal, and installation of the new engines is a significant effort. Once all the vessels are repowered and operational, then the administration of an MVERP focuses around data collection and reporting twice a year for ten years.

The draft timeline presented on the next page shows the major elements of planning and implementing an MVERP between USACE and a non-federal sponsor.

USACE - non-Federal sponsor Agreements	4-16 weeks
Development & coordination on Terms and Conditions	4-12 weeks
Development and coordination on contract language	4-12 weeks
RFP development & coordination	4-8 weeks
RFP posting	2 weeks
RFP closing	4-8 weeks
Proposal evaluation	3-6 weeks
Selecting & awarding	2-4 weeks
Vessel owner confirmation	2-4 weeks
Contracting	4-6 weeks
Engine ordering	2-3 weeks
Engine delivery	6-24 months
Dry-dock removal & installation	2-10 weeks
Verification of destruction of existing engine & new engines	1-3 weeks
Recordkeeping & reporting	Ongoing; reporting semiannually
SNEO Integration	Ongoing; integration semiannually
Retirement of vessel offset generation based on SNEO Protocol	Typically 10 years

Can overlap to some extent (Development and coordination on contract language; RFP development & coordination)

Start of emissions offset generation (after Verification of destruction of existing engine & new engines)

Attachment 1 – SNEO Protocol

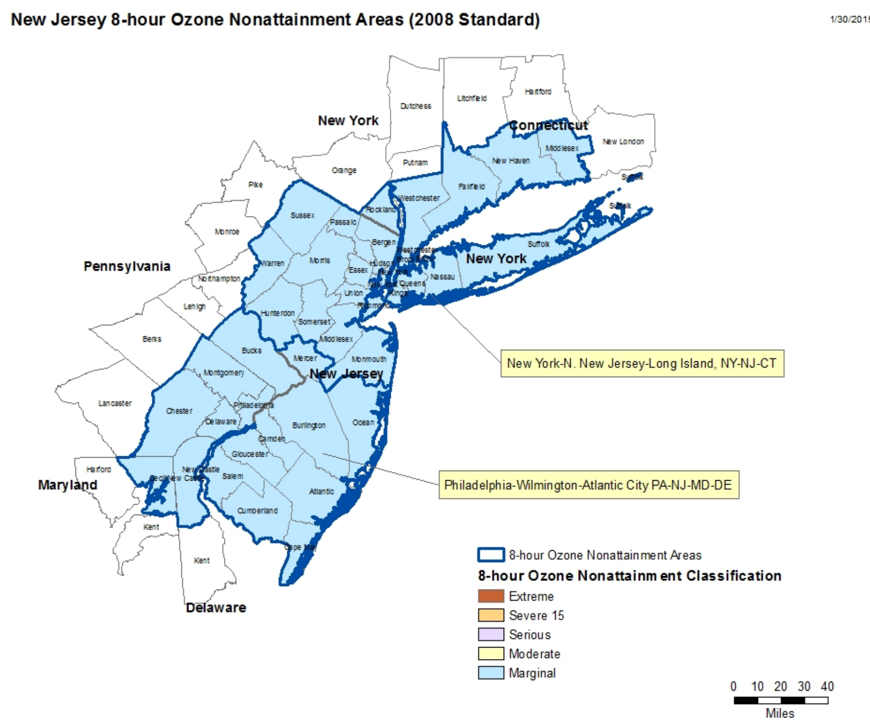
Attachment 2 – MVERP Survey of Interest Fact Sheet

FACT SHEET

The United States Army Corps of Engineers New York District is conducting a survey to determine interest from vessel owners/operators in a Marine Vessel Engine Replacement Program, similar to the programs conducted by the Port Authority of New York and New Jersey. The Army Corps is interested in conducting engine replacement programs to offset upcoming project emissions.

What will the program pay?

The program would pay for new marine engines that have lower emissions (and typically lower fuel consumption) than existing vessel engines. The vessel owner would be responsible for costs associated with installation and any changes to onboard machinery.



Who is eligible?

The area of operation includes NY/NJ harbor, Long Island Sound, Long Island and New Jersey coast, and Philadelphia/Delaware River areas (see figure) and the Army Corps is looking for vessels that spend a significant percent of their operational time in these areas (75% or greater). Vessel owners in this area can apply for funding for propulsion and auxiliary engines.

What are the requirements?

Repowered vessels will be required to operate in the above areas for 10 years; if the vessel is moved out of the area a decreasing repayment schedule would apply (similar to the Port's program).

What is the timeframe?

The programs would be completed through a Request for Proposals anticipated to come out in

Interested?

If your company is interested in the program, please respond to the following questions:
Name of Company
Contact information for the Request for Proposal (Name, Mail, Phone, email)
What type of vessel? For example: excursion, towboat, tugboat, ferry, workboat, supply boat.
How many vessels and engines would you consider repowering?
Engine Information, if available (model year, horsepower, engine make/model, average hours)

Contact

For further questions, please contact the Starcrest Consulting Group consultant that sent you this fact sheet.

Attachment 3 – Survey of Interest Data Template

Attachment 4 – Sample PANYNJ MVERP Contract with Vessel Owner

Attachment 5 – Bid Package & Contract Language Examples