

# **Flood Risk Management Feasibility Study**

## **Peckman River Basin New Jersey**

### **Draft Integrated Feasibility Report and Environmental Assessment**

#### **Appendix D: Cost Engineering**



**US Army Corps  
of Engineers®  
New York District**

**October 2019**

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## INTRODUCTION

This Appendix presents the detailed cost estimates for Peckman River (TSP). Peckman River project provides solutions to reduce the impact of flooding in Peckman River located in Essex and Passaic Counties, NJ, which is subjected to storm-related flooding on a regular basis. It consists of a combination of channel modifications, levees, floodwalls, retaining walls, diversion culvert, and nonstructural treatments of properties in the flood prone areas. The Total First Cost is presented in Table 1 below.

**Table 1 – First Cost**

**Peckman River**

October 2018 Price Level

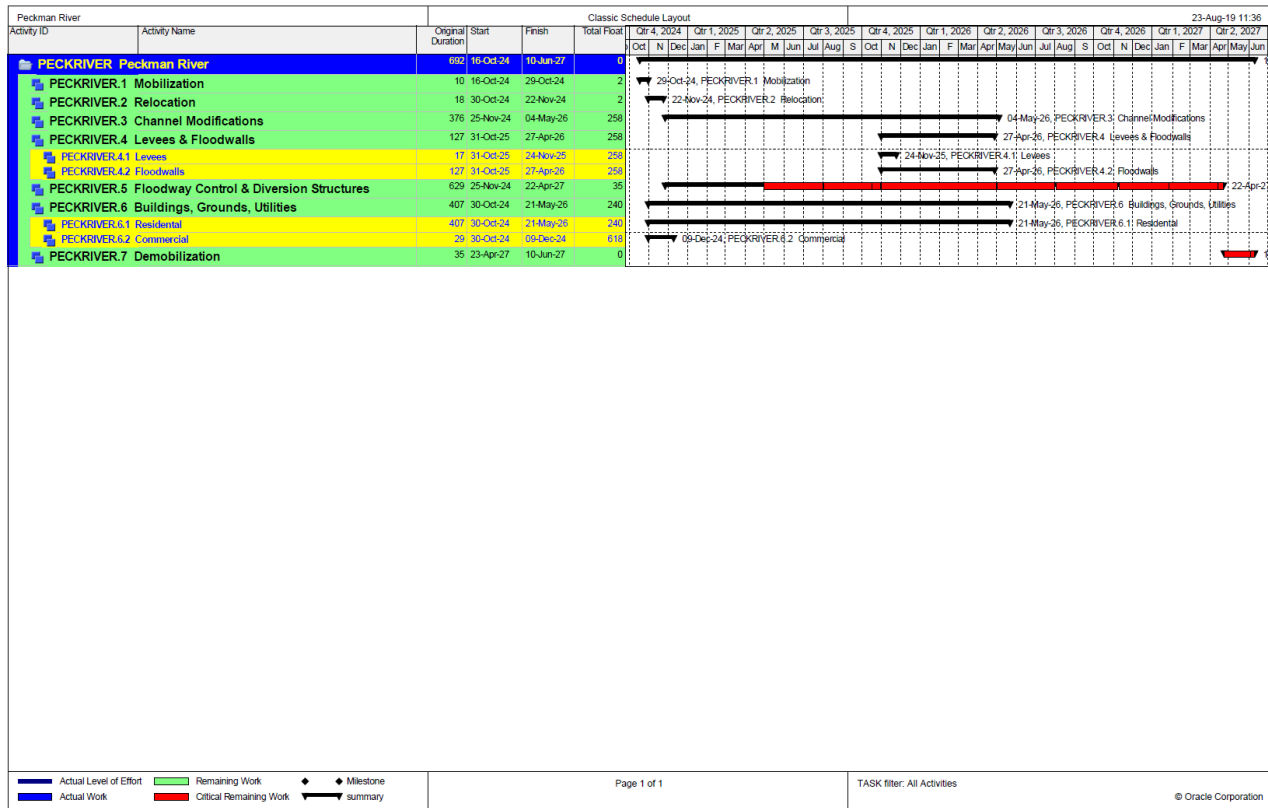
Feat. Acct.	Description	Subtotal	Cont. %	Cont \$	Total Cost
01	Lands & Damages	\$ 9,758,060	45%	\$ 4,391,127	\$ 14,149,187
	<b>Total Lands &amp; Damages</b>	<b>\$ 9,758,060</b>		<b>\$ 4,391,127</b>	<b>\$ 14,149,187</b>
02	Relocation	\$ 321,734	47%	\$ 151,215	\$ 472,948
	<b>Total Relocation</b>	<b>\$ 321,734</b>		<b>\$ 151,215</b>	<b>\$ 472,948</b>
06	Fish and Wildlife Facilities	\$ 1,530,065	47%	\$ 719,131	\$ 2,249,196
	<b>Total Fish &amp; Wildlife Facilities</b>	<b>\$ 1,530,065</b>		<b>\$ 719,131</b>	<b>\$ 2,249,196</b>
09	Channels & Canals	\$ 11,995,551	47%	\$ 5,637,909	\$ 17,633,459
	<b>Total Channels &amp; Canals</b>	<b>\$ 11,995,551</b>		<b>\$ 5,637,909</b>	<b>\$ 17,633,459</b>
11	Levees & Floodwalls	\$ 7,378,218	47%	\$ 3,467,762	\$ 10,845,980
	<b>Total Levees &amp; Floodwalls</b>	<b>\$ 7,378,218</b>		<b>\$ 3,467,762</b>	<b>\$ 10,845,980</b>
15	Floodway Control & Diversion Structure	\$ 39,180,416	47%	\$ 18,414,796	\$ 57,595,212
	<b>Total Floodway Control &amp; Diversion Structure</b>	<b>\$ 39,180,416</b>		<b>\$ 18,414,796</b>	<b>\$ 57,595,212</b>
18	Cultural Resource Preservation	\$ 1,550,000	47%	\$ 728,500	\$ 2,278,500
	<b>Total Cultural Resource Preservation</b>	<b>\$ 1,550,000</b>		<b>\$ 728,500</b>	<b>\$ 2,278,500</b>
19	Buildings, Grounds & Utilities	\$ 7,506,397	47%	\$ 3,528,007	\$ 11,034,403
	<b>Total Buildings, Grounds &amp; Utilities</b>	<b>\$ 7,506,397</b>		<b>\$ 3,528,007</b>	<b>\$ 11,034,403</b>
30	Planning, Engineering & Design	\$ 10,419,357	47%	\$ 4,897,098	\$ 15,316,455
31	Construction Management	\$ 5,556,990	47%	\$ 2,611,786	\$ 8,168,776
<b>Total First Cost</b>		<b>\$ 95,196,788</b>		<b>\$ 44,547,329</b>	<b>\$ 139,744,117</b>



# BASIS OF COST

The construction cost estimate was developed in MCACES, Second Generation (MII) using the appropriate Work Breakdown Structure (WBS) and based on current estimated quantities provided by the Hydraulics & Hydrology, Civil, and Structural Engineers. The cost estimate was developed from these quantities using cost resources such as RSMeans, historical data from similar construction features, and MII Cost Libraries. The contingencies were developed based on input to the Cost Schedule Risk Analysis (CSRA) (template provided by the Cost Mandatory Center of Expertise, MCX, Walla Walla District). These contingencies were applied to the construction cost estimates to develop the Total Project First Cost. The construction duration for Peckman River was estimated at 32 months, as shown in Figure 1. The construction schedule was developed based on the crew outputs referenced from RSMeans with the assumption that multiple crews would work simultaneously.

**Figure 1 – Construction Schedule**



## CONTINGENCIES

As stated in ER 1110-2-1302, the goal in contingency development is to identify the uncertainty associated with an item of work or task to an acceptable degree of confidence. Consideration must be given to the detail available at each stage of planning, design, or construction for which a cost estimate is being prepared. Contingency may vary throughout the cost estimate and could constitute a significant portion of the overall costs when data or design details are unavailable. Final contingency development and assessment of the potential for cost growth is included in this cost estimate. To develop the Total Project First Cost, contingencies developed in the CSRA were applied. The construction cost contingency developed per CSRA for Peckman River is shown in Table 2 below.

**Table 2 - Contingencies**

<b>Element</b>	<b>Contingency Factor</b>
Relocation	47%
Fish and Wildlife Facilities	47%
Channels & Canals	47%
Levees and Floodwalls	47%
Floodway Control & Diversion Structure	47%
Cultural Resource Preservation	47%
Buildings, Grounds & Utilities	47%
<b>Total Construction Contingency</b>	<b>47%</b>
Lands & Damages	45%
Planning, Engineering, and Design	47%
Construction Management	47%

## LANDS AND DAMAGES

To construct the proposed plan, local stakeholders are required to provide certain lands and easements. Studies were conducted by the Real Estate Division to determine the estimated value



of lands and easements needed for the channel improvement, installation of retaining walls, and construction of levees, floodwalls, and diversion culverts along with the nonstructural treatments of residential and commercial properties.

## **PLANNING, ENGINEERING AND DESIGN**

The cost was developed for all activities associated with the planning, engineering and design effort. The cost for this account includes the preparation of Design Documentation Reports, plans, and specifications for Peckman River and engineering support during construction through project completion. It includes all the in-house labor based upon work-hour requirements, material and facility costs, travel, and overhead.

## **CONSTRUCTION MANAGEMENT**

The cost was developed for all construction management activities from pre-award requirements through final contract closeout. This cost includes the in-house labor based upon work-hour requirements, materials, facility costs, support contracts, travel and overhead. The cost was developed based on the input from the construction division in accordance with the Civil Works Breakdown Structure (CWBS) and includes, but is not limited to, anticipated items such as the salaries of the resident engineer and staff, surveyors, inspectors, drafters, clerical, and custodial personnel; operation, maintenance and fixed charges for transportation and for other field equipment; field supplies; construction management, general construction supervision; and project office administration, distributive cost of area office and general overhead charged to the project.

## **INTEREST DURING CONSTRUCTION**

Interest during construction (IDC) is the amount of interest the construction cost would earn were it invested from the beginning of construction until the accumulation of benefits begins. IDC cost has been added to the project cost to determine investment cost. Average annual cost was determined based on investment cost, which includes IDC. The pre-base year costs were estimated using the Federal interest rate of 2.875%. The annual costs include the annualized investment cost along with annual operation and maintenance cost. A detailed breakdown of annual costs for Peckman River is presented in Table 3 below.



**Table 3 – Annualized Cost**

<b>Peckman River (TSP) Annualized Cost Summary</b>	
<b>First Cost</b>	\$ 139,744,117
<b>Sunk Cost</b>	\$ -
<b>Investment Cost</b>	
Interest During Construction <sup>(a)</sup>	\$ 5,245,543
<b>Total Investment Cost:</b>	<b>\$ 144,989,660</b>
<b>Annual Costs</b>	
Annualized Investment Cost <sup>(b)</sup>	\$ 5,502,080
Annualized Operation & Maintenance Cost <sup>(c)</sup>	\$ 510,548
<b>Total Annual Cost*</b>	<b>\$ 6,012,629</b>
*October 2018 Price Level	
(a) Based on 32 months of construction @ 2.875% (IDC, E&D, RE and Sunk costs calculated separately and included in this total)	
(b) Annualized investment cost only includes the remaining features. For annualized investment cost with the sunk cost, please see the economic appendix. I = 2.875% and n = 50 yrs	
(c) Assume 0.5% of total Construction Cost base on historical data.	

## **COST SUMMARY**

The Total Fully Funded Project cost is \$172,701,000.



## Figure 2 – Total Project Cost Summary

PROJECT: Peckman River (TSP)  
 PROJECT NO: P2 109001  
 LOCATION: Peckman River Basin, NJ

DISTRICT: NAN  
 POC: CHIEF, COST ENGINEERING, Mukesh Kumar

PREPARED: 8/19/20109

This Estimate reflects the scope and schedule in report: 0

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)				
		COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Spent Thru: 1-Oct-18 (\$K)	TOTAL FIRST COST (\$K)	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
WBS NUMBER	Civil Works Feature & Sub-Feature Description	C	D	E	F	G	H	I	J	K	L	M	N	O	
		Program Year (Budget EC): 2019 Effective Price Level Date: 1 OCT 18													
<b>02</b>	RELOCATIONS	\$322	\$151	47.0%	\$473	0.0%	\$322	\$151	\$473	\$0	\$473	23.5%	\$397	\$187	\$584
<b>06</b>	FISH & WILDLIFE FACILITIES	\$1,530	\$719	47.0%	\$2,249	0.0%	\$1,530	\$719	\$2,249	\$0	\$2,249	23.5%	\$1,889	\$888	\$2,777
<b>09</b>	CHANNELS & CANALS	\$11,996	\$5,638	47.0%	\$17,633	0.0%	\$11,996	\$5,638	\$17,633	\$0	\$17,633	23.5%	\$14,809	\$6,960	\$21,770
<b>11</b>	LEVEES & FLOODWALLS	\$7,378	\$3,468	47.0%	\$10,846	0.0%	\$7,378	\$3,468	\$10,846	\$0	\$10,846	23.5%	\$9,109	\$4,281	\$13,390
<b>15</b>	FLOODWAY CONTROL & DIVERSION STRU	\$39,180	\$18,415	47.0%	\$57,595	0.0%	\$39,180	\$18,415	\$57,595	\$0	\$57,595	23.5%	\$48,371	\$22,734	\$71,105
<b>18</b>	CULTURAL RESOURCE PRESERVATION	\$1,550	\$729	47.0%	\$2,279	0.0%	\$1,550	\$729	\$2,279	\$0	\$2,279	23.5%	\$1,914	\$899	\$2,813
<b>19</b>	BUILDINGS, GROUNDS & UTILITIES	\$7,506	\$3,528	47.0%	\$11,034	0.0%	\$7,506	\$3,528	\$11,034	\$0	\$11,034	23.5%	\$9,267	\$4,356	\$13,623
	<b>CONSTRUCTION ESTIMATE TOTALS:</b>	\$69,462	\$32,647		\$102,110	0.0%	\$69,462	\$32,647	\$102,110	\$0	\$102,110	23.5%	\$85,756	\$40,305	\$126,062
<b>01</b>	LANDS AND DAMAGES	\$9,758	\$4,391	45.0%	\$14,149	0.0%	\$9,758	\$4,391	\$14,149	\$0	\$14,149	19.0%	\$11,608	\$5,224	\$16,832
<b>30</b>	PLANNING, ENGINEERING & DESIGN	\$10,419	\$4,897	47.0%	\$15,316	0.0%	\$10,419	\$4,897	\$15,316	\$0	\$15,316	24.8%	\$13,008	\$6,114	\$19,122
<b>31</b>	CONSTRUCTION MANAGEMENT	\$5,557	\$2,612	47.0%	\$8,169	0.0%	\$5,557	\$2,612	\$8,169	\$0	\$8,169	30.8%	\$7,270	\$3,417	\$10,686
	<b>PROJECT COST TOTALS:</b>	\$95,197	\$44,547	46.8%	\$139,744		\$95,197	\$44,547	\$139,744	\$0	\$139,744	23.6%	\$117,642	\$55,060	\$172,701

CHIEF, COST ENGINEERING, Mukesh Kumar

ESTIMATED TOTAL PROJECT COST: **\$172,701**

PROJECT MANAGER, Dag Madara

CHIEF, REAL ESTATE, xxx



**Peckman River Basin**



PROJECT: Peckman River (TSP)  
 LOCATION: Peckman River Basin, NJ  
 This Estimate reflects the scope and schedule in report;

0

DISTRICT: NAN  
 POC: CHIEF, COST ENGINEERING, Mukesh Kumar

PREPARED: 8/19/20109

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: <b>19-Aug-19</b>		Effective Price Level: <b>1-Oct-18</b>		Program Year (Budget EC): <b>2019</b>		Effective Price Level Date: <b>1 OCT 18</b>						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
<b>PHASE 1 or CONTRACT 1</b>														
<b>02</b>	RELOCATIONS	\$322	\$151	47.0%	\$473	0.0%	\$322	\$151	\$473	2026Q2	23.5%	\$397	\$187	\$584
<b>06</b>	FISH & WILDLIFE FACILITIES	\$1,530	\$719	47.0%	\$2,249	0.0%	\$1,530	\$719	\$2,249	2026Q2	23.5%	\$1,889	\$888	\$2,777
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<b>CONSTRUCTION ESTIMATE TOTALS:</b>		<b>\$69,462</b>	<b>\$32,647</b>	<b>47.0%</b>	<b>\$102,110</b>		<b>\$69,462</b>	<b>\$32,647</b>	<b>\$102,110</b>			<b>\$85,756</b>	<b>\$40,305</b>	<b>\$126,062</b>
<b>01</b>	LANDS AND DAMAGES	\$9,758	\$4,391	45.0%	\$14,149	0.0%	\$9,758	\$4,391	\$14,149	2025Q1	19.0%	\$11,608	\$5,224	\$16,832
<b>30</b>	PLANNING, ENGINEERING & DESIGN													
15.0%	Planning, Engineering & Design	\$10,419	\$4,897	47.0%	\$15,316	0.0%	\$10,419	\$4,897	\$15,316	2025Q1	24.8%	\$13,008	\$6,114	\$19,122
<b>31</b>	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$5,557	\$2,612	47.0%	\$8,169	0.0%	\$5,557	\$2,612	\$8,169	2026Q2	30.8%	\$7,270	\$3,417	\$10,686
<b>CONTRACT COST TOTALS:</b>		<b>\$95,197</b>	<b>\$44,547</b>		<b>\$139,744</b>		<b>\$95,197</b>	<b>\$44,547</b>	<b>\$139,744</b>			<b>\$117,642</b>	<b>\$55,060</b>	<b>\$172,701</b>



# MII Report

Print Date Mon 7 October 2019  
 Eff. Date 8/16/2019

U.S. Army Corps of Engineers  
 Project : Peckman River (TSP)  
 Peckman River

Time 17:16:23

Summary Page 1

Description	Quantity	UOM	ProjectCost
<b>Summary</b>			<b>69,462,380.60</b>
Alternative 10b-40	1.0000	EA	69,462,380.60
02 Relocation	1.0000	EA	321,733.62
06 Fish and Wildlife	1.0000	EA	1,530,065.48
09 Channel Modifications	1.0000	EA	11,995,550.65
11 Levees & Floodwalls	1.0000	EA	7,378,217.57
15 Floodway Control & Diversion Structure	1.0000	EA	39,180,416.41
18 Cultural Resource Preservation	1.0000	EA	1,550,000.00
19 Buildings, Grounds & Utilities	1.0000	EA	7,506,396.87

Labor ID: NLS2016

EQ ID: EP16R01

Currency in US dollars

TRACES MII Version 4.2



**Peckman River Basin**