



Case Study: Dredging and Beneficial Reuse of Sediments from the Delaware and Raritan Canal, New Jersey

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Overview

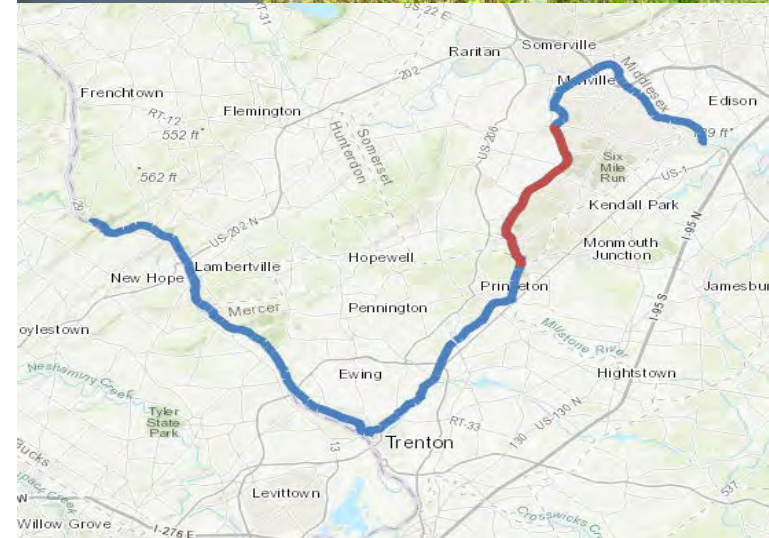
- 1 Site Introduction and Background
- 2 Site Set-Up and Preparation
- 3 Dredging Operations
- 4 Beneficial Reuse Program and Off-Site Transport
- 5 Next Steps

1

Site Introduction and Background

Delaware and Raritan Canal Overview

- Drinking water supply for multiple water works
- Maintained by the New Jersey Water Supply Authority (NJWSA)
- New Jersey State Park
- Dredging covers 10.5-mile stretch of the Canal
 - From Kingston Lock to Amwell Road



Project Purpose and Goals

Purpose and Need

- Maintain water supply

Project Objectives

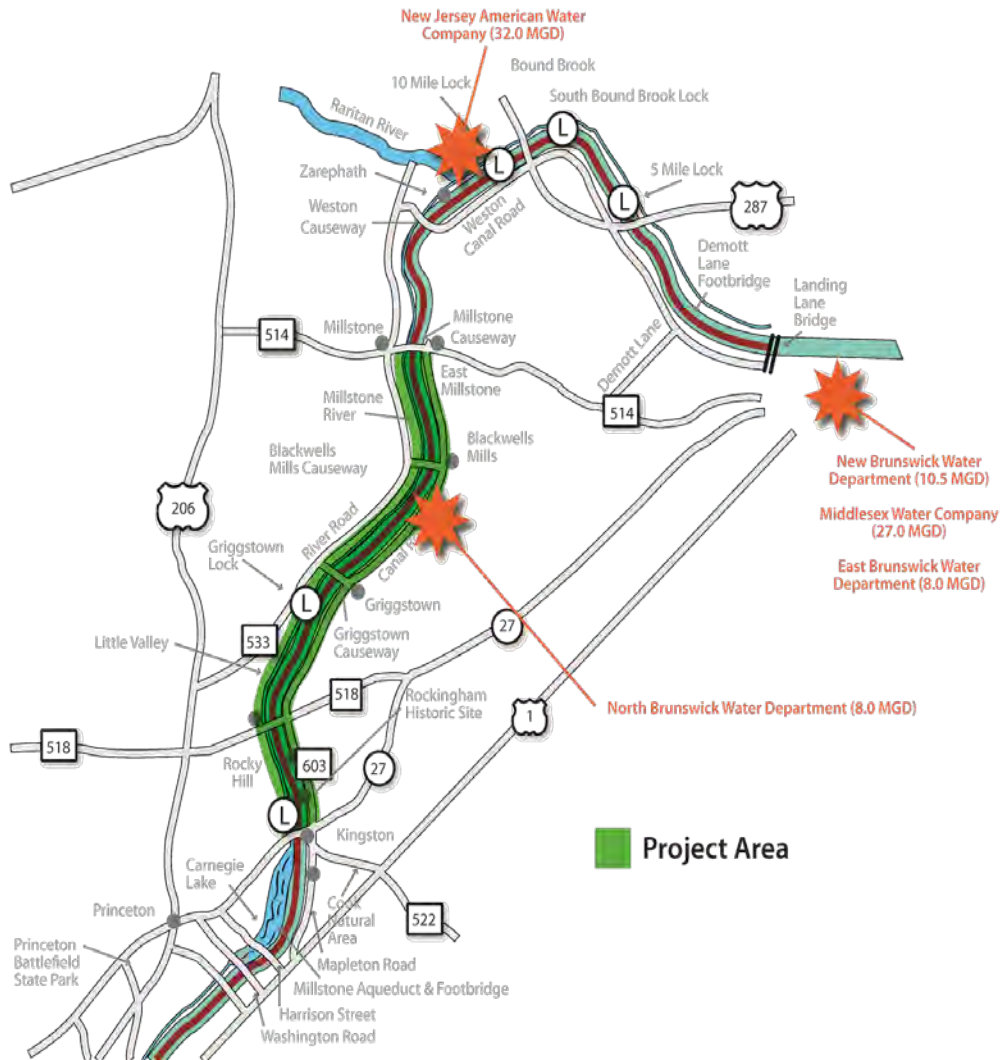
- Remove 248,000 CY of sediment deposit from the Canal to restore flow capacity
- Remove 48,000 CY of historically dredged material from the NJWSA stockpile site

Project Goals

- Protect the historical integrity of the Canal
- Protect existing structures
- Minimize environmental and community impacts
- Conduct focused outreach to public officials and stakeholders



Project Area

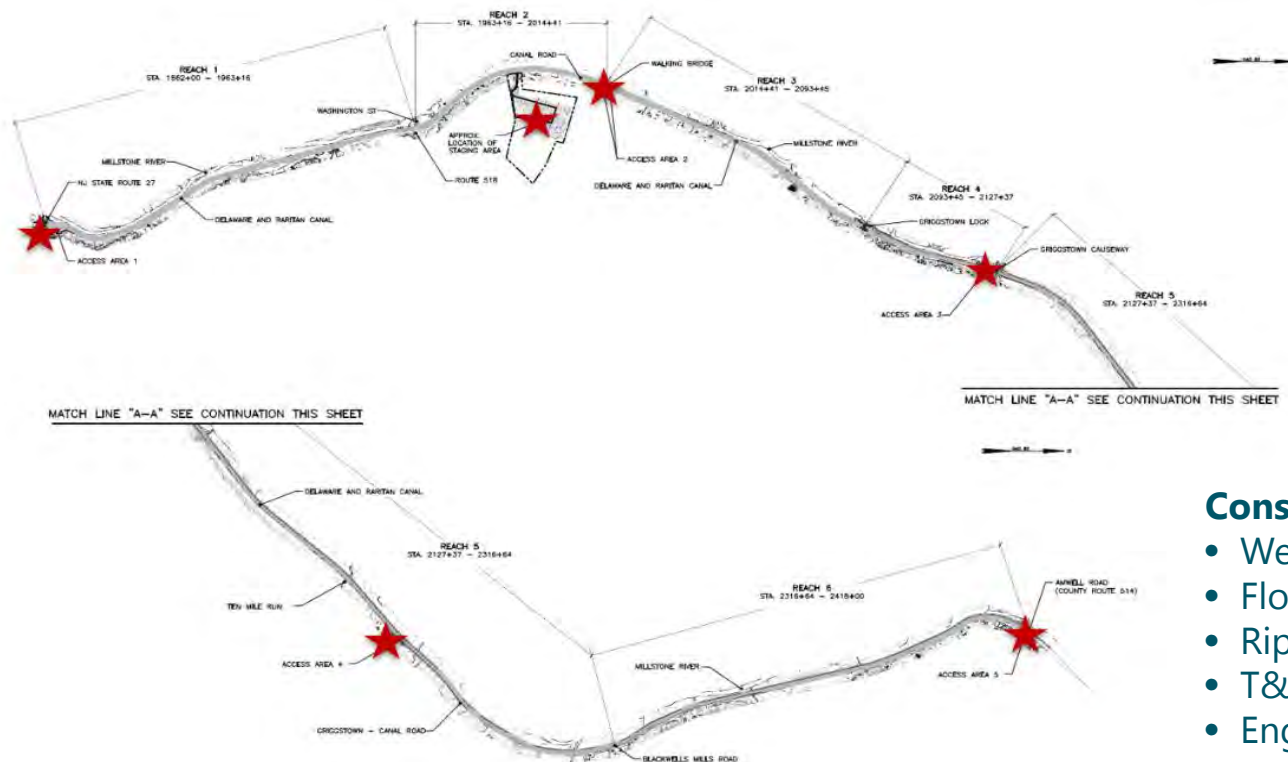


2

Site Set-Up and Preparation

Design – Access Area Selection Process

- Canal segmented into six reaches
- Access Areas – Five access areas for equipment and materials mobilization
- Centrally Located Staging Area of 8 acres – Dewatering pad and sediment processing area

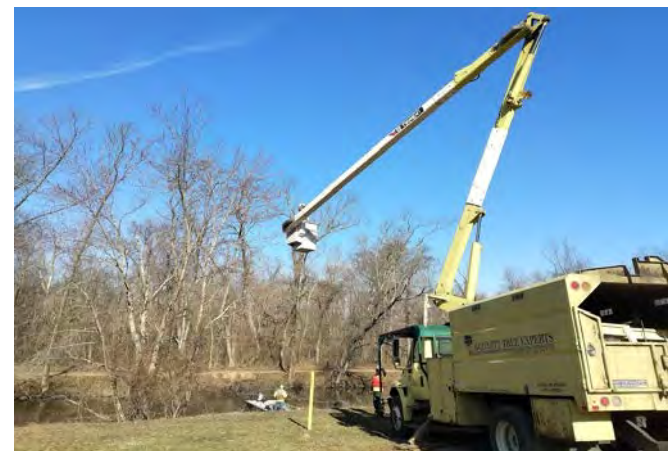


Constraints

- Wetlands and Transition Areas
- Flood Hazard Area
- Riparian Zone
- T&E Species
- Engineering Constraints

Mobilization and Surveying

- Site mobilization began in March 2018
- Pre-construction conditions surveys
- Tree trimming operations
- Pre-construction bathymetric and topographic survey
 - Prior to SAV interference
 - Simplified baseline surveying



Site Preparation

- Protection of culturally significant features
- Construction of Access Areas 1, 2, and 3
- Fuse and float ~32,000 LF HDPE pipeline
- SAV and debris removal operations conducted prior to dredging



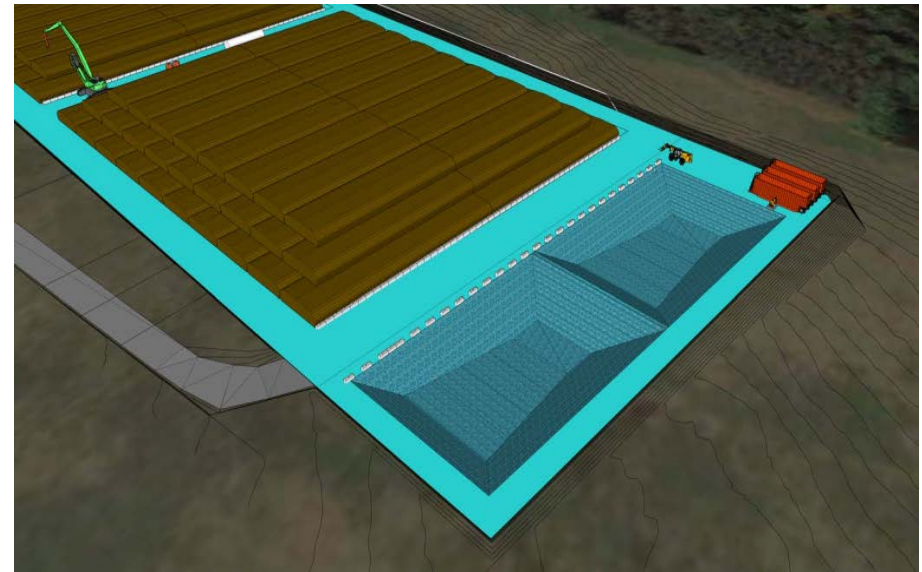
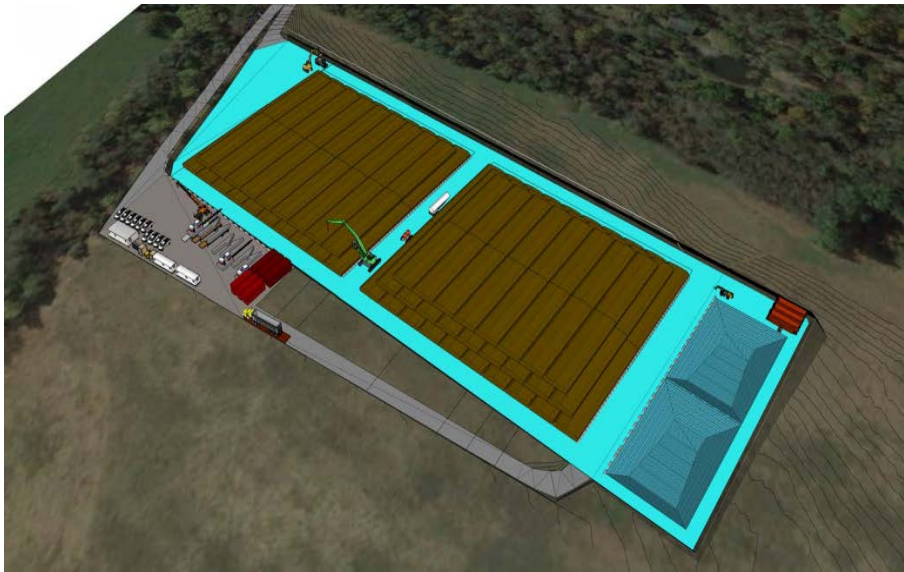
Staging Area Layout

- Single, centrally located – 8 acres of open field
- Dewatering and sediment processing operations
- Performance-based requirements for dewatering



Staging Area Planning

- Brennan and IAI selected geobag dewatering approach
- Brennan utilized 3D modeling to balance the cut/fill earthwork and layout for dewatering/sediment management operations
- Two dewatering sumps of ~1 million gallons capacity



Staging Area Construction

- Planned cut/fill earthwork encounters bedrock along the eastern boundary
- Layout positioning modified to account for bedrock
- Three-layer liner protection
 - Heavy duty woven stabilization fabric
 - 30-mil impermeable liner
- Gravel layer supplemented with crane mats to support operations and protect liner system



3

Dredging Operations

Hydraulic Dredging

- Turbidity curtains deployed
- Three hydraulic dredges deployed in Reaches 1, 2, and 4
- Dredging conducted from July through October 2018
- 50,000 CY of sediment dredged from the canal during Year 1 operations



Year 1 Geobag Dewatering Summary

- Total of 31 geobags (~2,000 CY capacity) utilized during Year 1 operations
- Polymer and treatment additives for solids separation
- Polymer dosage adjusted continuously
- 1.6 MGD daily return discharge



4

Beneficial Reuse Program and Off-Site Transport

Beneficial Reuse Program and Off-Site Transport



- Comprehensive chemical analysis program
- Intense coordination between all project parties and regulatory agencies

Beneficial Reuse of Dewatered Sediments

- American Cyanamid Superfund Site in Bridgewater Township, New Jersey
 - Material use as grading fill to support site closure cap
 - Chemical and physical properties testing requirements
 - Site improvements undertaken to accept full project volume



Beneficial Reuse of Dewatered Sediments

- 4-5 years planning span from concept to implementation
- Contingency placement facilities identified
- All dewatered dredged material accepted for import to beneficial reuse site during Year 1



Sampling Protocols

- USEPA-approved sampling plan
- Geobags gridded into four quadrants per bag
 - Represent 500 CY batch
- 142 sediment samples collected
 - 5-way composite per grid
- Comprehensive analytical screening
- Geotechnical parameters tested



Bench-Scale Testing Program

- Pre-design testing performed in 2010 and 2016
 - Targeted dosage of 8% Portland cement by weight basis
- Stabilization dosage refined throughout operations



Material Amendment with Portland Cement

- ALLU mixing head stabilization
- Initial dosage rates refined in the field
- Coordination with AMCY for optimal workability
- 3 to 4% Portland cement average for Year 1



Off-Site Transportation

- Beneficial reuse material transportation
 - December 2018 through March 2019
- Trucks weighed and ticketed at on-site scale
- 2,800 truck loads
- 76,000 tons



5

Next Steps

Next Steps

- 2019 and 2020 dredging seasons
- Dewatering, sampling, and stabilization
- Continued tree trimming and surveying
- NJWSA stockpile area excavation to provide future capacity for small-scale Canal maintenance work

Questions?
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