

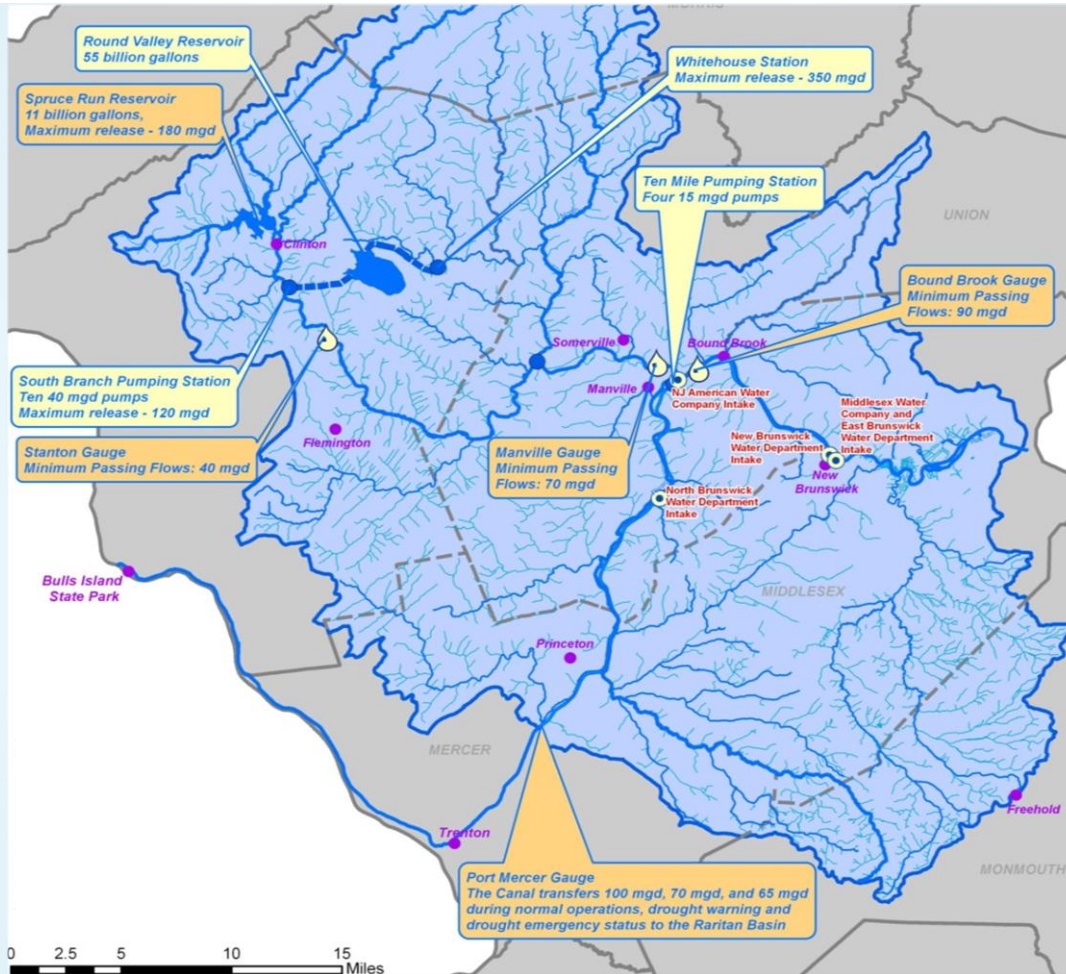
NEW JERSEY WATER SUPPLY AUTHORITY
Dredging of the Delaware and Raritan Canal
from Kingston to Amwell Road

May 13, 2013



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Raritan Basin Water Supply System



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Purpose and Need

- Maintain Water Supply

Project Objective

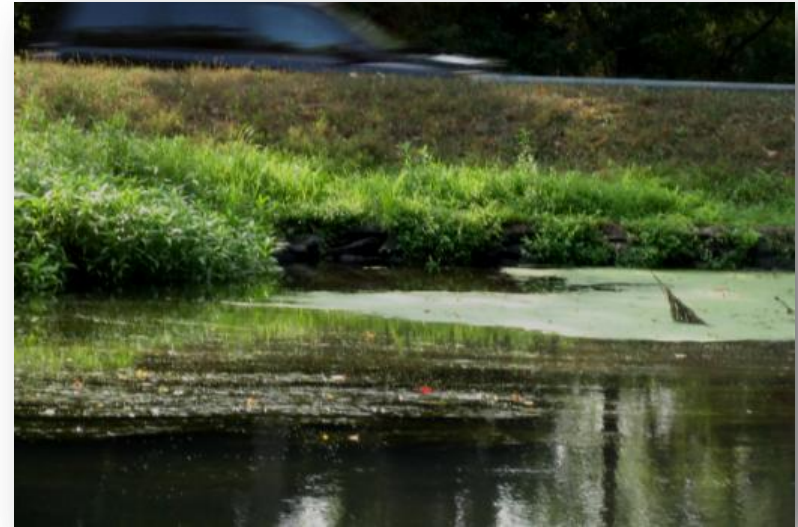
- Remove an estimated 240,000 cubic yards of sediment from the Canal in order to restore its flow capacity
- Remove and dispose of 45,000 cubic yards of sediment from the Authority's stockpile site in Delaware Township, Hunterdon County, NJ

Project Goals

- Protect the historical integrity of the Canal
- Minimize environmental and social impacts

Critical Project Elements

- Develop dredging plan acceptable to stakeholders
- Focused outreach to public officials and stakeholders



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Public Officials Briefings:

- Rocky Hill
- Franklin Township
- Hillsborough
- South Brunswick
- Millstone Borough
- Somerset County
- Montgomery

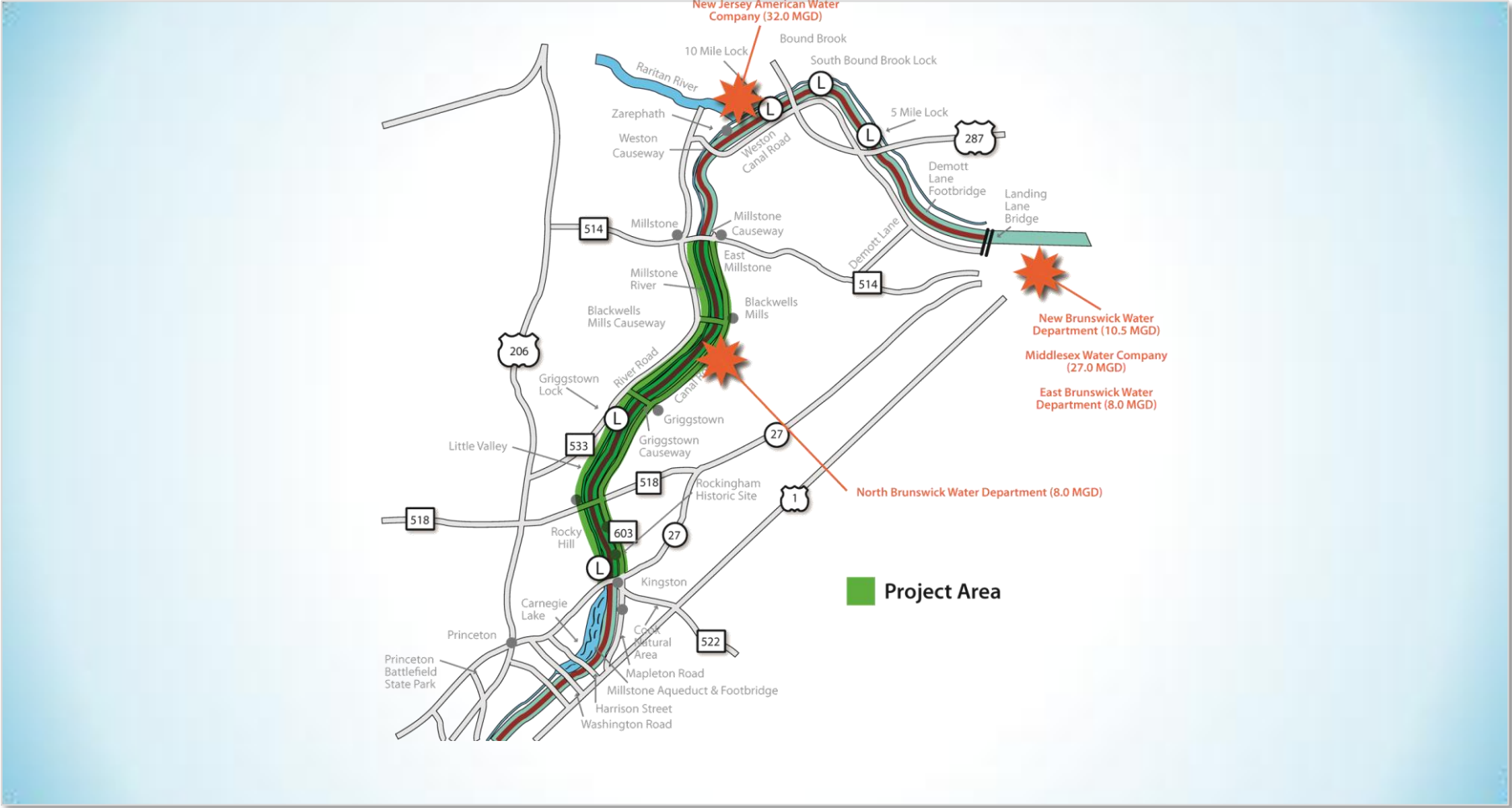
Coordination Meetings

- NJDEP
- Governors Office
- D&R Canal State Park
- D&R Canal Commission
- D&R Canal interest groups briefing
- Dec 2010 and Sep 2011 Public Open Houses
- Dec 2012 Presentation to Franklin Township Council



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Project Area



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Level II Environmental Information Document



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Level II EID – Key Environmental Issues

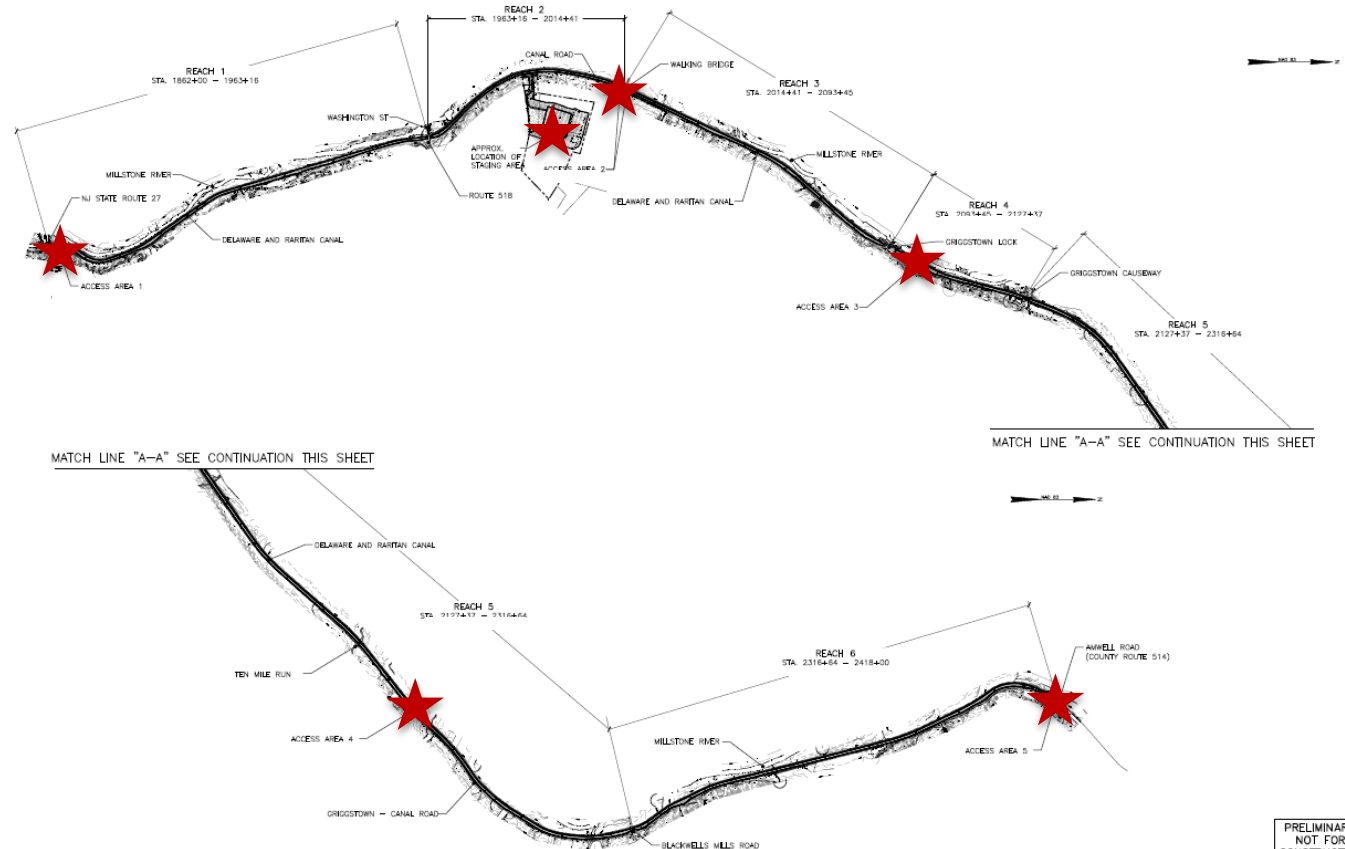
Key Issue	Prevention / Minimization
Public use	Maintain recreational use of Canal/multi use trail during construction
Surface water	Maintain flow and quality of source water to water users
Floodplains and riparian zones	Minimize encroachment of access and staging areas
Biotic (plant and animal communities)	Adhere to timing restrictions noted in applicable permits and minimize disturbance
Forest	Minimal tree removal over 10.5 mile project area, trees to be replanted
Wetlands	Temporary encroachment on freshwater wetlands
Threatened and endangered species	Adhere to timing restrictions noted in applicable permits and minimize disturbance
Cultural resources	Monitoring and subsurface testing of work area as required



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Staging Area and Site Access Selection Process Constraints

- Wetlands and transition area
- Flood hazard area
- Riparian zone
- Threatened and endangered species habitat
- Engineering constraints



PRELIMINARY
NOT FOR
CONSTRUCTION

Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Dredging Technologies Evaluated

- Mechanical Excavation (in the dry)
- Mechanical Dredging (in the wet)
- Hydraulic Dredging with Mechanical Dewatering
- Hydraulic Dredging with Geobags

Dredge Material Characterization

- Chemical analysis of the target materials meet State non-residential re-use standards with a portion also meeting re-use standards at residential sites. Vanadium and benzo(a) pyrene was observed in some samples at higher than residential levels, but within known criteria for site-specific brownfield reuse
- Elutriate (filtrate water) samples from bench-scale dewatering tests concluded that direct discharge to the Canal would achieve surface water standards. Treatment (such as filtration) to remove suspended solids may be required to improve the return water quality



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Laurie Rubber Site

- NJDEP collected soil, in-canal sediment and canal water samples in the vicinity of the former Laurie Rubber Site located adjacent to Market Street
- Results of the soil, sediment and canal water analysis were provided to the NJWSA in March 2013 – the laboratory analysis of the collected sediments showed elevated concentrations of lead, zinc, barium, and arsenic, which exceeded ecological screening criteria, and extractable petroleum hydrocarbons were present at six locations adjacent to the canal
- The laboratory analysis also showed that the quality of the water within the canal was NOT compromised
- In order to further delineate the extent of contamination the NJWSA collected additional canal sediment samples upstream and downstream of the former Laurie Rubber site
- Based on the results of these analysis, and further review of the data by the design team, the Authority will take appropriate action



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Mechanical Excavation (in the dry)

- Canal separated into segments varying in manageable lengths, with each segment provided with an access area and truck ramp
- Flow bypassed through work area via portable dams or other structures
- Low-ground pressure excavators and dozers used to excavate sediment
- Sediment within the dewatered canal section would be reworked/air dried within the canal or transported to centrally located staging area for further drying
- Allows for higher degree of accuracy during sediment removal (increased volume control) depending on degree on in-situ sediment dryness
- Requires intensive water management operations
- Dropped from further consideration due to impacts to Canal Road and/or the towpath as a result of construction vehicle traffic and potential impacts to water users resulting from blended Canal/Millstone River water



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Mechanical Dredging (in the wet)

- Conducted in the wet using hydraulic excavator operating from shallow-draft barge or flexi-float
- Hydraulic clamshell bucket to be used on dredge to minimize turbidity (1-3 cubic yard bucket)
- Dredge maneuvering with non-penetrative methods such as cables and anchors or spuds fitted with plates to reduce average ground pressure
- Dredged sediment would be placed into 10-20 cubic yard scows or 20 cubic yard containers on flexi-floats
- Scows unloaded to trucks at access areas and transported to staging area for air-drying / stabilization
- Potential for multiple dredge units operating simultaneously
- Dropped from further consideration due to risk associated with impacts to Canal Road due to construction vehicle traffic and projected construction cost



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Hydraulic Dredging with Mechanical Dewatering

- Conducted in the wet using hydraulic cutterhead dredge
- Separate Submerged Aquatic Vegetation (SAV) / and debris removal operations prior to dredging
- Dredge maneuvering with non-penetrative methods such as cables and anchors or ground-pressure reducing spud plates
- Booster pumps required to transport dredged sediment slurry through plastic pipeline to staging area for dewatering
- One access area per canal reach/one dewatering and staging area for entire project; removed and restored at end of construction
- Pipe fusing activities at each end of project
- Water treatment/water management operations prior to discharge to achieve permit conditions
- Minimal impacts to recreational users (boating/cycling/hiking)
- Low operational risk



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Hydraulic Dredging with Geobags

- Conducted in the wet using hydraulic cutterhead dredge
- Separate SAV and debris removal operations prior to dredging
- Dredge maneuvering with non-penetrative methods such as cables and anchors or ground-pressure reducing spud plates
- Booster pumps required to transport dredged sediment through plastic pipeline to staging area for dewatering
- One access area per canal reach / one dewatering and staging area for entire project; removed and restored at end of construction
- Pipe fusing activities at each end of project
- Water treatment / water management operations prior to discharge to achieve permit conditions
- Minimal impacts to recreational users (boating / cycling / hiking)
- Low operational risk



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Dredging Support Equipment

Silt Curtains

- Control suspended solids and turbidity in the water column
- Fabricated of flexible, vinyl fabric and provided with anchors to secure curtain bottom
- Skirt to extend to bottom surface of the Canal

Booster Pumps

- Required to convey dredged sediment through plastic pipeline to dewatering area
- Located along the western shoreline of the Canal to facilitate refueling and maintenance operations
- Equipped with double wall fuel storage tanks
- Provided with oil containment booms to provide envelope around each booster pump

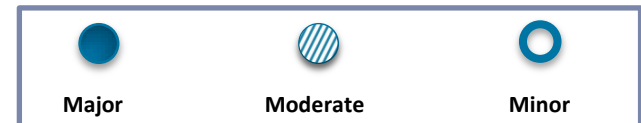


Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Environmental and Aesthetic Concerns	Dredge Methodology		
	Mechanical Dredging (in the wet)	Mechanical Excavation (in the dry)	Hydraulic Dredging
Canal Draining			
Staging Areas			
Access Areas			
Tree Clearing			
Tree Trimming			
Wetland and Wetland Transition Area Impacts			
Species Relocation / Restocking			
Flood Hazard Area Disturbance			
Traffic			
Cultural Resources			
Trail Closures / Recreational Impacts			

Potentially Required Permits

- USACE - Section 10 Individual Permit
- D&R Canal Commission; GP#1 – Maintenance & Repair of Existing Features
- NJ Department of Environmental Protection
 - Freshwater Wetlands; GP #1 and #3
 - Individual Flood Hazard Permit
 - No Net Loss Reforestation Act Compliance
 - Section 106 Consultation
 - Air Permit
- Somerset County Soil Conservation District
 - NJPDES Construction
 - Soil erosion and sediment control
- Franklin Township Road Opening Permit



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

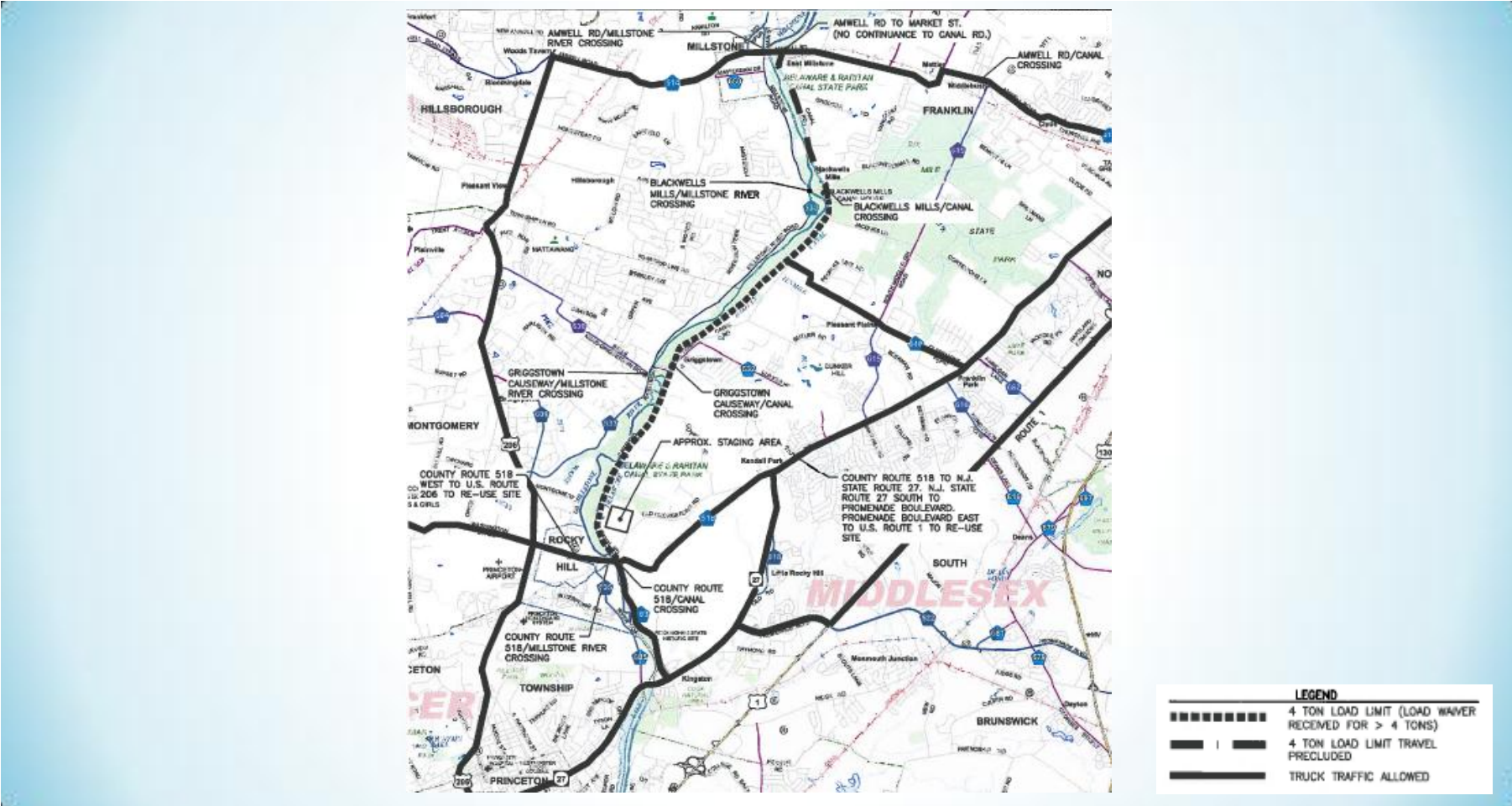
Potential Beneficial Use Sites

- Bellmawr Landfill –
Deptford, New Jersey
- NL Industries (aka Sayreville Seaport Associates) –
Sayreville, New Jersey
- AHA Meadowlands Landfill –
Lyndhurst, New Jersey
- El Paso Nuodex Site –
Woodbridge, New Jersey
- Wyeth Holdings Corporation (American Cyanamid
Superfund Site (contingent on agency approval)) –
Bridgewater, New Jersey



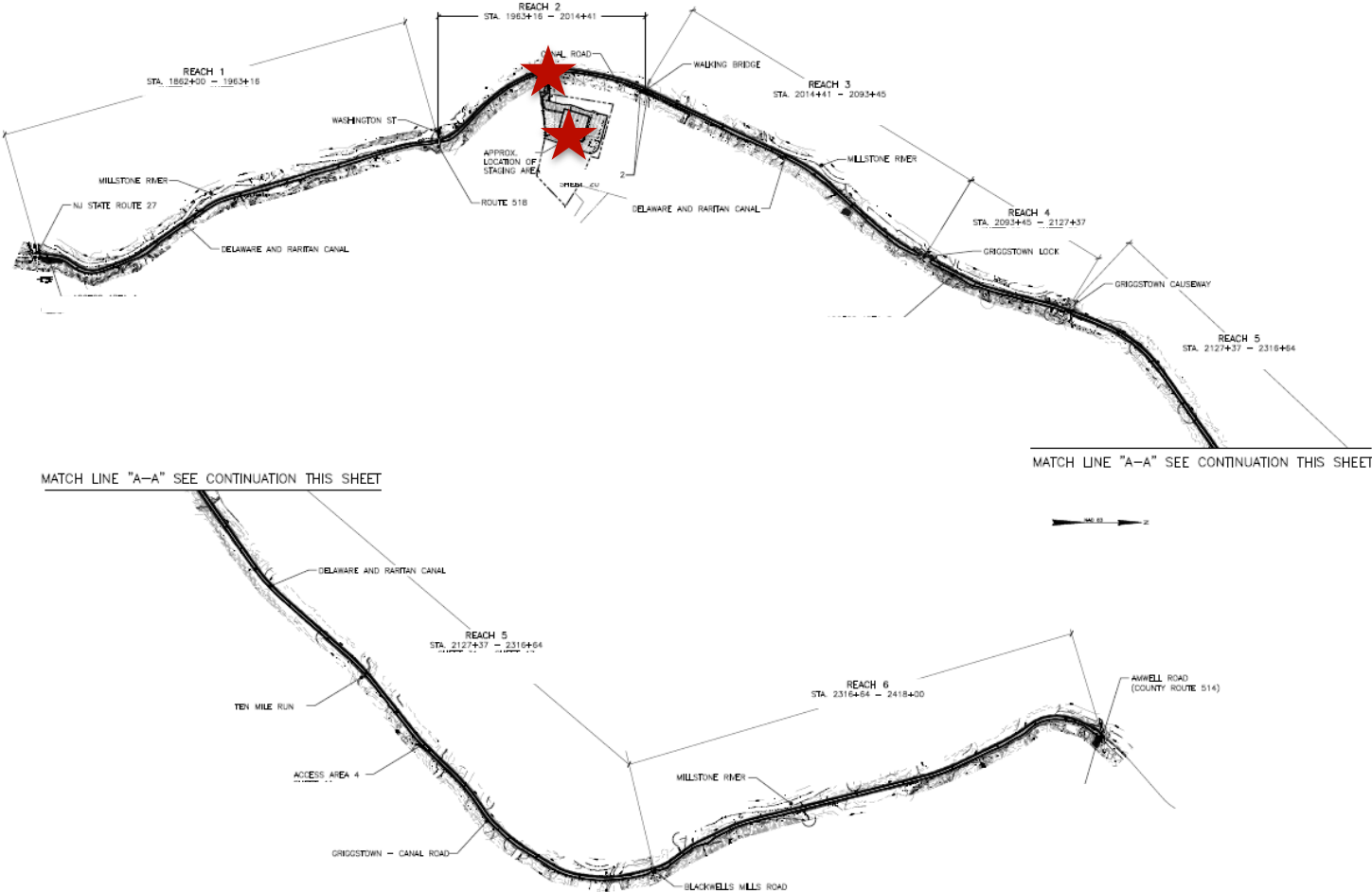
Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Conceptual Traffic Routes



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Staging Area 1391 Canal Road



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Staging Area

1391 Canal Road

- The Canal staging area will be located in an active agricultural field located approximately 600 feet east of Canal Road
- An isolated emergent wetland and 50-foot wetland transition area will be avoided
- The NJ Natural Heritage Program records and NJDEP Landscape Project mapping do not identify threatened or endangered species habitat onsite
- Flood hazard areas and riparian zones are not present on this site

Dewatering of dredged sediment, rehandling and trucking and water treatment will occur at the Staging Area.



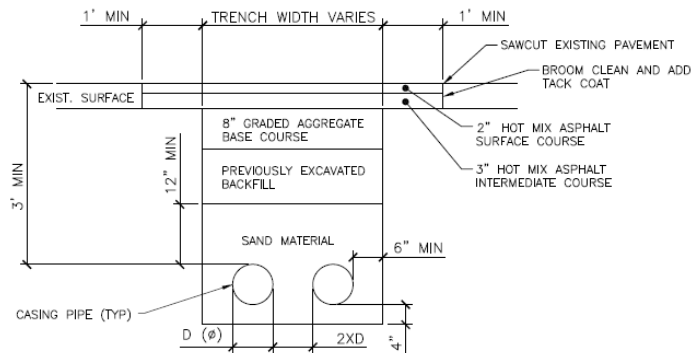
Figure excerpted from EID, UDC 2013

Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Staging Area

1391 Canal Road

- Access to the staging area will be from Canal Road, following an existing residential driveway and farm road
- Slurry and return water piping will exit and enter the Canal across from the staging area access at Canal Road
- Piping to be buried and not interfere with Canal Road traffic



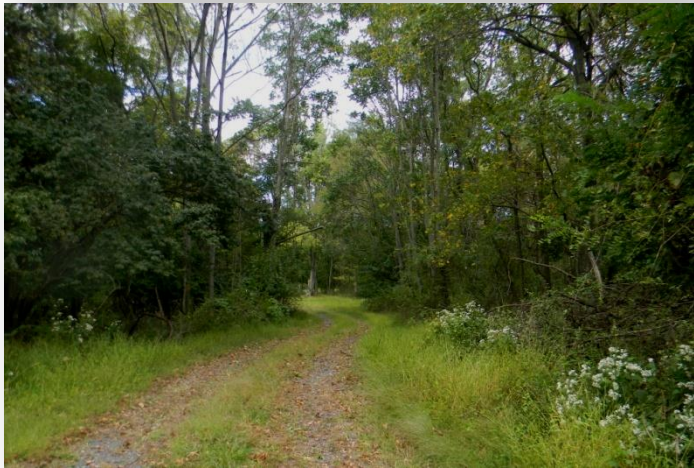
TYPICAL PIPE TRENCH ROAD CROSSING DETAIL
NOT TO SCALE



Figure excerpted from EID, UDC 2013

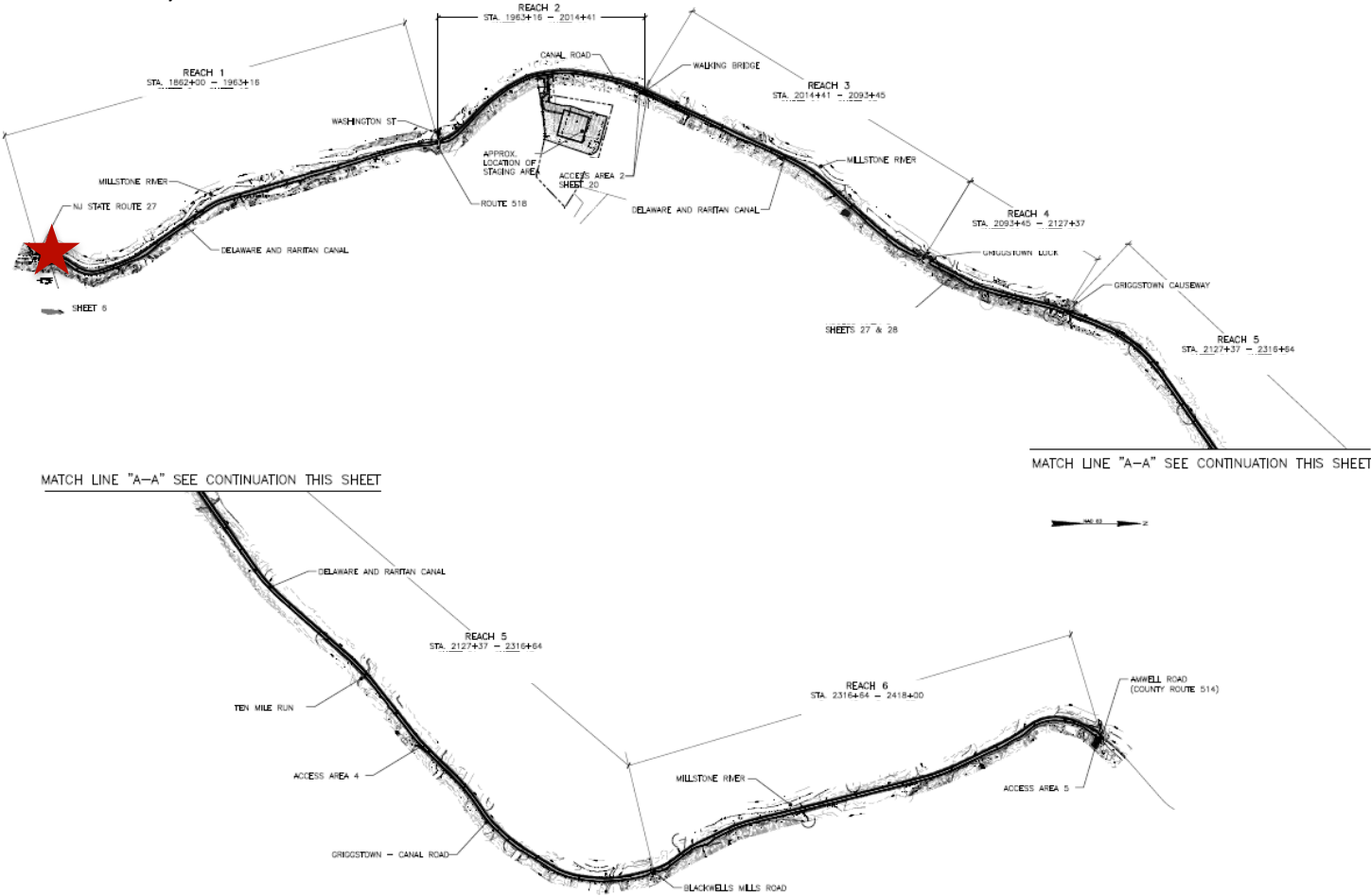
Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Staging Area
1391 Canal Road



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 1 – Route 27 Reach 1 (Route 27 to Route 518)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 1 – Route 27

Reach 1 (Route 27 to Route 518)

- Principally maintained lawn with an intermittent band of trees and shrubs along the Canal bank
- Tree removal will be minimal (approx four trees)
- Wetlands are not present
- Riparian zone disturbance will be minimal (approx 634 square feet)
- Located in John W. Flemer Preserve
- Parking area and trail to remain accessible to public during construction

Equipment and debris handling and slurry pipe fusing will occur at this access area. Clearing, grading and placement of a temporary work surface will be required.

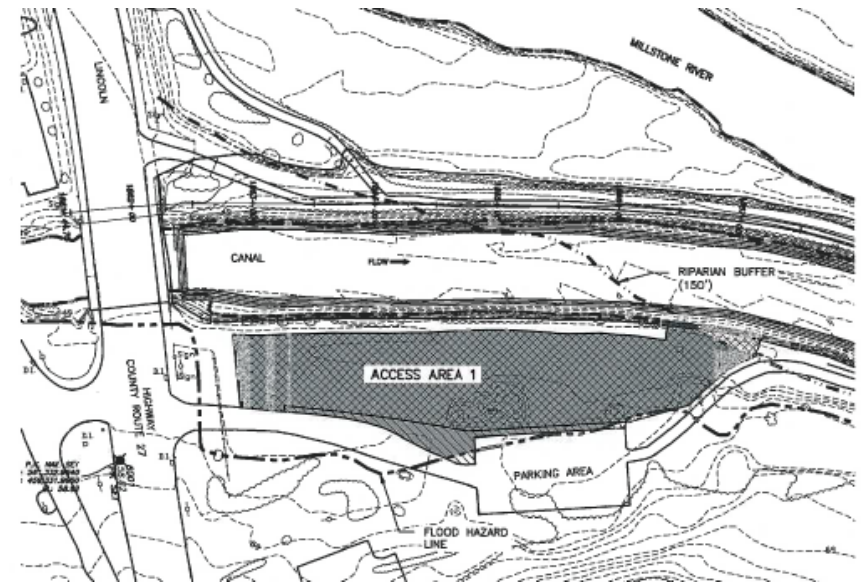


Figure excerpted from EID, UDC 2013

Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 1 – Route 27
Reach 1 (Route 27 to Route 518)

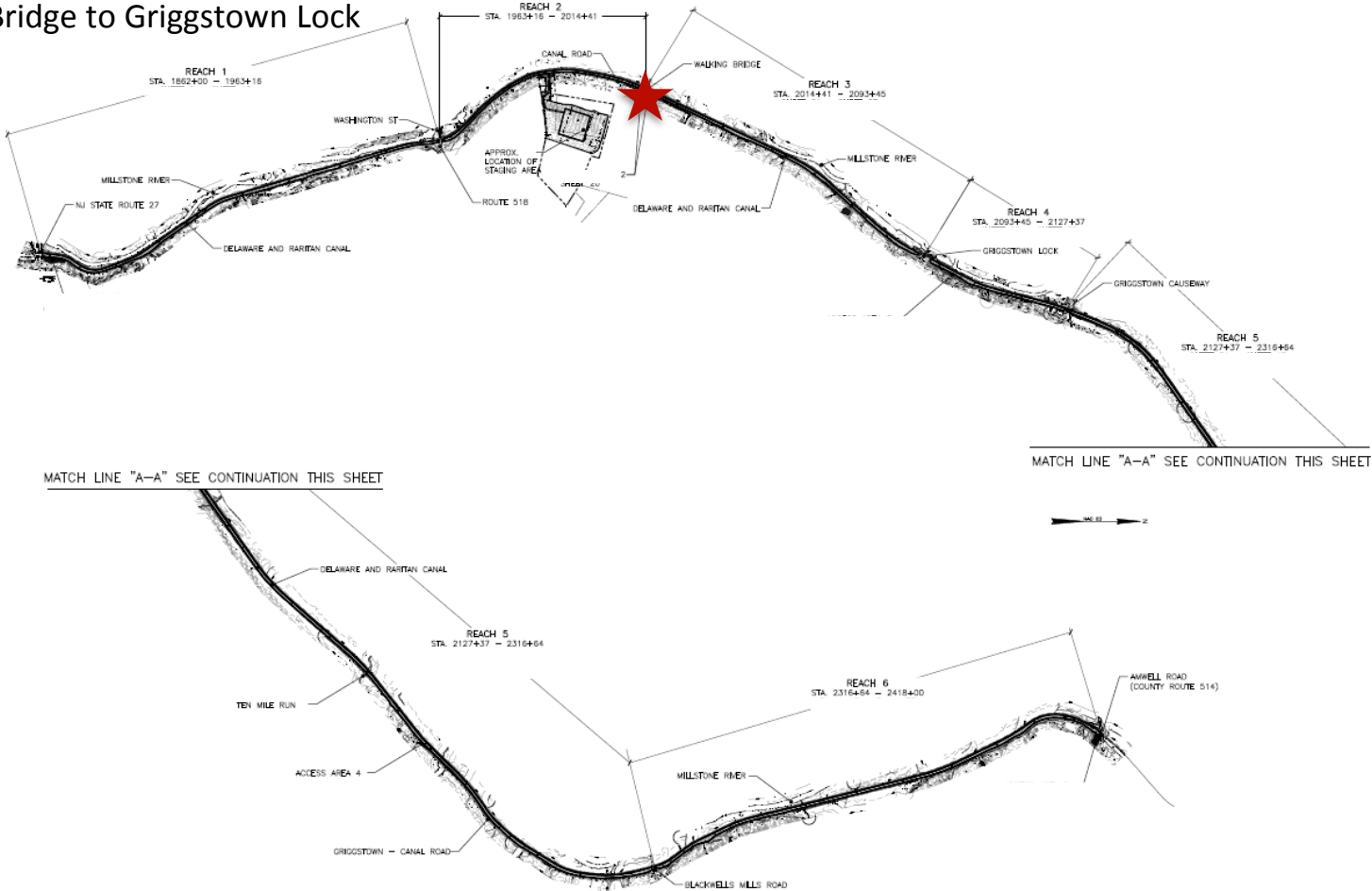


Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 2 – Walking Bridge

Reach 2 (Route 518 to Walking Bridge)

Reach 3 (Walking Bridge to Griggstown Lock)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 2 – Walking Bridge

Reach 2 (Route 518 to Walking Bridge)

Reach 3 (Walking Bridge to Griggstown Lock)

- Principally forest with the exception of dirt parking area and drainage feature (culvert and ditch)
- Approximately 30 trees will be removed
- Approximately 1,554 square feet of emergent wetlands will be temporarily disturbed
- Approximately 10,183 square feet of riparian zone will be disturbed

Equipment and debris handling will occur at this access area. Clearing, grading and placement of a temporary work surface will be required. The culvert and swale will be protected.

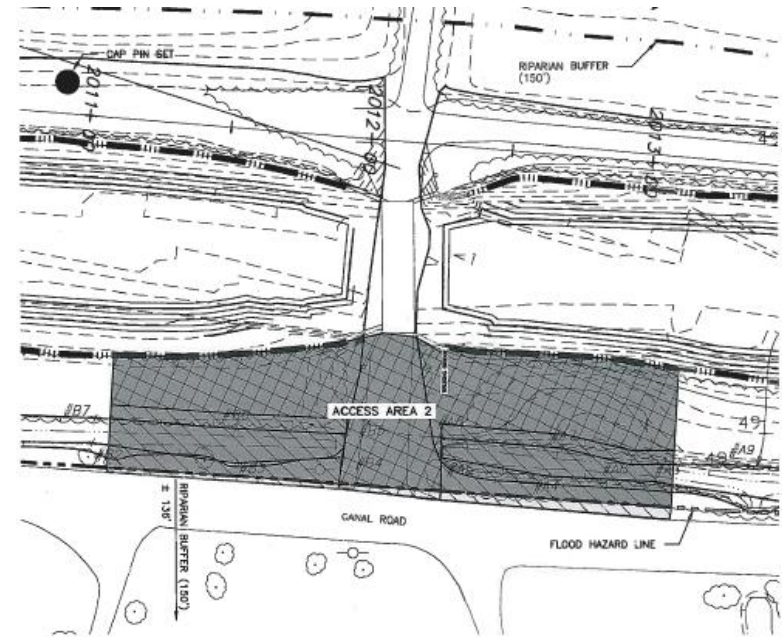


Figure excerpted from EID, UDC 2013

Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 2 – Walking Bridge

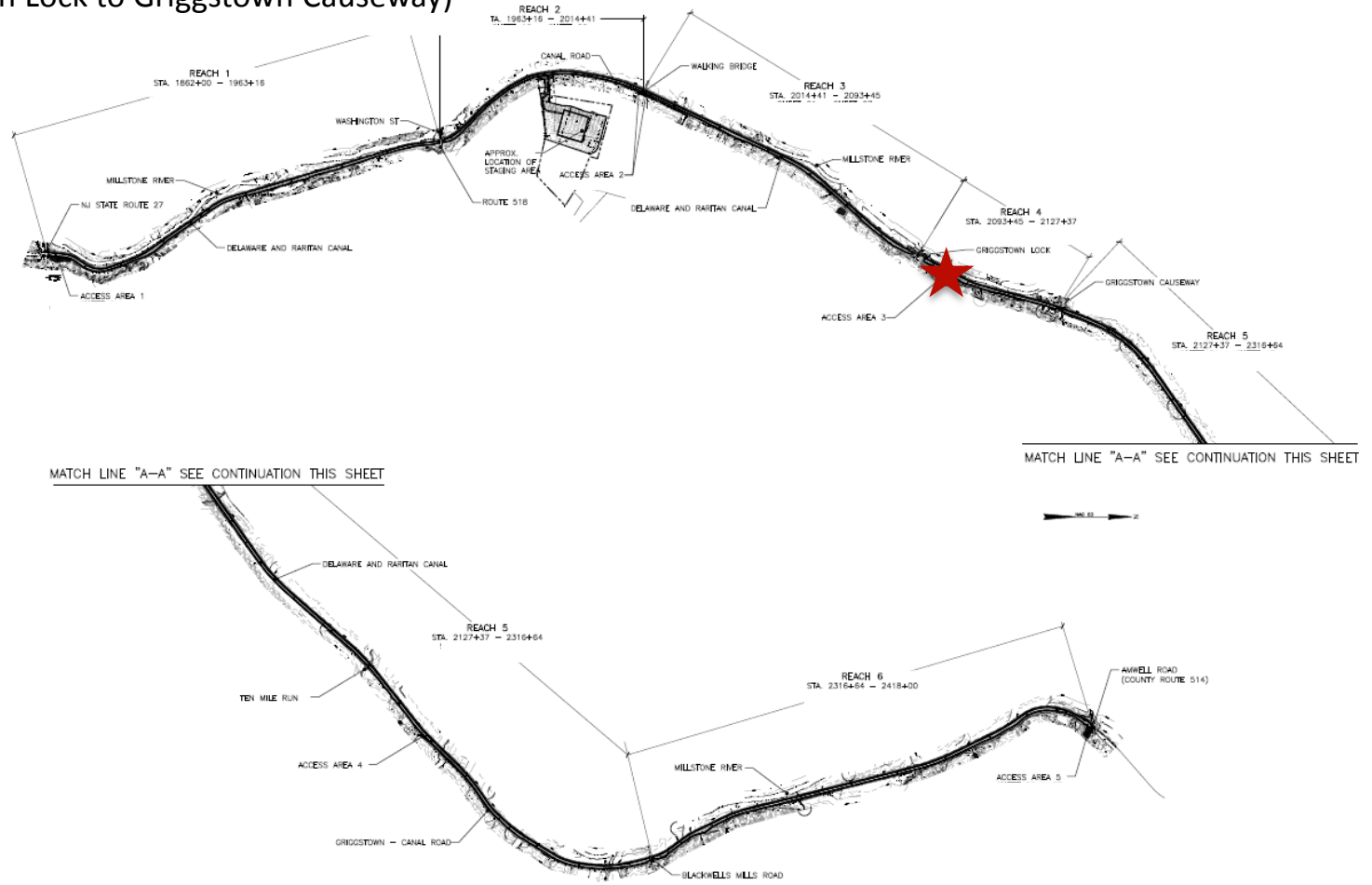
Reach 2 (Route 518 to Walking Bridge)

Reach 3 (Walking Bridge to Griggstown Lock)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 3 – Canal Road & Copper Mine Road Reach 4 (Griggstown Lock to Griggstown Causeway)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 3 – Canal Road & Copper Mine Road Reach 4 (Griggstown Lock to Griggstown Causeway)

- Access Area also comprises Canal Road; intermittent, temporary road closures may be required
- Edge completely forested
- Wetlands are not present
- Tree removal will be minimal (approx four trees)
- Removals primarily for equipment and debris lifting clearance
- Approximately 3,150 square feet of riparian zone to be disturbed

Equipment and debris handling will occur at this access area. Clearing, grading and placement of temporary work surface will be required.

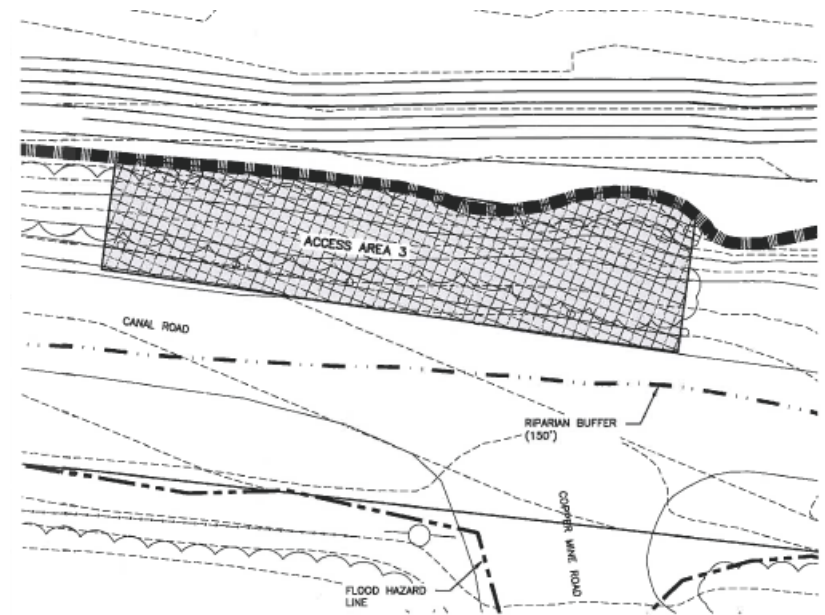


Figure excerpted from EID, UDC 2013

Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

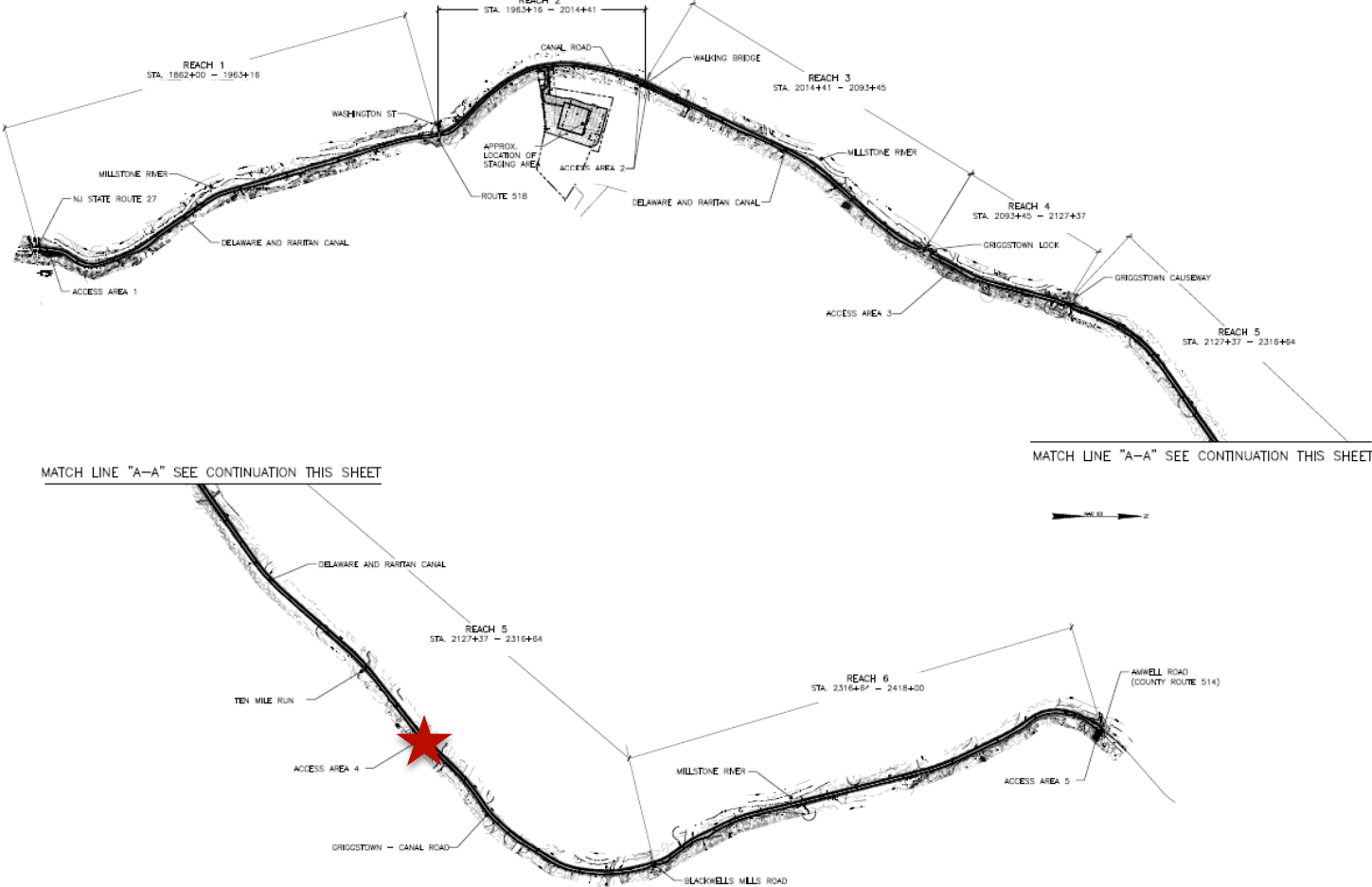
Access Area 3 – Canal Road & Copper Mine Road
Reach 4 (Griggstown Lock to Griggstown Causeway)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 4 – North Brunswick WTP

Reach 5 (Griggstown Causeway to Blackwells Mills Causeway)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 4 North Brunswick WTP

Reach 5 (Griggstown Causeway to Blackwells Mills Causeway)

- Mostly parking area with intermittent trees and shrubs along the Canal bank
- Wetlands are present, but will be avoided
- A riparian zone is not present
- Tree removal will be minimal (approx seven trees)

Equipment and debris handling will occur at this access area. Clearing, grading and placement of a temporary work surface may be required.

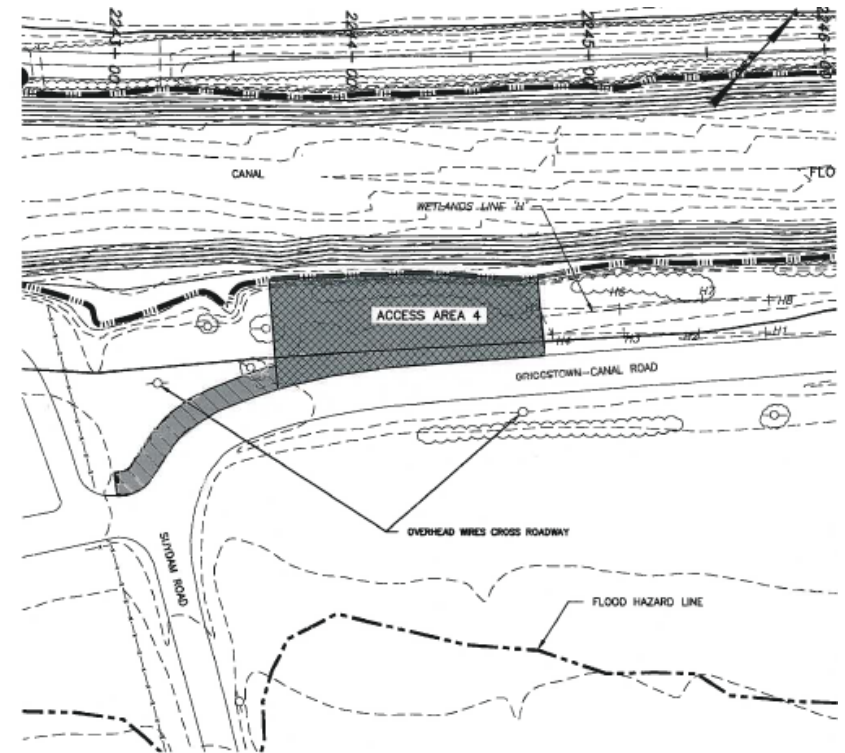


Figure excerpted from EID, UDC 2013

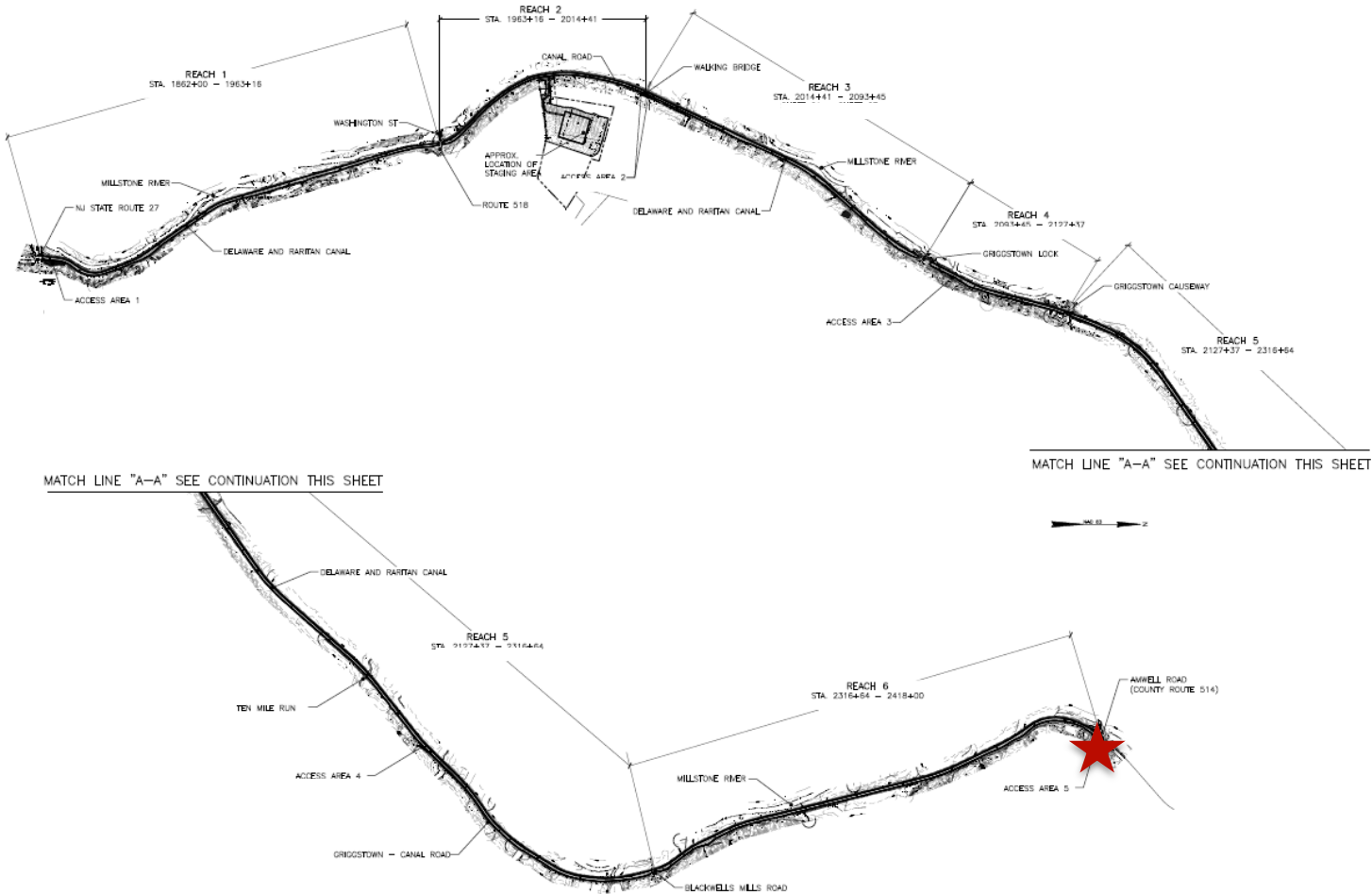
Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 4 North Brunswick WTP
Reach 5 (Griggstown Causeway to Blackwells Mills Causeway)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 5 – East Millstone Park Reach 6 (Blackwells Mills Causeway to Amwell Road)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 5 – East Millstone Park

Reach 6 (Blackwells Mills Causeway to Amwell Road)

- Mostly maintained lawn; trees and shrubs are intermittent along the Canal bank; a basketball court and paved parking lot are present
- Wetlands are present but will be avoided
- No trees will be removed
- Riparian zone disturbance (17,702 square feet) will be limited to previously disturbed land

Equipment and debris handling and slurry pipe fusing (Setup) will occur at this access area. Grading and placement of a temporary work surface will be required.

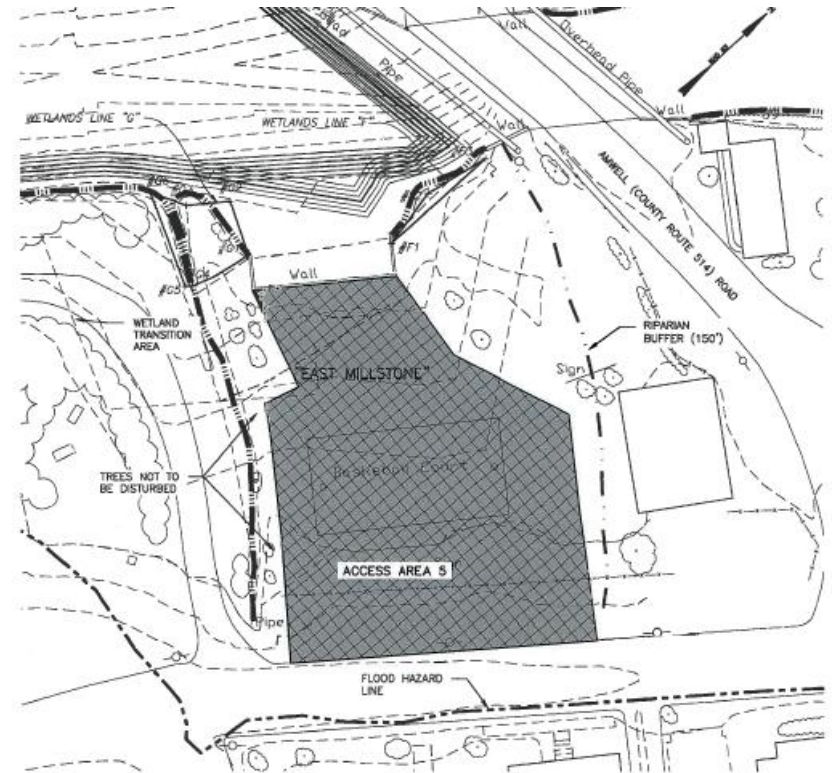


Figure excerpted from EID, UDC 2013

Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Access Area 5 – East Millstone Park
Reach 6 (Blackwells Mills Causeway to Amwell Road)



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Section 106 of the National Historic Preservation Act: *Cultural Resources Investigations Phase 1A Preliminary Cultural Resource Sensitivity Investigation Report*

- A 5-foot offset will be applied to protect canal armor stone and a 10-foot offset will be applied to protect other adjacent canal structures
- **Canal Prism** – High sensitivity. Inspection and monitor during dredging operations
- **Access Area 1** – Low to moderate sensitivity. Regular monitoring recommended during preparation and use
- **Access Area 2** – Moderate to high sensitivity. Shovel testing program recommended where the ground will be disturbed by grading or other activities
- **Access Area 3** – Low sensitivity. Regular monitoring recommended during preparation and use
- **Access Area 4** - Low to moderate sensitivity. Regular monitoring recommended during preparation and use
- **Access Area 5** - Moderate to high sensitivity. Shovel testing program recommended where the ground will be disturbed by grading or other activities
- **Staging Area** - High sensitivity. Phase IB subsurface testing is recommended



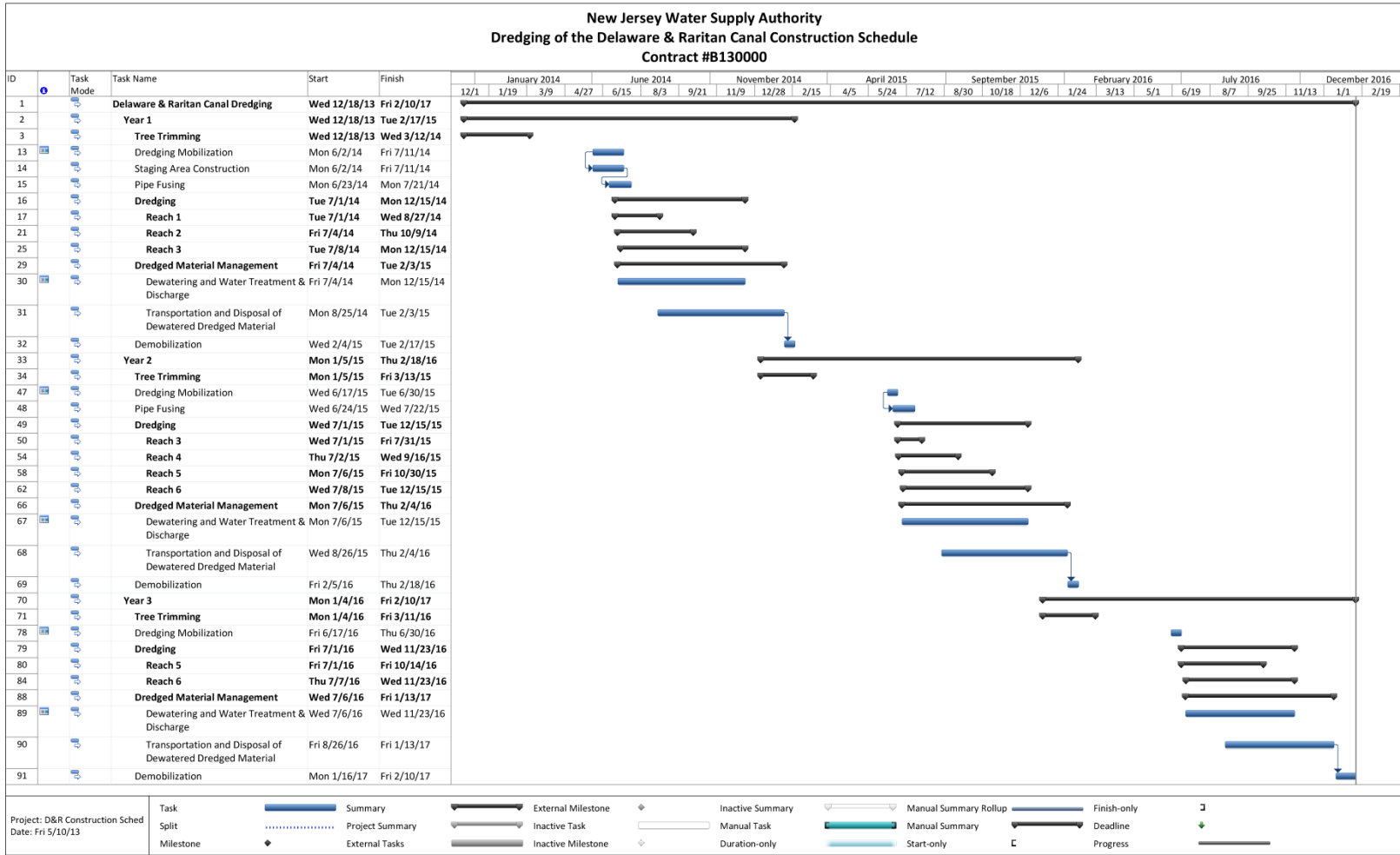
Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Proposed Environmental Impact Minimization Measures

	Potential Restriction	Restriction Dates	Mitigation/Constraint
Indiana bat	Tree trimming and removal	Apr 1 to Sept 30	Adhere to restriction as applicable
Bald eagle foraging	Tree trimming and removal	Mar 15 to Jun 30	Nest in Princeton NJ may no longer be viable
Wood turtle	All In-water activities (Sta 2170+00 to 2280+00)	Nov 1 to Apr 1	Sequence work to achieve restriction
	All land-ward activities (Sta 2170+00 to 2280+00)	Mar 15 to Nov 15	Sequence work and qualified herpetologist onsite
Cooper Hawk	Tree trimming and removal (Vicinity of nest only)	Mar 1 to Jul 15	In vicinity of nest only
Warm water fisheries / pickerel	All In-water activities	Apr 1 to Jun 30	May be waived by NJDEP
Migratory birds	Tree trimming and removal	April 15 to Sept 15	Sequence work to achieve restriction

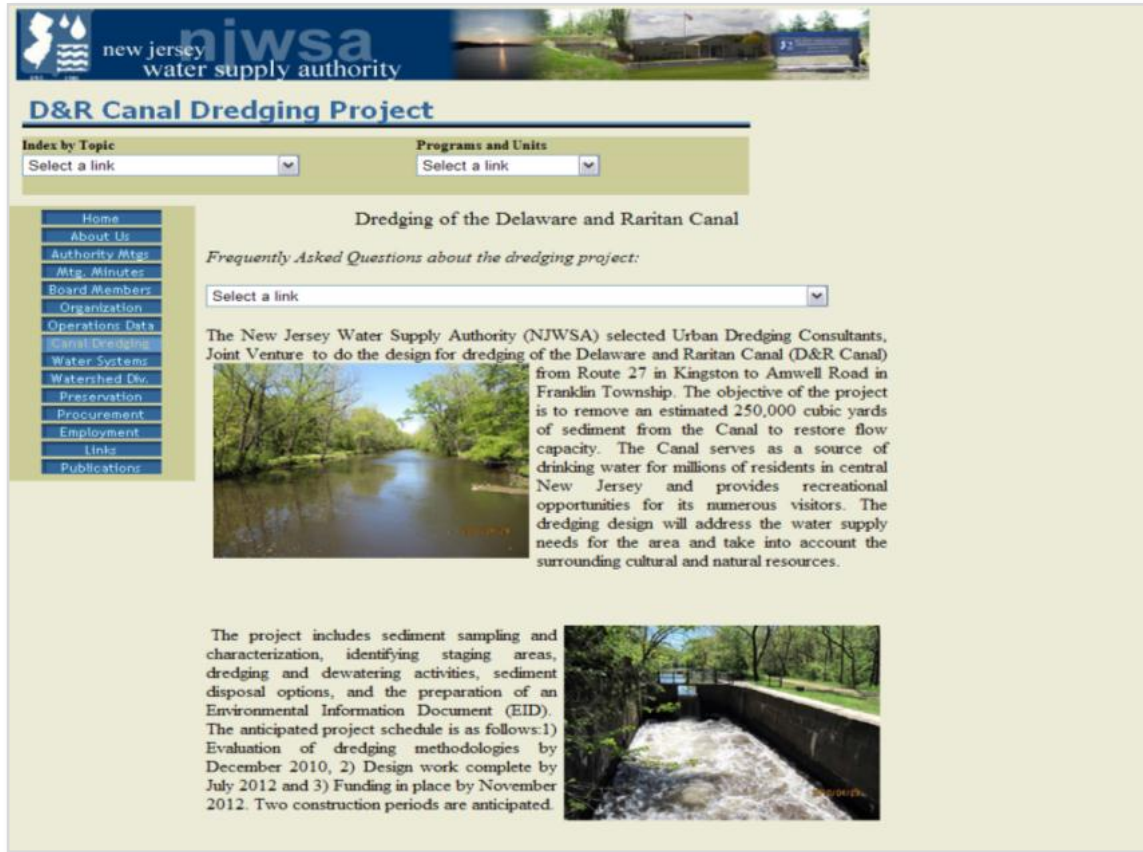
Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

Project Schedule



Dredging of the Delaware and Raritan Canal from Kingston to Amwell Road

View NJWSA Website for Continuing Project Updates



The screenshot shows the NJWSA website's page for the D&R Canal Dredging Project. The header includes the NJWSA logo and a navigation menu with links such as Home, About Us, Authority Mtgs, and Canal Dredging. The main content area features a title "Dredging of the Delaware and Raritan Canal" and a section for "Frequently Asked Questions about the dredging project:" with a dropdown menu. Below this, there is a paragraph of text and two photographs: one of a canal and one of a construction site. The text describes the project's goal to remove 250,000 cubic yards of sediment and lists the project schedule.

new jersey njwsa water supply authority

D&R Canal Dredging Project

Index by Topic: Select a link | Programs and Units: Select a link

Dredging of the Delaware and Raritan Canal

Frequently Asked Questions about the dredging project:

Select a link

The New Jersey Water Supply Authority (NJWSA) selected Urban Dredging Consultants, Joint Venture to do the design for dredging of the Delaware and Raritan Canal (D&R Canal) from Route 27 in Kingston to Amwell Road in Franklin Township. The objective of the project is to remove an estimated 250,000 cubic yards of sediment from the Canal to restore flow capacity. The Canal serves as a source of drinking water for millions of residents in central New Jersey and provides recreational opportunities for its numerous visitors. The dredging design will address the water supply needs for the area and take into account the surrounding cultural and natural resources.

The project includes sediment sampling and characterization, identifying staging areas, dredging and dewatering activities, sediment disposal options, and the preparation of an Environmental Information Document (EID). The anticipated project schedule is as follows: 1) Evaluation of dredging methodologies by December 2010, 2) Design work complete by July 2012 and 3) Funding in place by November 2012. Two construction periods are anticipated.

<http://www.njwsa.org/html/canaldredging.html>

PUBLIC COMMENT

State name and address for the record