



Jeffrey Hill, PE

WEDA – Norfolk Virginia

June 27, 2018

Wick Drains for Soil Consolidation and Environmental Remediation

- Introduction
- Technology
- Installation
- Project Summary
- Additional Technology



Atlantic Wood Industries Site Portsmouth, VA

- About 50 acre Superfund site on Elizabeth River
- Approximately 30 acres contaminated sediment
- Surrounded by industrial properties
- 66 year history as wood treating facility
- Portsmouth Naval Shipyard also utilized site

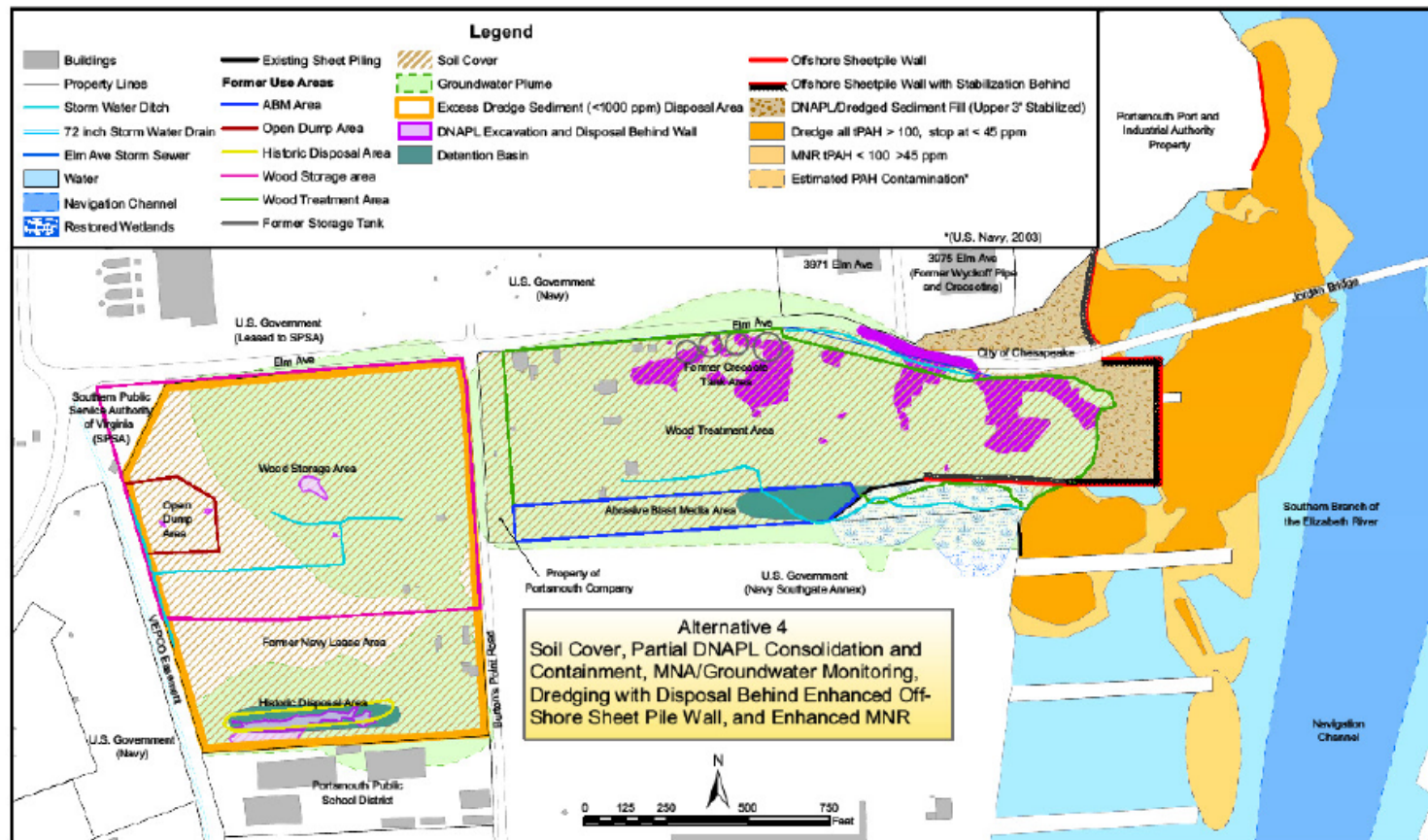
Proximity to today's presentation



Atlantic Wood Industries Site

- Contaminants include:
 - Creosote
 - Pentachlorophenol (PCP)
 - Abrasive Blast Media with copper, lead, zinc, arsenic
 - Acetylene sludge byproducts
- Site added to EPA National Priority List (NPL) in 1990

EPA Selected Remedy



CDM
 December 2007 Record of Decision

Atlantic Wood Industries, Inc. Superfund Site
 Portsmouth, Virginia

Figure 29
 Alternative 4
 EPA's Selected Remedy

AWI Site Remediation 2009-2017

- Step 1 – Offshore sheet pile wall – **McLean Contracting**
- Step 2 – Water treatment facility
- Step 3 – Dredge contaminated river sediments
- Step 4 – Spread sand drainage blanket
- Step 5 – Amend/Treat contaminated Dredge Material
- Step 6 – Spread treated dredged fill (working platform)
- Step 7 – Install PVD/Wick drains - **HB**
- Step 8 - Surcharge site
- Step 9 – Cap to final site grade
- Step 10 – Return to commercial use with Long term monitoring
 - **Sevenson Environmental Services**

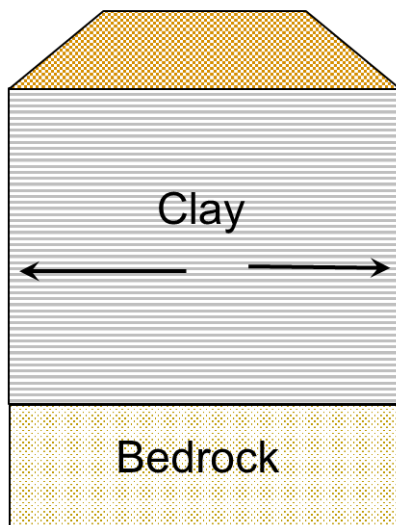
Vertical Prefabricated Drain Technology

The Theory Basics

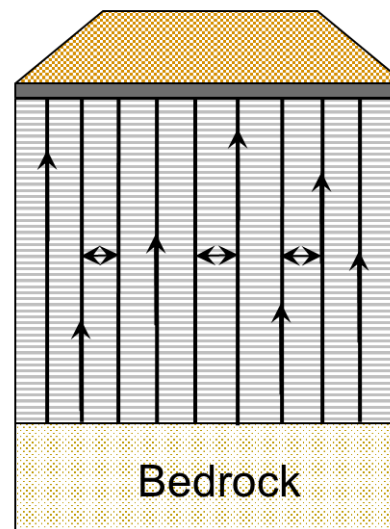
- A structure constructed on a site that is underlain by soft, saturated soils
- Load on the soil is partially supported by incompressible water within the soil matrix
- As time passes, the excess pore water pressure dissipates as the contaminated water slowly drains
- Then, the load share is increased in the soil and consolidation and settlement occurs
- Process can take a very long time, as dictated by permeability

The General Idea

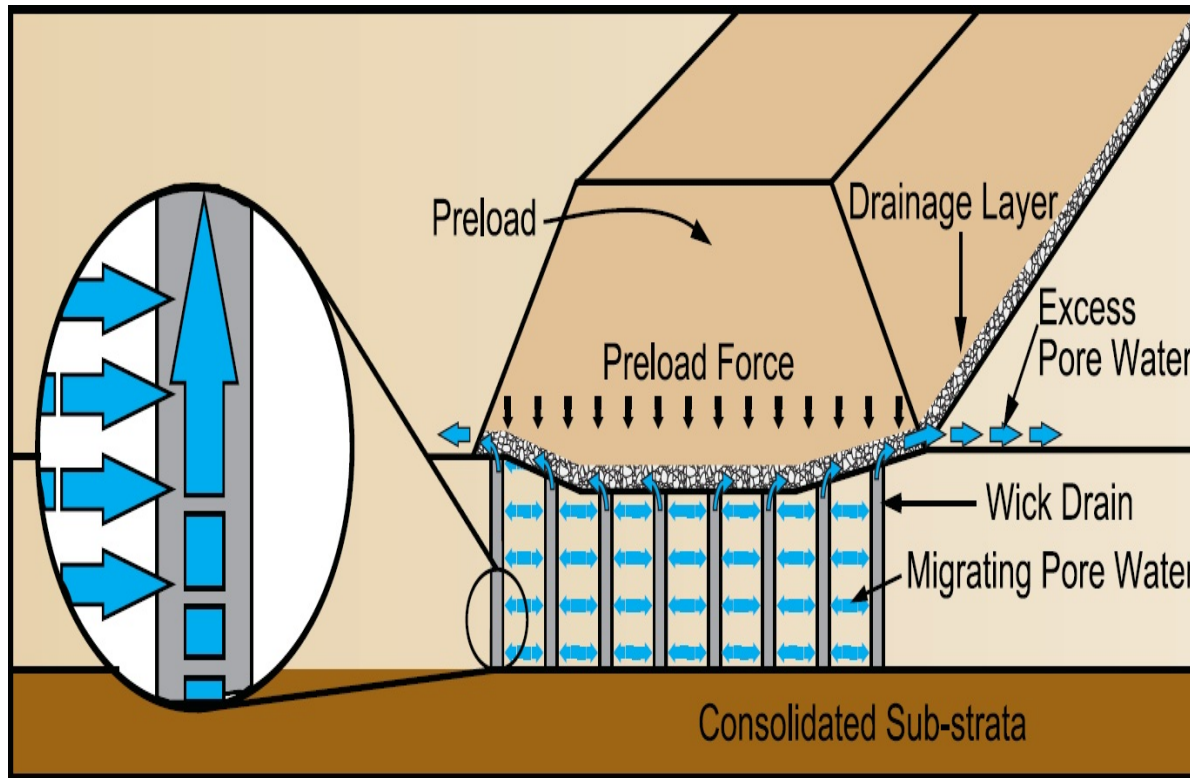
Without Drains

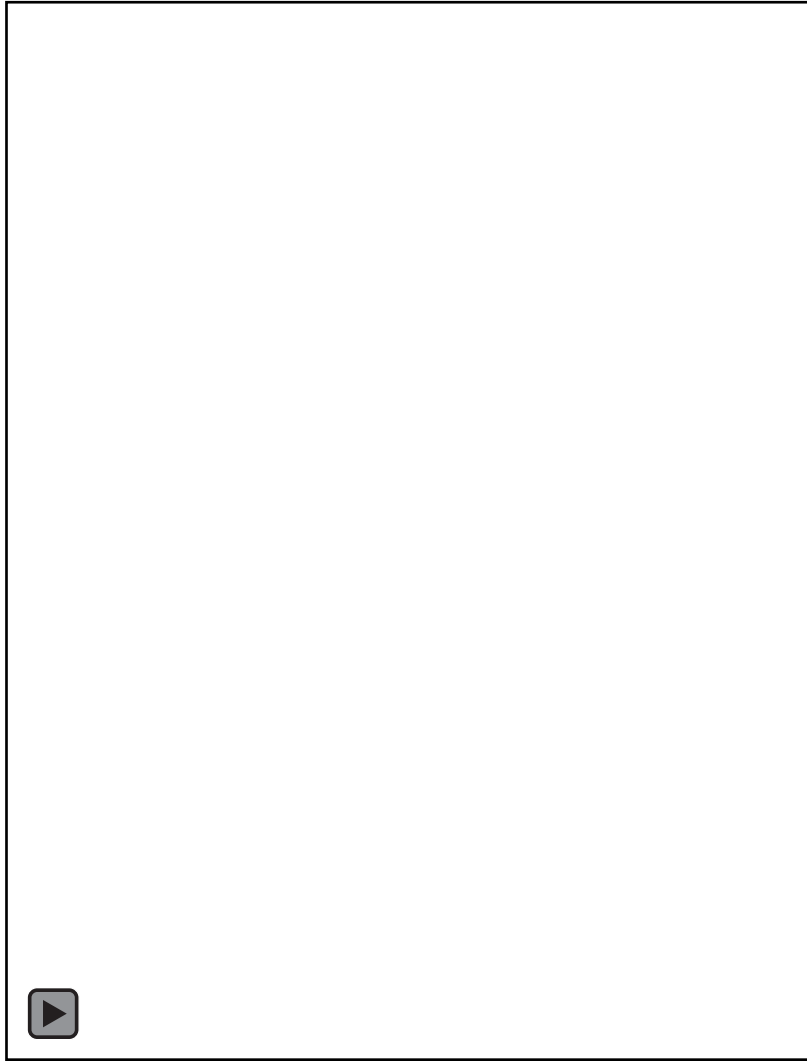


With Drains



PREFABRICATED VERTICAL DRAINS (PVD or Wick Drains)





Surcharging

- Surcharge prior to construction is placing a temporary fill upon the area
- Causes “hydraulic pressure” at depth
- Wick drains are used to greatly accelerate the drainage of pore water – with contaminants
- Allows the consolidation to occur much quicker
- Pore water is collected and treated

The Product

- Wick Drains are a plastic band shaped conduit
- Approximately 4 inches wide by ¼ inch thick
- Composed of a poly strip with drainage channels wrapped in a filter fabric
- Relatively inert to chemical reaction



Vertical Wick Drain Installation Process

Installation Methods

- Static Push
- Vibratory Energy
- Preparatory drilling
 - Data Acquisition

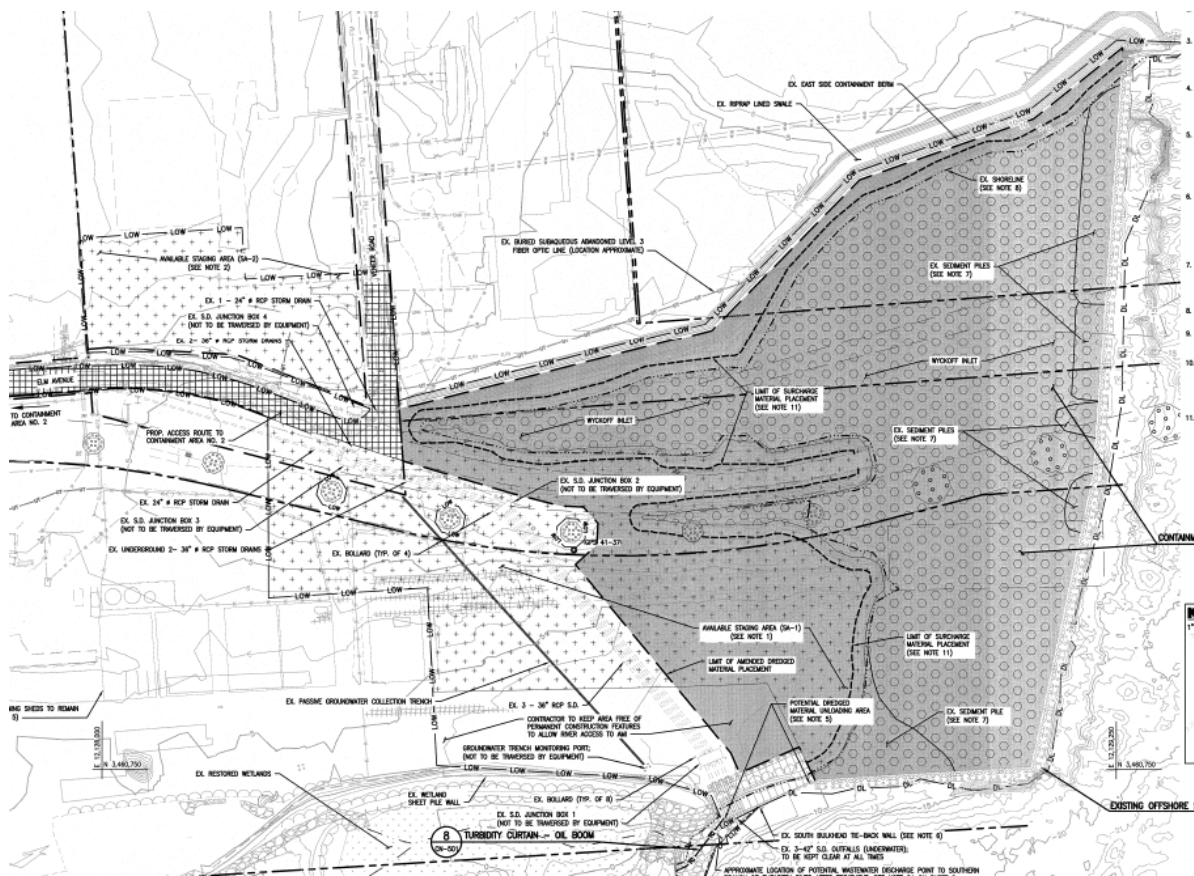


Project Summary: Consolidation of DNAPL

Environmental Remediation with Wick Drains

- Similar to standard port berth creation
- Required wick drains to accelerate consolidation
- Allows the pore water to be collected
- And, treated at on site facility

AWI - Site Plan



AWI North – Prior to Construction



AWI South – Prior to Construction

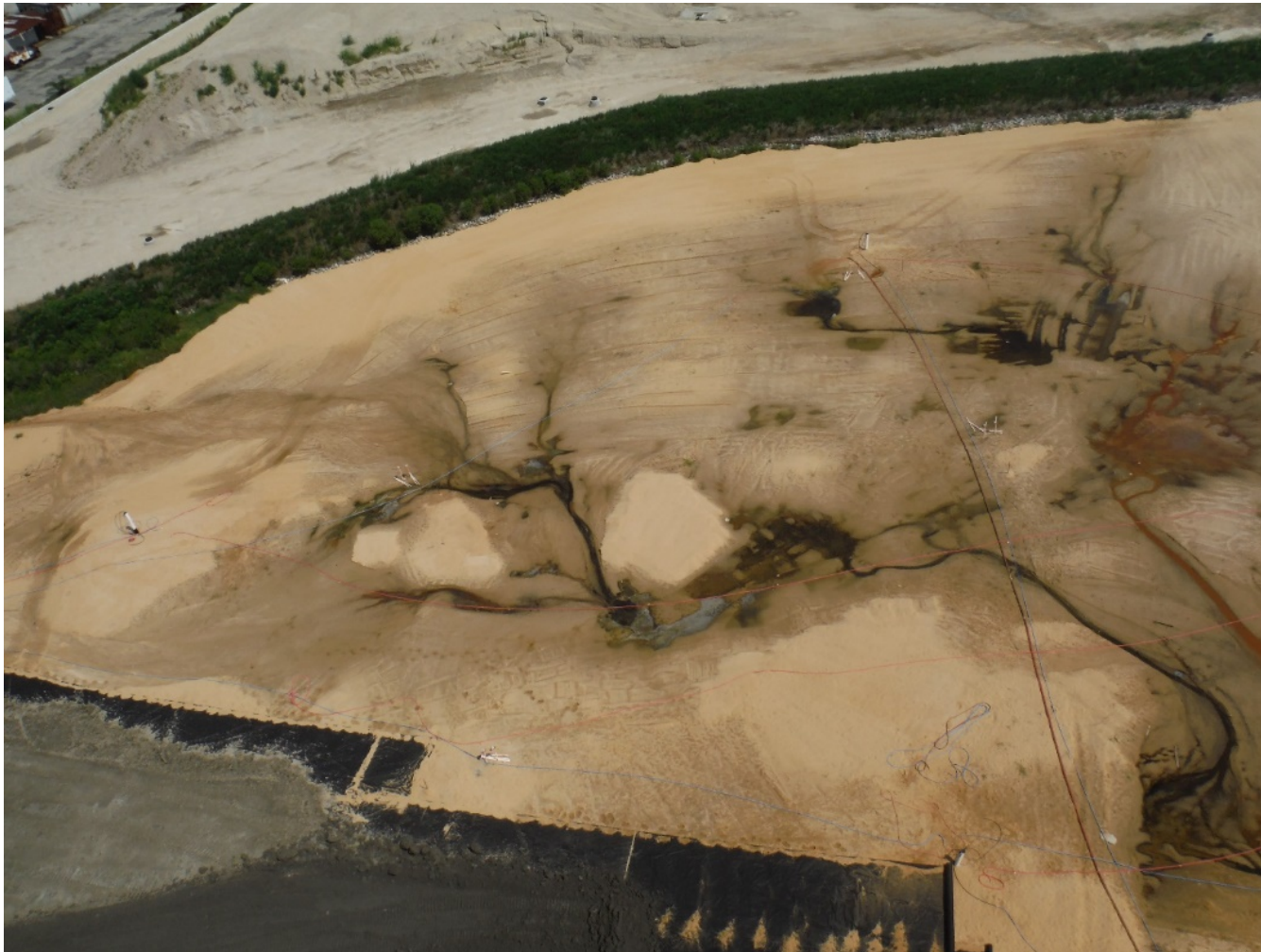


Spreading Sand Drainage Blanket



Finished Sand Blanket

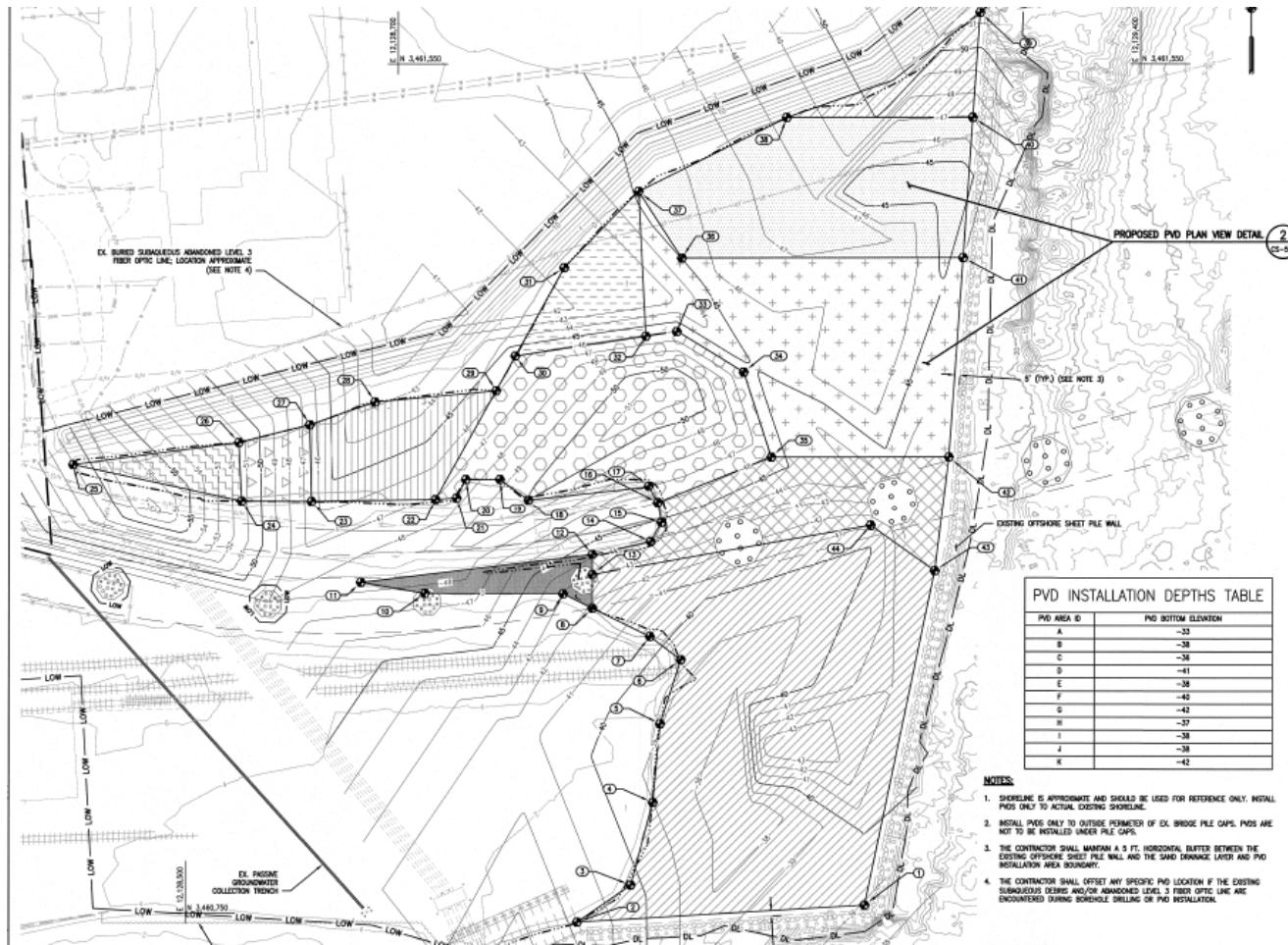
- Shows leaching contaminants to surface



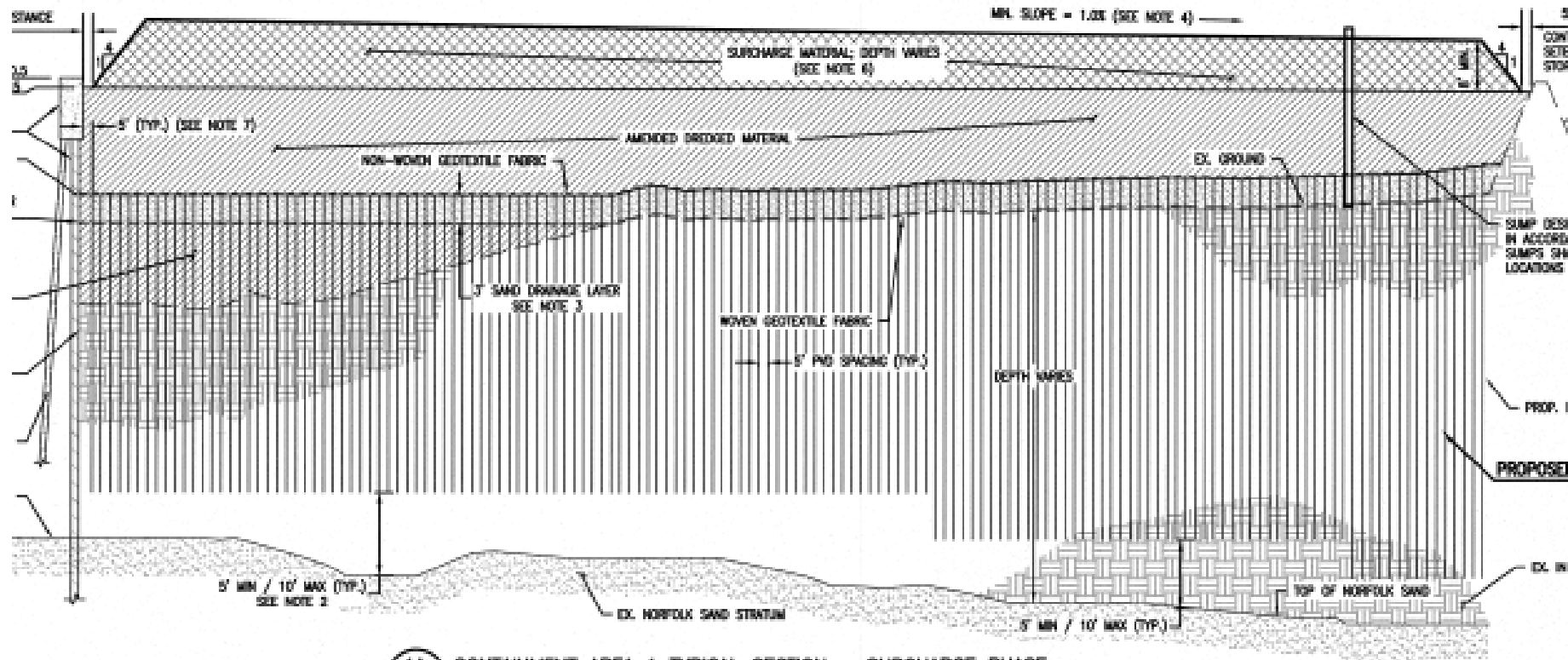
Dredging of Contaminated Sediments



PVD Installation Layout Plan



Wick Drain Section



1A CONTAINMENT AREA 1 TYPICAL SECTION – SURCHARGE PHASE
 CS-107 NOT TO SCALE

AWI- Wick Drain Layout in North Cell



PVD Layout With Monitoring Wells & Sumps



Spreading Treated Dredge Material



New Jordan Bridge Foundations Bisect Site



Dredge material mixing and wick installation



AWI- Surcharge on North cell



AWI- Surcharge on South cell



Vacuum extraction option

New modular system

Very efficient

Quick installation

No surcharge



Conventional Well Points



Summary

- Contaminated dredged materials and soil can be treated on site.
- Wick drains can be utilized to consolidate and stabilize the fine grained dredged material
- Discharged pore water can be collected and treated
- A rehabilitated port facility is created

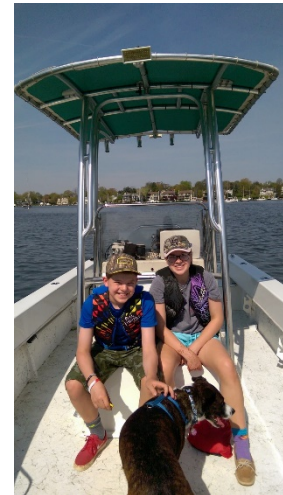
- Vacuum Extraction Option available

THINK SAFE

THINK
SAFE

WORK
SAFE

GO HOME
SAFE



Contact Info

Jeff Hill, PE

Director

Hayward Baker

7550 Teague Road

Hanover, MD 21076

410.551.8200 Office

410.551.8206 Fax

847.343.2023 Cell

Email: jrhill@haywardbaker.com

www.hbwickdrains.com