Sheldon Mine Tailings Pile Cap & Drainage Enhancements

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Outline

- Overview of Sheldon Mine site
- Site drainage improvements
- Vegetative cap system
- Construction methods
- Traffic impacts
- Questions???

Overview-
Why are we here?

- Existing cap is failing, allowing tailings high in Arsenic (As) and Lead (Pb), and other toxic heavy metals to migrate.
- Acid Mine Drainage (AMD) can leach to groundwater or surface water
- Fugitive dust can be a health hazard to humans and wildlife
- Runoff can impact water quality in Lynx Creek, Lynx Lake, and in down-gradient water wells.

Overview-
What will the EPA do about it?

- Site drainage improvements to route clean water around the Tailings Pile. --Reduces or eliminates contaminated surface runoff and impacts to groundwater
- Vegetative Cap constructed of natural materials (wood mulch, soil, and organic compost)

  -Prevents fugitive dust emissions and reduces impacts to groundwater and surface water from infiltration and generation of AMD
- Coordination of activities with USFS, AZDEQ, SHPO, Yavapai County, Walker FD, City of Prescott, and Tribal Nations

Overview-
What are the impacts to local residents?

- Likely to have temporary road closures and delays and alternate routes near site
- Heavy equipment at site and trucks on Walker Road-increased noise during business hours.
- Dust emissions on dirt roads and during excavation
- 5-6 week project duration

Overview-

What will the EPA do to mitigate these impacts?

- Command Post communication center (phones and radios)
- Periodic fact sheets and website will provide updated info on project
- EPA OSC at the site and available to help

Overview-

What will the EPA do to mitigate these impacts?

- Hire a local traffic safety consultant to develop a traffic control plan
- Road signs and flaggers will help direct traffic through work zone
- Dust suppression w/water trucks
  - Gorilla Snot – non-toxic glue
- Conduct air monitoring to ensure dust emissions are at safe levels

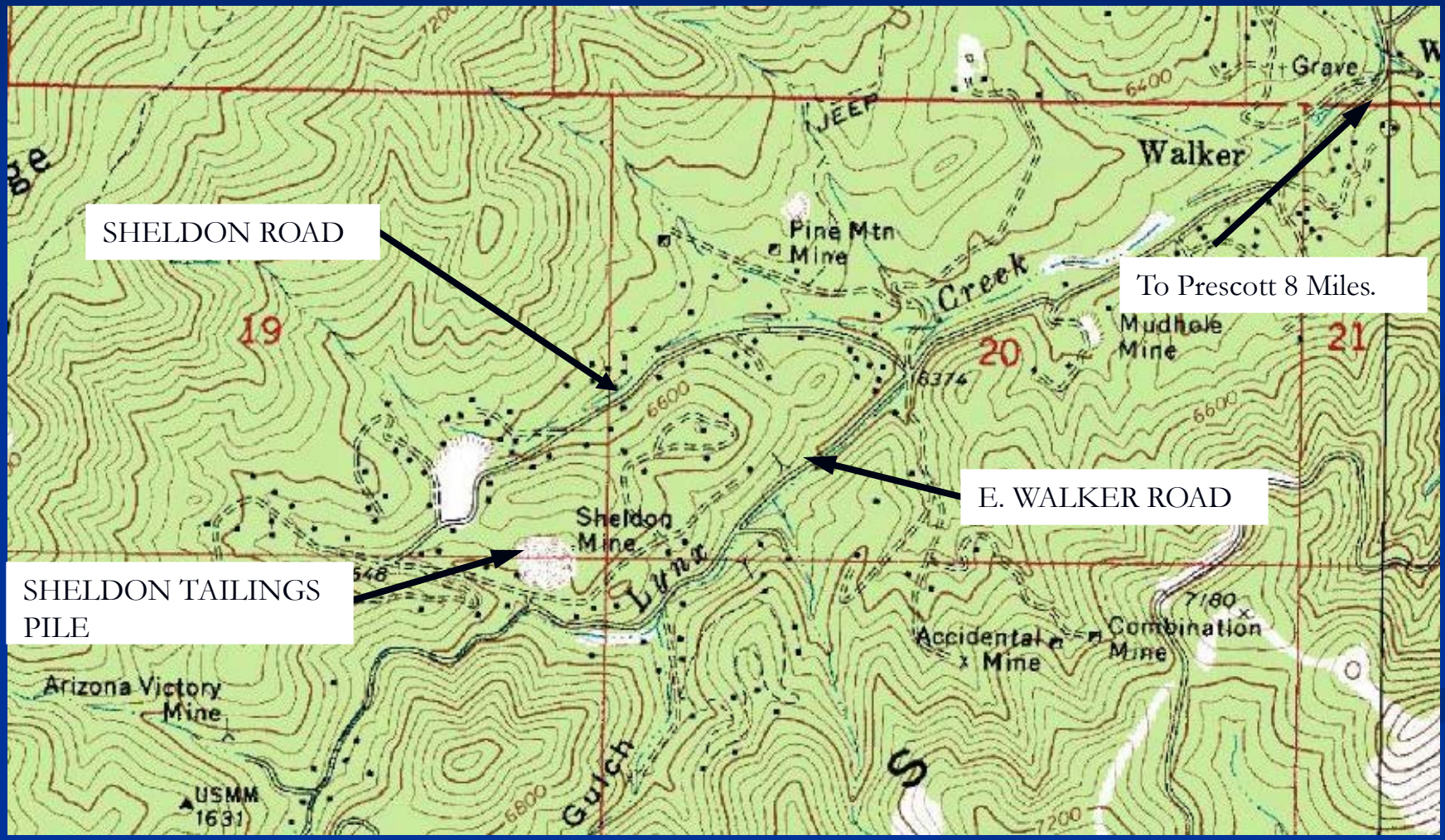
Traffic Control and Road Crossings

- Temporary traffic delays and road closures
  - Import of materials will likely mean temporary delays from ~7:30 am-5:30 pm on Walker Road between FD and Site for 10-15 days during construction.
  - Heavy equipment and truck traffic on Eagle Road which borders the site will cause temporary delays for 4-6 weeks.
  - Culvert pipe installation work on Walker Rd near New Strike Ln may mean complete road closure for 7-9 hours one day in May, 2013. EPA will ensure that ambulances and fire trucks will be able to pass over trench on steel road crossing plates.
  - EPA will work with the Walker FD and County PW to notify residents in advance of any major road delay or temporary road closure that may impact residents and to lessen the impact as much as possible.

Traffic Control Plan

- EPA is working with County PW and traffic safety company to design a plan to direct traffic on Walker Rd
- Residents should avoid driving on Walker Rd between hours 7:30 am – 5:30 pm due to potential delays

Vicinity Map



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TDD: T0-02-09-12-04-0006

Source: ESRI 2010; E&E 2011; Microsoft Virtual Earth 2011
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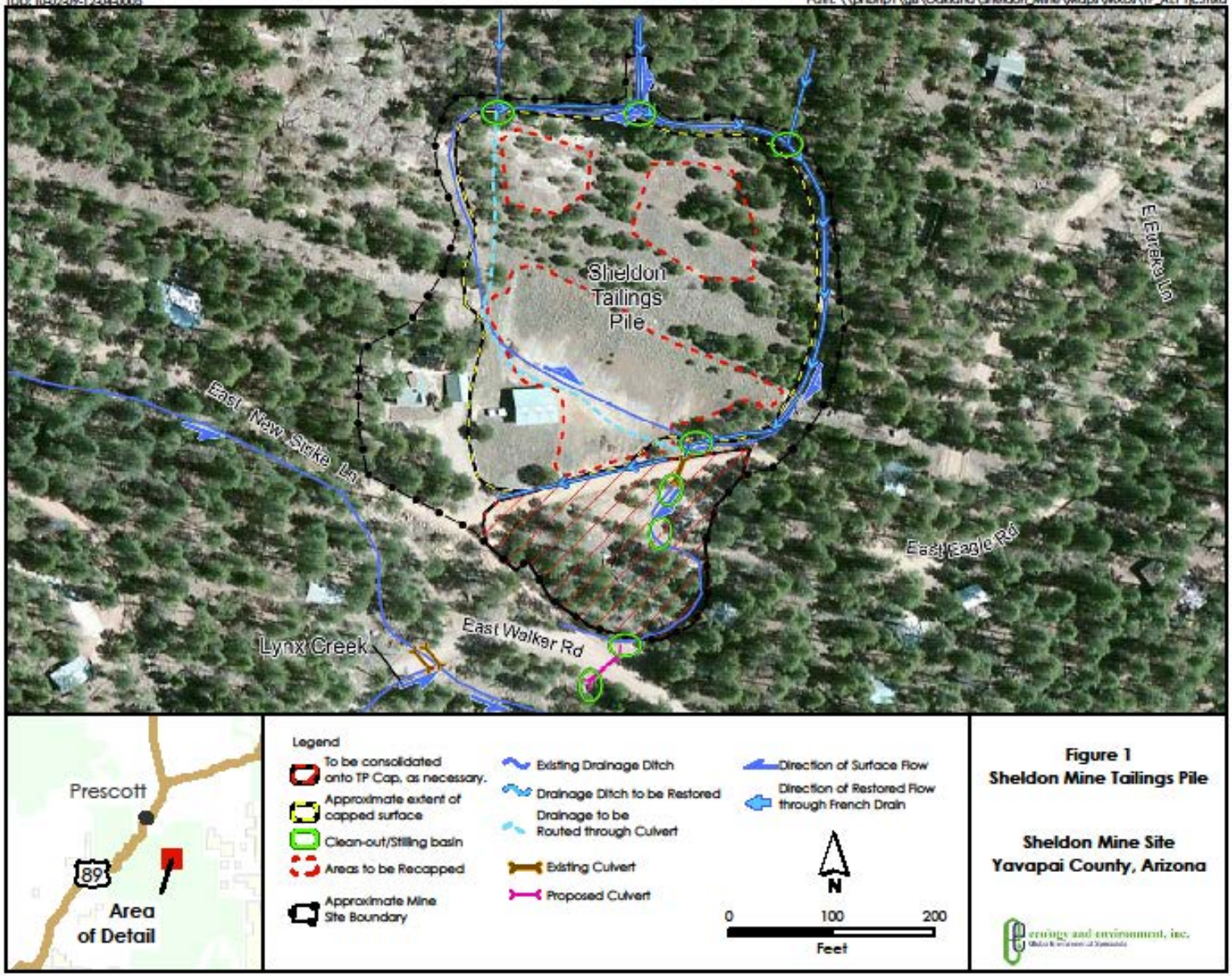

Figure 1
Sheldon Mine Tailings Pile

Sheldon Mine Site
Yavapai County, Arizona

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Background

- 1863-1959: Active copper, gold, silver, and lead mine.
- 1975-6: Partial Site restoration by University of Arizona School of Renewable Natural Resources and the U.S. Forest Service.
- 1999: Environmental Investigation of mine sites in the Lynx Creek and Hassayampa Creek watersheds (EPA, USFS, USFWS, ADEQ, ADHS, AG&F). Surface water, soil, sediment and tailings samples were collected throughout the watershed.

Background (cont)

- 2004 -2005: Sediment, water, crayfish, and fish were collected from Lynx Creek and Lynx Lake (USFWS and EPA). Heavy metals contamination was found in water and sediments from Lynx Creek; crayfish, carp and catfish had elevated concentrations.
- 2005: EPA Removal Assessment. Surface and subsurface soils and water were collected at Sheldon. Elevated levels of As and Pb detected in soil samples. Low pH (acidic) water high in metals were detected.

Background (cont)

- 2012: Additional sampling and investigation of soil and sediment. Drainage areas downstream of TP identified as having high Pb and As concentrations.
- 2013: Removal Action to remediate Tailings Pile and contaminated sediments in drainage channel.

Tailings Pile

Tailings Pile

Why is there a Problem?

- Loss of cover due to erosion allows exposure of pyritic (high iron and sulfide) mine waste to oxygen and water.
  - Metal sulfide minerals are oxidized and dissolve into water. Acid generation occurs resulting in increased metal mobility and increased acidity (lowered pH)
- Contaminated runoff to Lynx Creek and groundwater
- Fugitive dust
- Direct contact

Remedial Actions

- Site Drainage Improvements
  - Grading
  - French drain system with lined trenches to reroute clean surface water around mine waste
- Vegetative Cap
  - Barrier to direct exposure and fugitive dust
  - Reduction of storm water infiltration to minimize Acid Mine Drainage (AMD)
- Excavation and removal of contaminated sediments in stream channel

Site Drainage Improvements

- Grade site to remove areas of ponding.
- Install French Drain system around the perimeter of the tailings pile.
- Diverts surface water around the tailings pile to natural drainage.
- Minimizes water available for acid mine drainage.

Evapotranspiration Covers- How do they work?

- Isolate contaminants and keep them in place to prevent spread of contaminated materials
- - Typically constructed by placing 2- to 10-foot-thick layer of fine-grained soil over contaminated material
- - Native grass, shurbs, small trees that form extensive root systems are planted in the soil
- - Soil-plant layer of an ET cover slows downward movement of rainwater and snowmelt and promotes storage of water
- - Stored water will either evaporate or transpire which keeps water from seeping into contaminated material
- - ET covers are commonly used in dry climates where there is little rainfall
- - ET covers can be used to cover tailings piles to prevent or reduce acid mine drainage

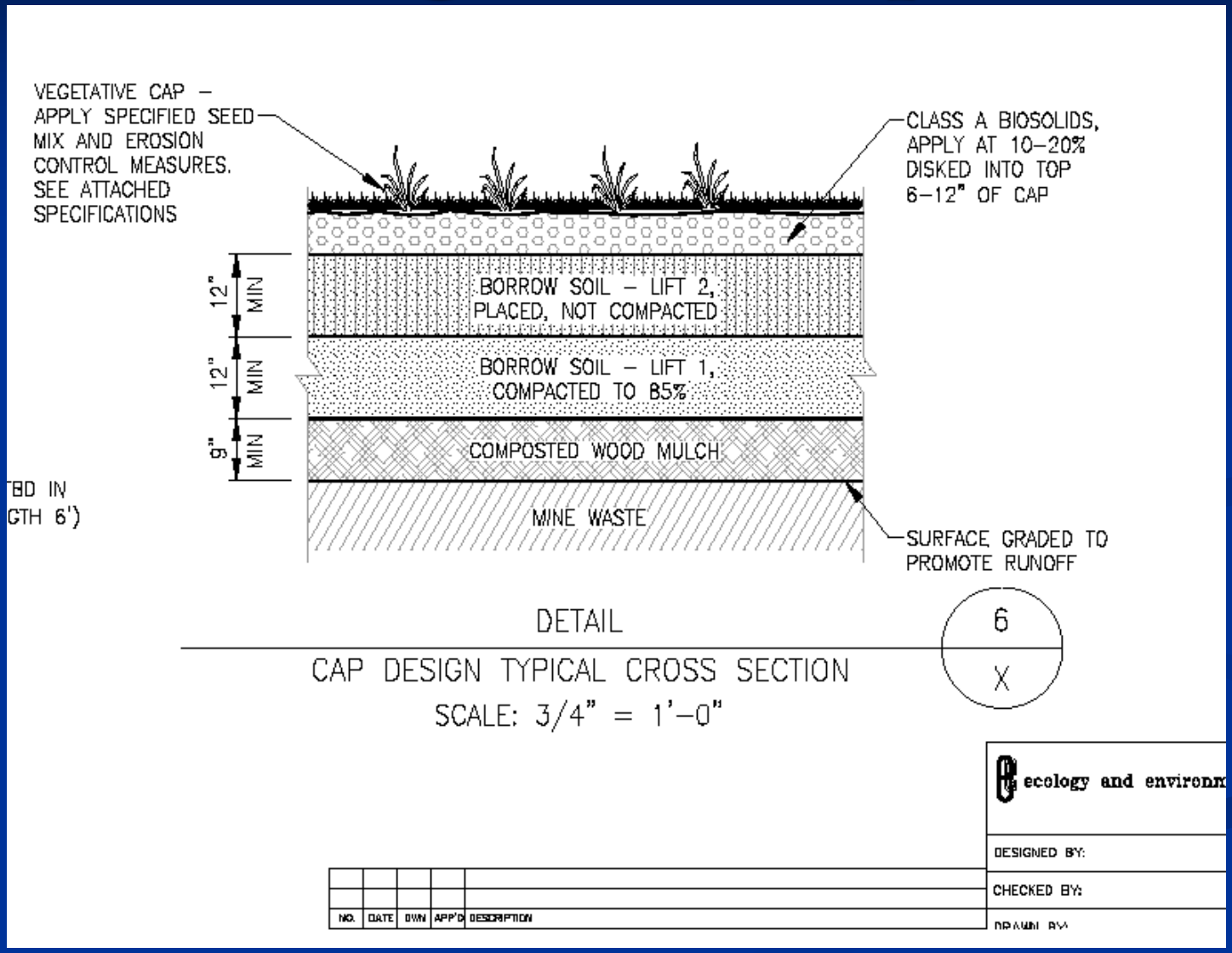
The Vegetative Cap

- Purpose –Designed to create a physical barrier between the waste and the environment to prevent uncontrolled release of contamination
- Acts as a "sponge" to hold water until it can evaporate, or be used by plants
- Additionally the vegetation on the surface helps prevent erosion and reduces water infiltration, minimizing acid mine drainage.

The Vegetative Cap

- The CAP:
  - Organic mulch lower layer that isolates contaminated mine waste, slowly releases N and P, holds water, and helps plants grow long-term
  - Upper vegetated layer that acts as a sponge
    - Special blend of available borrow soil and organic fertilizer
    - Good growth media for establishing plants
    - Plant uptake, transpiration and evaporation help prevent water infiltration into tailings and the generation and migration of AMD from the repository
  - Multiple layers work together to seal in waste, store water, prevent erosion, and limit AMD generation

Vegetative Cap



Erosion Control

- Hydroseeding of vegetative cap to reduce erosion due to rainfall.
- Install fiber rolls around culverts and across all vegetated slopes.
  - Reduce loss of topsoil and sediment loading to waterways.
  - Reduce erosion due to rainfall.
  - Blown Straw on surface to reduce impact energy of rainfall.

Import Quantities

- Approximately 3,300 cubic yards (cy) of Borrow Soil available at no cost from USFS. Located ~6 miles from the site off of Walker Road
- Approximately 1,100 cy of composted wood mulch available at no cost from Sun Dog Ranch Road Transfer Station
- Approximately 225 cy of Exceptional Quality Class A sterile biosolid compost
- LOTS OF TRUCKING (approx. 500 loads)

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Source: ESRI 2010; E&E 2011; Microsoft Virtual Earth 2011
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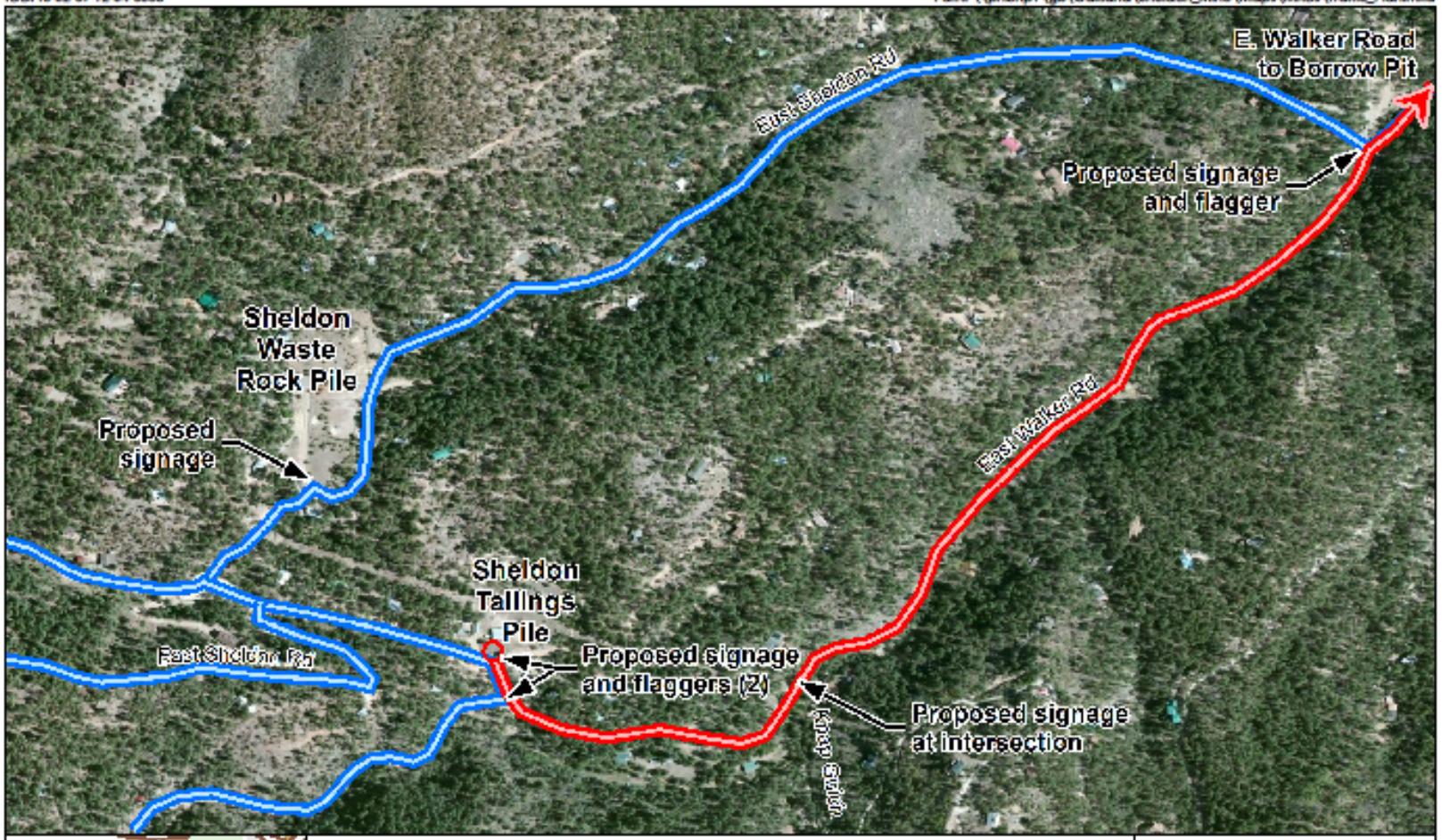

Legend

- Alternate Route
- Truck Route
- Truck Turn Around Site

N

0 250 500
Feet

Figure
Sheldon Mine Soil Potential Traffic Plan

Sheldon Mine Site
Yavapai County, Arizona

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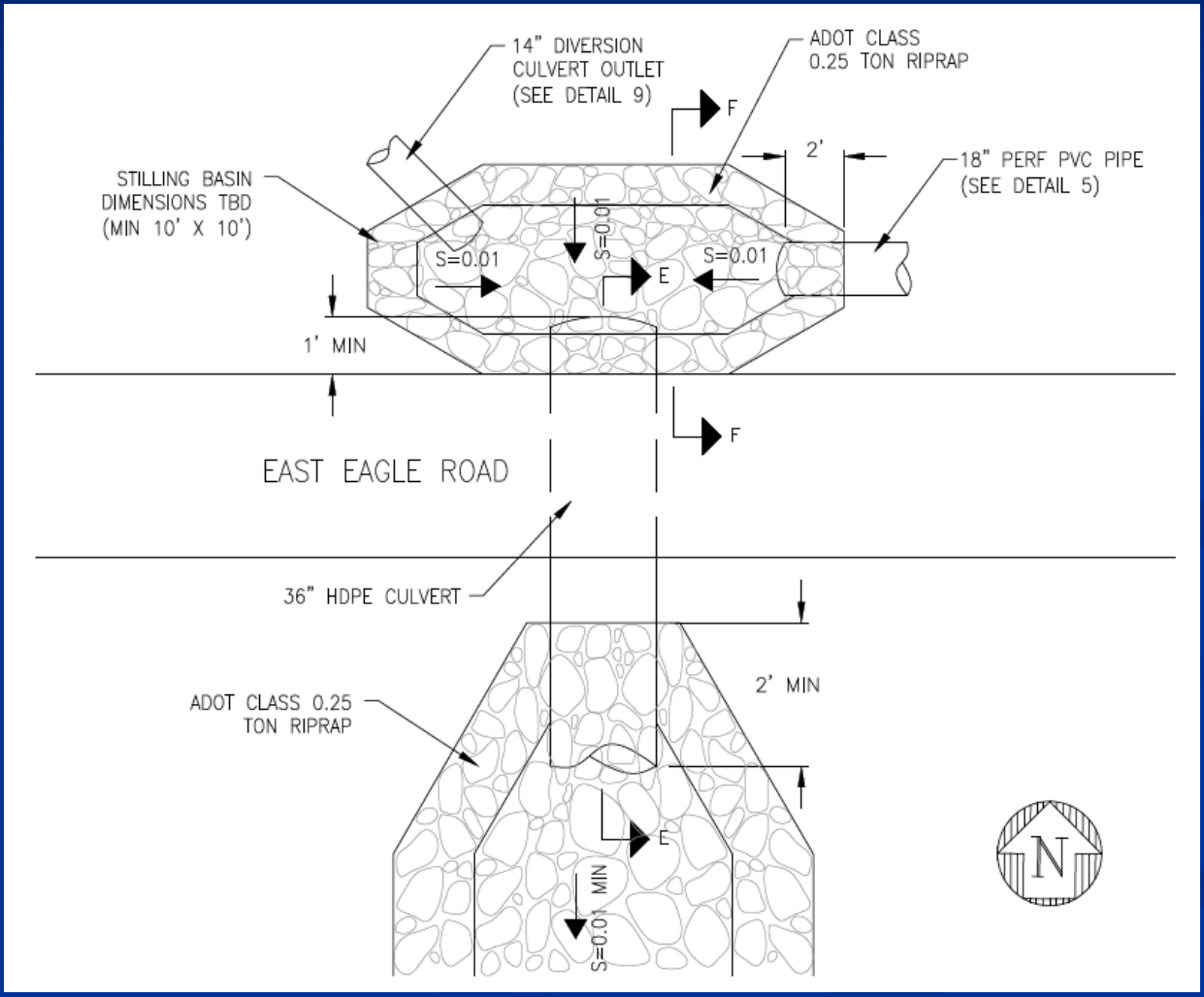
Project Summary

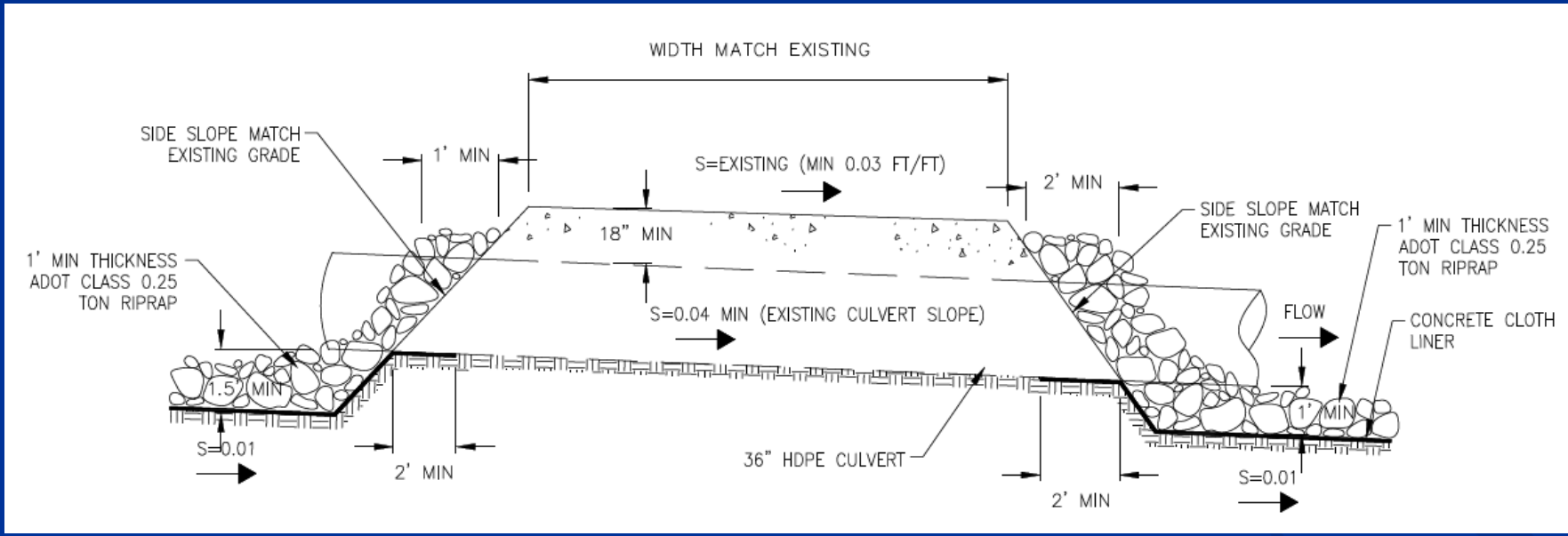
- US EPA to improve drainage and restore cap at Sheldon Tailings Pile beginning ~4/15 to limit or prevent contaminated soil, surface water, and groundwater from migrating offsite
- Temporary alternate routes and road closures possible for 3-6 weeks ~4/15-late May
- Project completion date ~ June 1
- Improvements expected to last >30 years.

Questions???

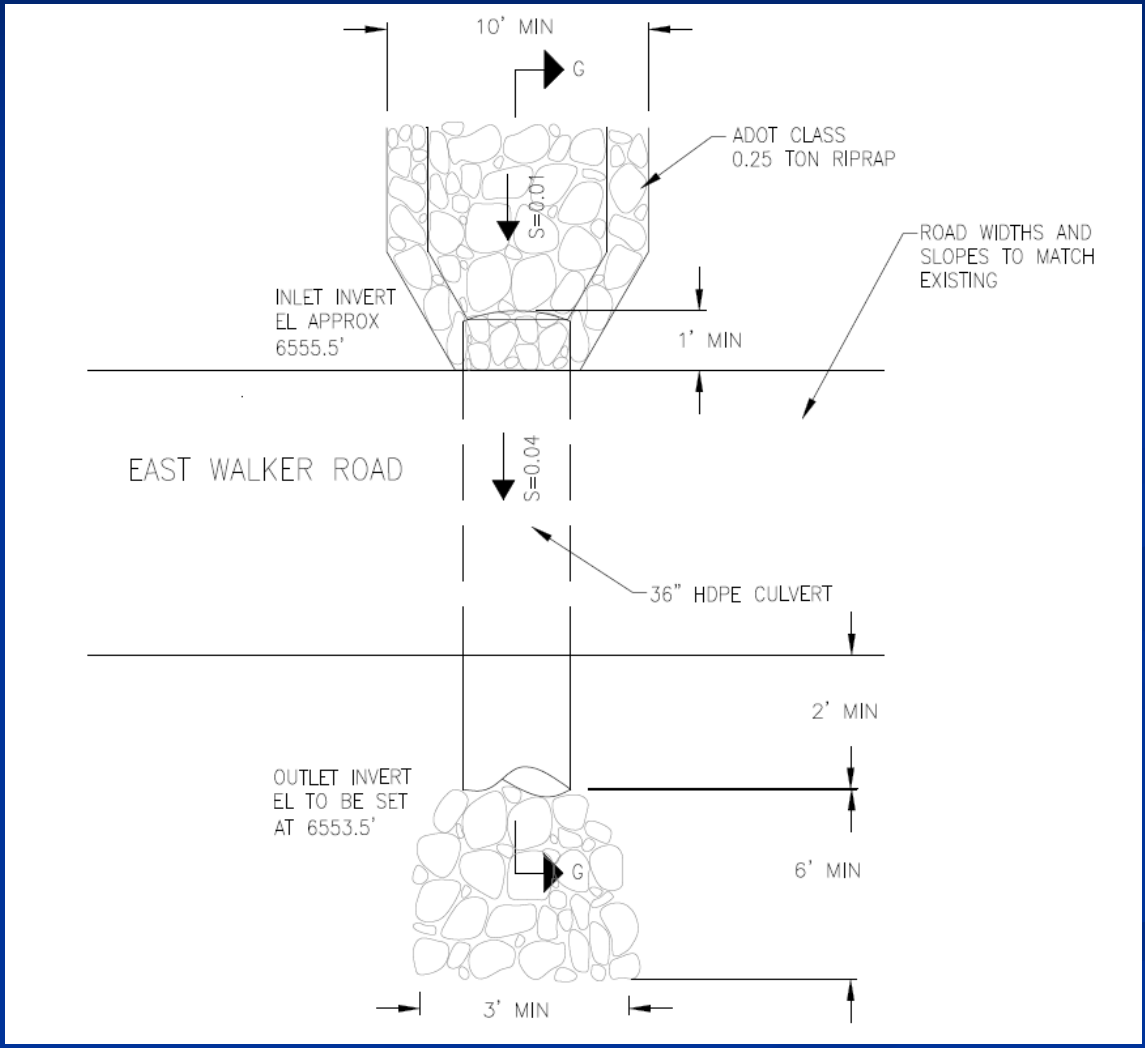
Eagle Road Crossing (plan view)



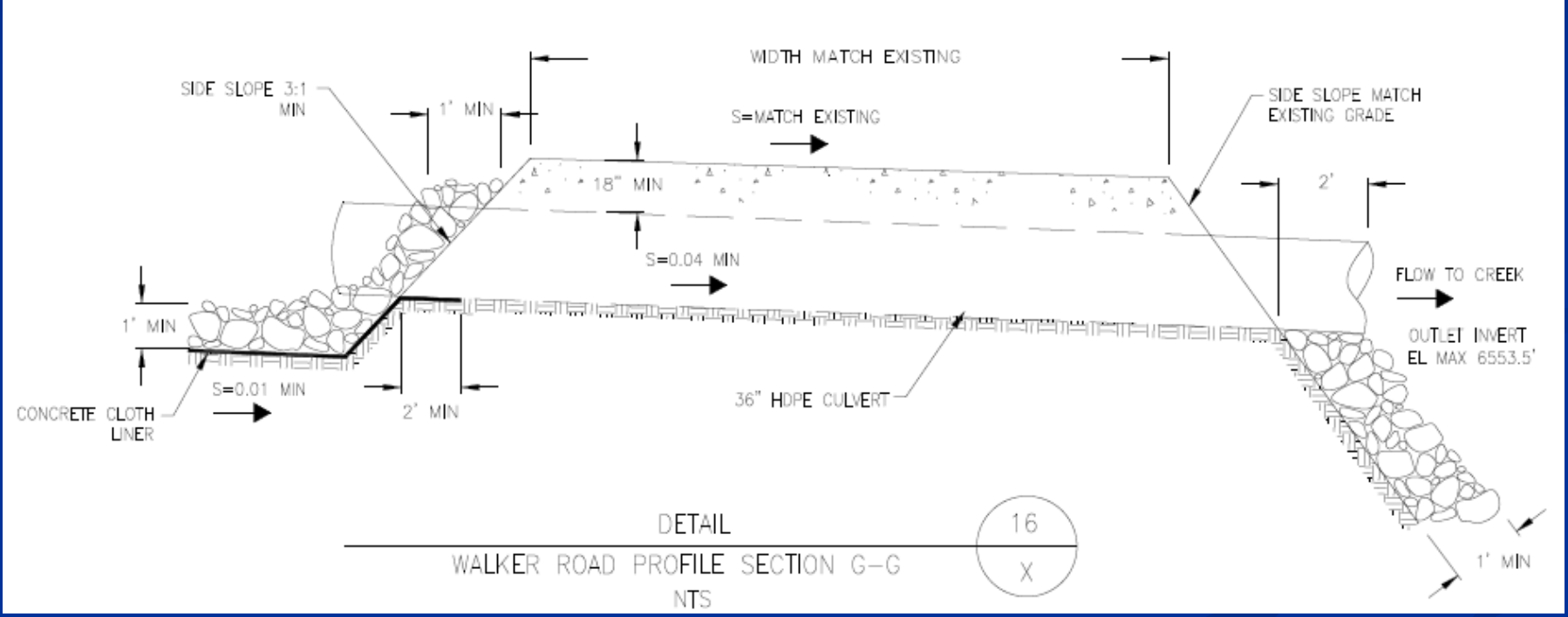
Eagle Road Crossing (section)



Walker Road Crossing (plan view)

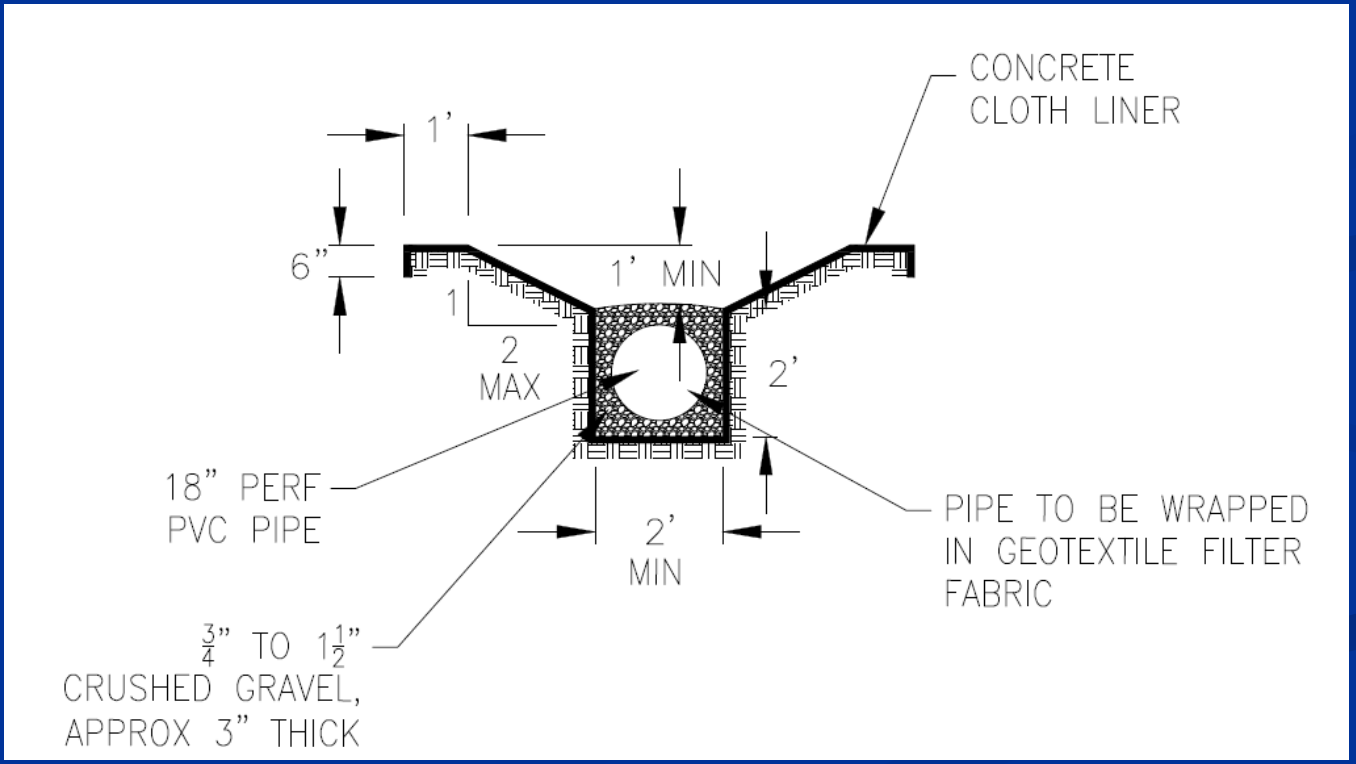


Walker Road Crossing (section)

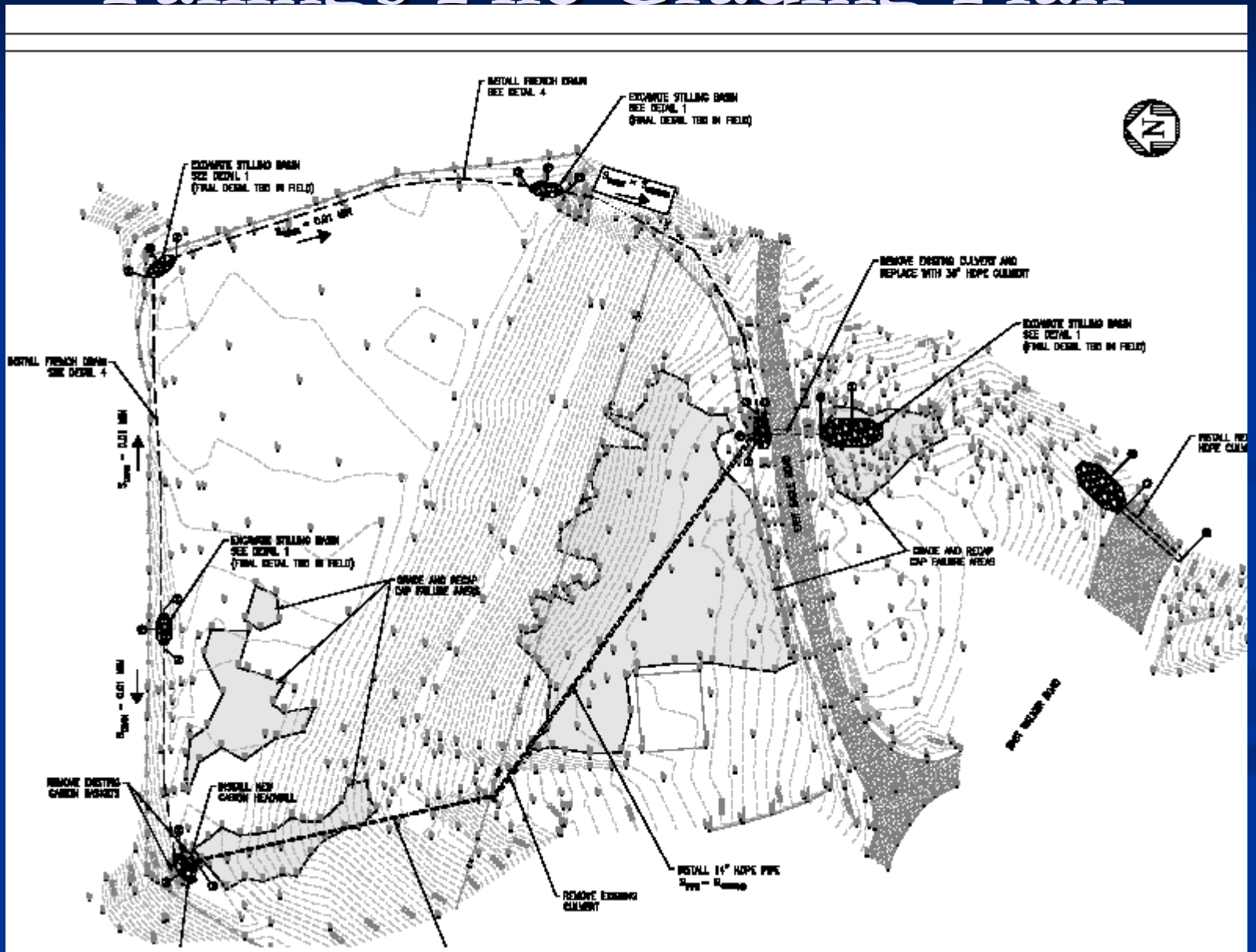


French Drain System

- Slotted pipe laid near surface to capture and transport surface water.



Tailings Pile Grading Plan



A Few Definitions

- Wood Mulch – yard waste from local transfer station.
- Borrow Soil – imported soil used as fill in the vegetative cap.
- Class A Biosolids – Typically a composted organic byproduct from a wastewater treatment plant. Class A (or Exceptional Quality) biosolids are tested and meet State and Federal Standards.
- Hydroseed – a grass planting slurry sprayed on surface made up of mulch and grass seed.

Definitions (cont.)

- Concrete Cloth – is a flexible concrete impregnated fabric, that hardens on hydration to form a thin, durable, water proof concrete layer.
- Riprap - rock used to armour streambeds, bridge abutments, and other shoreline structures against scour by water.
- HDPE – High Density Polyethylene, a rugged, chemically resistant piping material.