

Reconnecting Waterways

Case Study for Managing Construction Site Sediment

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Josh Carvajal, VT DEC Rivers Program

December 2024

Case Study – Wainwright Mill Dam Removal, Salisbury

Dam Removal and Stream Restoration: DA = 1.6 sm, Wbkf = 11', Dbkf = 1', Slope = 0.55%

Owner: Private, Engineer: SRL, Sponsor: VT Natural Resource Council, Contractor: Markowski Excavating



Case Study – Stream Alteration Individual Permit (IP)

IP Required: *due to sediment volume to remain and tributary listed on 303(d) as impaired due to nutrients; Impounded Sediment = 22,000 cyds, Sediment Removed = 10,700 cyds over 770 linear feet of stream*

3 years of Site Visits – Annual during low flow period and after rainfall events of 5+ inches over 48 hours

Water Quality Monitoring – Threshold of 30.5 NTU determined to be the ‘Action Level’ for maintenance

Monitoring Reports – Submitted with 45 days to USACE and VT DEC, summary memo and map with photos

Maintenance Activities – Based on sediment source(s), to be completed within 3 months of observation

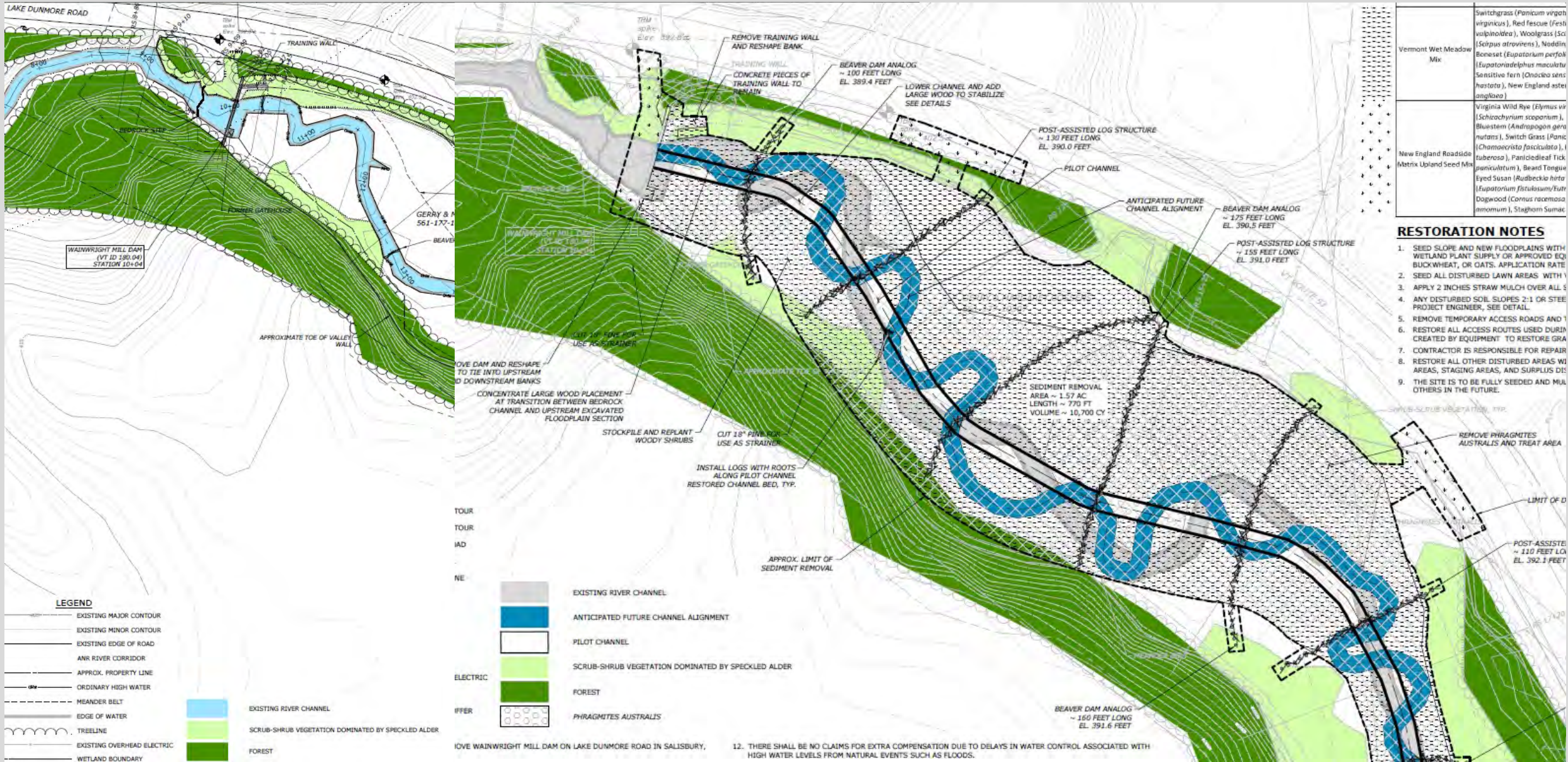
Table 1: Maintenance Matrix

Observation	Maintenance Action	Metrics to Cease Maintenance
Headcut with >1.5-foot water surface drop	Bolstering or installation of either PALS or BDA in area	Headcut drop decreases below 1.5 feet.
PALS structure with full vertical breach at least 5 feet wide or partial breach of more than 75% of height of structure more than 10 feet wide with turbidity export	Rebuild PALS structure to repair breached section	Channel vertically stable and no turbidity export.
BDA breached	No action required	N/A
Vegetation goals are more than 25% below expected coverage compared to goal for the duration past construction	Reseed areas with less than 80% coverage with approved native seed mix.	Vegetation goals met
If the turbidity is above the established monitoring threshold, perform an additional stream walk to confirm the source of sediment and identify alternatives to stabilize the sediment.	Alternatives (below) shall be reviewed with regulators and a preferred alternative shall be collaboratively agreed upon, see list of water quality alternatives to be considered below. The project team shall discuss an implementation plan including timing, required permitting, funding, and installation.	Re-check turbidity level to determine if turbidity has returned to below threshold values.

If turbidity above 30.5 NTU exists, consider the following water quality maintenance alternatives with the project team.

1. Spot fix (i.e., revegetate, shape by hand or small machine, stabilize with wood, bioengineering) banks areas that are the source of baseflow turbidity.
2. Adjust large wood structures by hand or small machine if baseflow turbidity originating at installed BDAs or PALS.
3. If baseflow turbidity originating over full project length, reseed/plant and continue monitoring vegetation reestablishment. Install erosion control matting to cover the exposed floodplain leading to turbidity.
4. If baseflow turbidity originating over only upstream portion of project area where sediment was not removed, either revegetate upstream areas with seed or plantings, and consider erosion control matting or install wood structures using PALS or BDA structures.
5. If excessive sediment transport is ongoing with heavy turbidity originating over the upstream portion of project area where sediment was not removed, develop and implement a sediment removal plan.

Case Study – Existing and Proposed Conditions

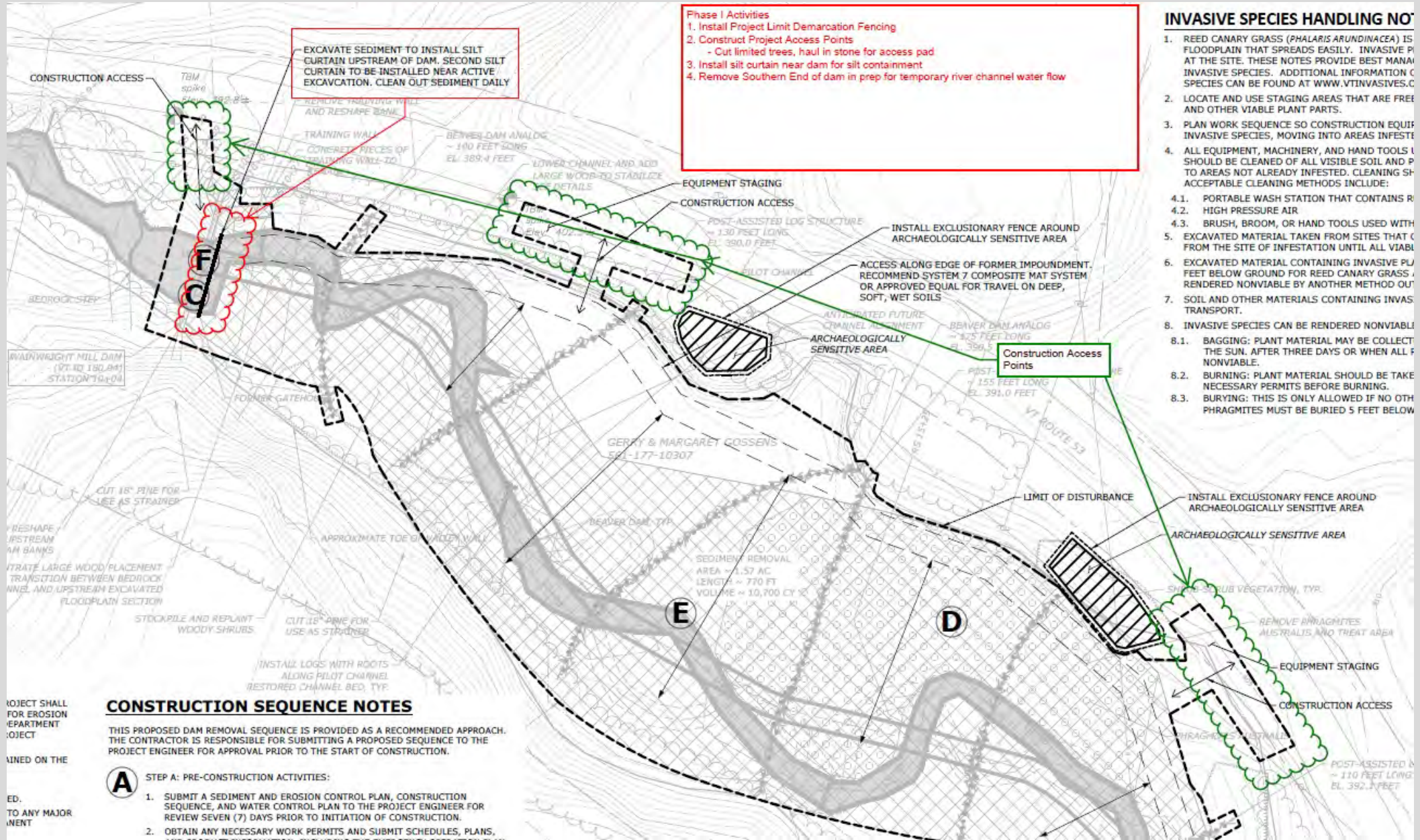


Vermont Wet Meadow Mix	Switchgrass (<i>Panicum virgatum</i>), Red fescue (<i>Festuca rubra</i>), Woolgrass (<i>Scirpus atrovirens</i>), Noddin Boneset (<i>Eupatorium perfoliatum</i>), New England aster (<i>Aster angustifolius</i>)
New England Roadsides (Matrix Upland Seed Mix)	Virginia Wild Rye (<i>Elymus virginicus</i>), Bluestem (<i>Andropogon gerardii</i>), Beard Tongue (<i>Chamaecrista fasciculata</i>), Panicledleaf Tick (<i>Panicum capillare</i>), Broadleaf Plantain (<i>Plantago lanceolata</i>), Red Top (<i>Lolium perenne</i>), Yellow Rattle (<i>Chamaecrista ciliata</i>), Red Top (<i>Lolium perenne</i>), Yellow Rattle (<i>Chamaecrista ciliata</i>), Red Top (<i>Lolium perenne</i>), Yellow Rattle (<i>Chamaecrista ciliata</i>)

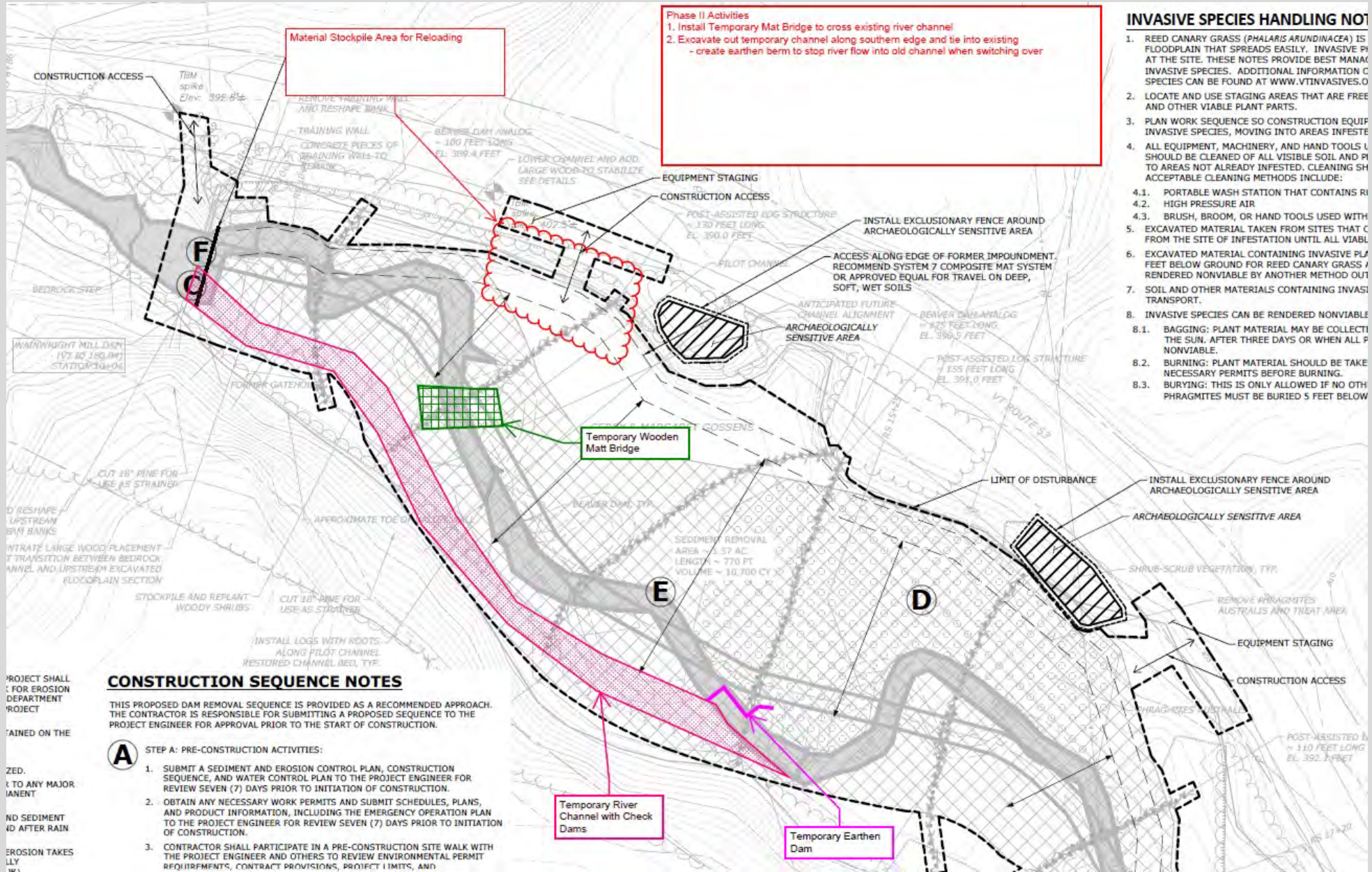
12. THERE SHALL BE NO CLAIMS FOR EXTRA COMPENSATION DUE TO DELAYS IN WATER CONTROL ASSOCIATED WITH HIGH WATER LEVELS FROM NATURAL EVENTS SUCH AS FLOODS.

PROPOSED Phasing and Flow Control Plan

PHASE 1 - Wainwright Mill Dam Removal



PHASE II - Wainwright Mill Dam Removal



Phase II Activities

1. Install Temporary Mat Bridge to cross existing river channel
2. Excavate out temporary channel along southern edge and tie into existing - create earthen berm to stop river flow into old channel when switching over

INVASIVE SPECIES HANDLING NOTES

1. REED CANARY GRASS (*PHALARIS ARUNDINACEA*) IS FLOODPLAIN THAT SPREADS EASILY. INVASIVE PLANT AT THE SITE. THESE NOTES PROVIDE BEST MANAGEMENT PRACTICES FOR HANDLING INVASIVE SPECIES. ADDITIONAL INFORMATION ON INVASIVE SPECIES CAN BE FOUND AT WWW.VTINVASIVES.COM
2. LOCATE AND USE STAGING AREAS THAT ARE FREE AND OTHER VIABLE PLANT PARTS.
3. PLAN WORK SEQUENCE SO CONSTRUCTION EQUIPMENT DOES NOT SPREAD INVASIVE SPECIES, MOVING INTO AREAS INFESTED.
4. ALL EQUIPMENT, MACHINERY, AND HAND TOOLS USED SHOULD BE CLEANED OF ALL VISIBLE SOIL AND PLANT MATTER TO AREAS NOT ALREADY INFESTED. CLEANING METHODS SHOULD INCLUDE:
 - 4.1. PORTABLE WASH STATION THAT CONTAINS RINSE WATER
 - 4.2. HIGH PRESSURE AIR
 - 4.3. BRUSH, BROOM, OR HAND TOOLS USED WITH CARE
5. EXCAVATED MATERIAL TAKEN FROM SITES THAT CONTAIN INVASIVE SPECIES FROM THE SITE OF INFESTATION UNTIL ALL VIABLE PLANT PARTS ARE REMOVED.
6. EXCAVATED MATERIAL CONTAINING INVASIVE PLANTS SHOULD BE BURIED AT LEAST 6 FEET BELOW GROUND FOR REED CANARY GRASS / RIVER BENT GRASS BY ANOTHER METHOD OUT OF SITE.
7. SOIL AND OTHER MATERIALS CONTAINING INVASIVE SPECIES CAN BE RENDERED NONVIABLE BY:
 - 8.1. BAGGING: PLANT MATERIAL MAY BE COLLECTED AND BAGGED. BAGS SHOULD BE STORED IN THE SUN. AFTER THREE DAYS OR WHEN ALL PLANTS ARE DRY, BAGS CAN BE BURIED AT LEAST 6 FEET BELOW GROUND.
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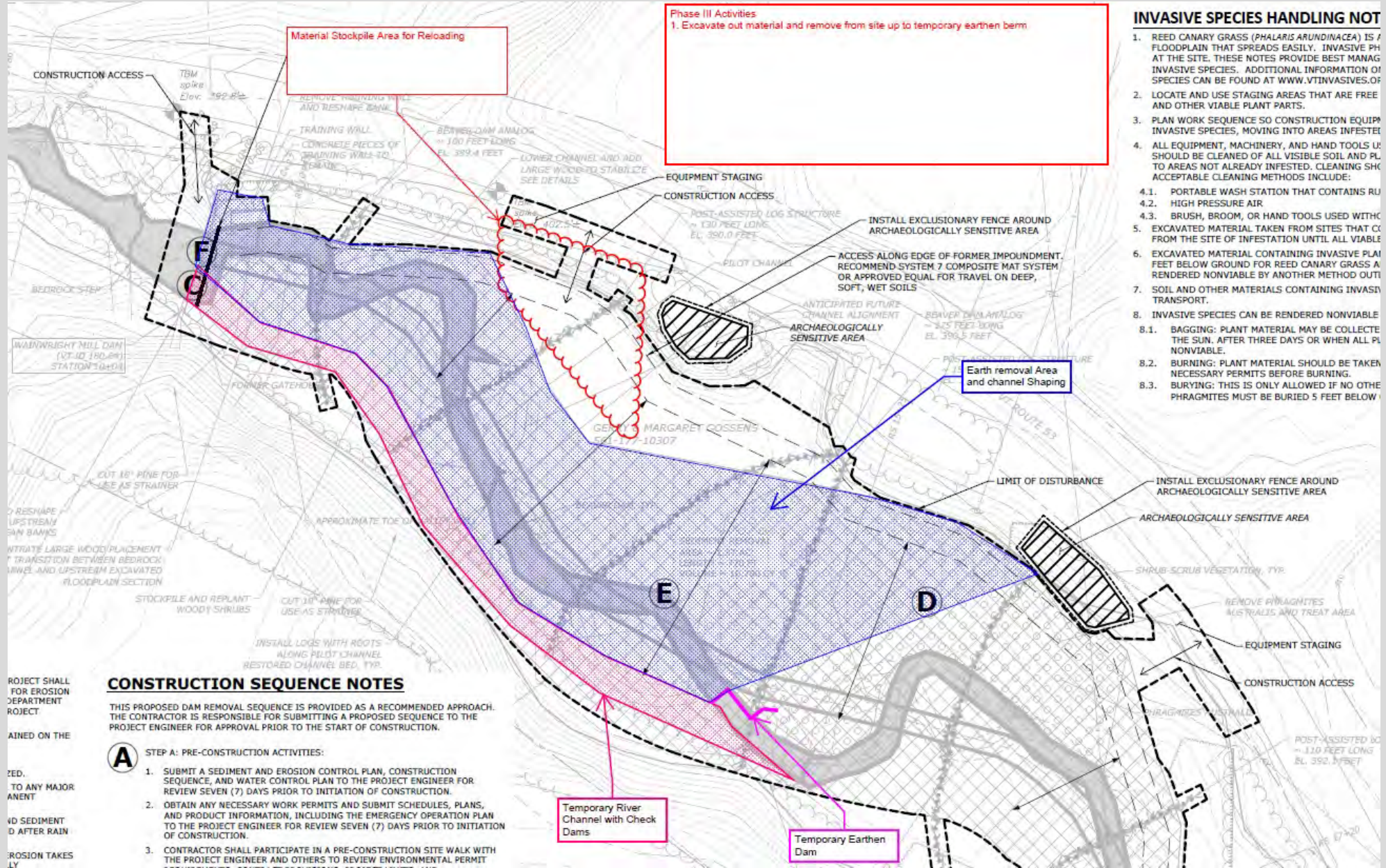
CONSTRUCTION SEQUENCE NOTES

THIS PROPOSED DAM REMOVAL SEQUENCE IS PROVIDED AS A RECOMMENDED APPROACH. THE CONTRACTOR IS RESPONSIBLE FOR SUBMITTING A PROPOSED SEQUENCE TO THE PROJECT ENGINEER FOR APPROVAL PRIOR TO THE START OF CONSTRUCTION.

- A** STEP A: PRE-CONSTRUCTION ACTIVITIES:
1. SUBMIT A SEDIMENT AND EROSION CONTROL PLAN, CONSTRUCTION SEQUENCE, AND WATER CONTROL PLAN TO THE PROJECT ENGINEER FOR REVIEW SEVEN (7) DAYS PRIOR TO INITIATION OF CONSTRUCTION.
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PHASE III - Wainwright Mill Dam Removal



Phase III Activities
 1. Excavate out material and remove from site up to temporary earthen berm

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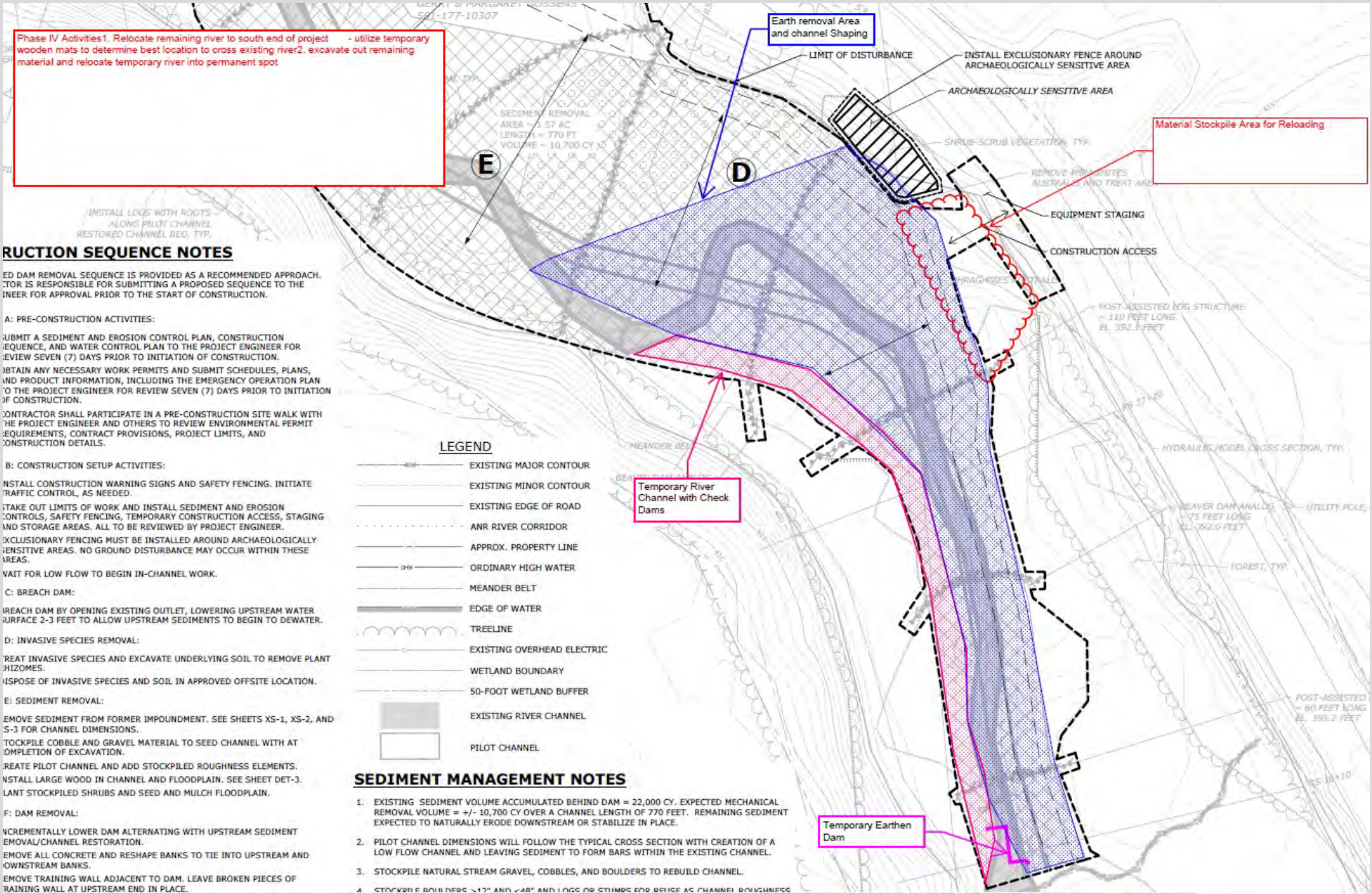
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PHASE IV - Wainwright Mill Dam Removal



Phase IV Activities 1. Relocate remaining river to south end of project - utilize temporary wooden mats to determine best location to cross existing river 2. excavate out remaining material and relocate temporary river into permanent spot

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B: CONSTRUCTION SETUP ACTIVITIES:

- 1. INSTALL CONSTRUCTION WARNING SIGNS AND SAFETY FENCING. INITIATE TRAFFIC CONTROL, AS NEEDED.
- 2. STAKE OUT LIMITS OF WORK AND INSTALL SEDIMENT AND EROSION CONTROLS, SAFETY FENCING, TEMPORARY CONSTRUCTION ACCESS, STAGING AND STORAGE AREAS. ALL TO BE REVIEWED BY PROJECT ENGINEER.
- 3. EXCLUSIONARY FENCING MUST BE INSTALLED AROUND ARCHAEOLOGICALLY SENSITIVE AREAS. NO GROUND DISTURBANCE MAY OCCUR WITHIN THESE AREAS.

WAIT FOR LOW FLOW TO BEGIN IN-CHANNEL WORK.

C: BREACH DAM:

- 1. BREACH DAM BY OPENING EXISTING OUTLET, LOWERING UPSTREAM WATER SURFACE 2-3 FEET TO ALLOW UPSTREAM SEDIMENTS TO BEGIN TO DEWATER.

D: INVASIVE SPECIES REMOVAL:

- 1. TREAT INVASIVE SPECIES AND EXCAVATE UNDERLYING SOIL TO REMOVE PLANT RHIZOMES.
- 2. DISPOSE OF INVASIVE SPECIES AND SOIL IN APPROVED OFFSITE LOCATION.

E: SEDIMENT REMOVAL:

- 1. REMOVE SEDIMENT FROM FORMER IMPOUNDMENT. SEE SHEETS XS-1, XS-2, AND S-3 FOR CHANNEL DIMENSIONS.
- 2. STOCKPILE COBBLE AND GRAVEL MATERIAL TO REBUILD CHANNEL WITH AT COMPLETION OF EXCAVATION.
- 3. RECREATE PILOT CHANNEL AND ADD STOCKPILED ROUGHNESS ELEMENTS.
- 4. INSTALL LARGE WOOD IN CHANNEL AND FLOODPLAIN. SEE SHEET DET-3.
- 5. PLANT STOCKPILED SHRUBS AND SEED AND MULCH FLOODPLAIN.

F: DAM REMOVAL:

- 1. INCREMENTALLY LOWER DAM ALTERNATING WITH UPSTREAM SEDIMENT REMOVAL/CHANNEL RESTORATION.
- 2. REMOVE ALL CONCRETE AND RESHAPE BANKS TO TIE INTO UPSTREAM AND DOWNSTREAM BANKS.
- 3. REMOVE TRAINING WALL ADJACENT TO DAM. LEAVE BROKEN PIECES OF TRAINING WALL AT UPSTREAM END IN PLACE.

LEGEND

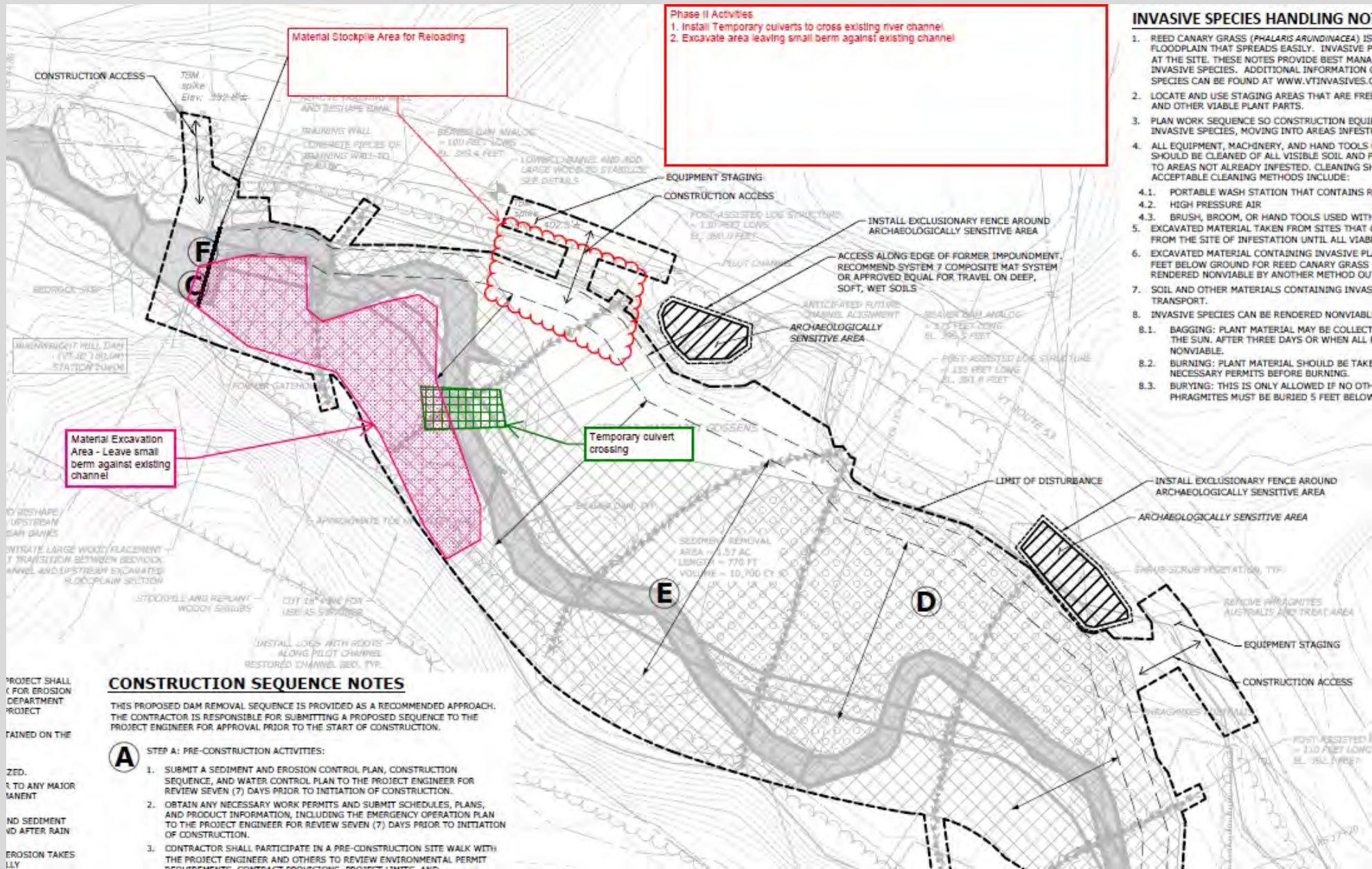
	EXISTING MAJOR CONTOUR
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	EXISTING EDGE OF ROAD
	ANR RIVER CORRIDOR
	APPROX. PROPERTY LINE
	ORDINARY HIGH WATER
	MEANDER BELT
	EDGE OF WATER
	TREELINE
	EXISTING OVERHEAD ELECTRIC
	WETLAND BOUNDARY
	50-FOOT WETLAND BUFFER
	EXISTING RIVER CHANNEL
	PILOT CHANNEL

SEDIMENT MANAGEMENT NOTES

1. EXISTING SEDIMENT VOLUME ACCUMULATED BEHIND DAM = 22,000 CY. EXPECTED MECHANICAL REMOVAL VOLUME = +/- 10,700 CY OVER A CHANNEL LENGTH OF 770 FEET. REMAINING SEDIMENT EXPECTED TO NATURALLY ERODE DOWNSTREAM OR STABILIZE IN PLACE.
2. PILOT CHANNEL DIMENSIONS WILL FOLLOW THE TYPICAL CROSS SECTION WITH CREATION OF A LOW FLOW CHANNEL AND LEAVING SEDIMENT TO FORM BARS WITHIN THE EXISTING CHANNEL.
3. STOCKPILE NATURAL STREAM GRAVEL, COBBLES, AND BOULDERS TO REBUILD CHANNEL.
4. STOCKPILE BOLLERS >12" AND >48" AND LOGS OR STUMPS FOR BRISE AS CHANNEL ROUGHNESS

REVISED Phasing and Flow Control Plan

PHASE II - Wainwright Mill Dam Removal



Phase II Activities

1. Install Temporary culverts to cross existing river channel
2. Excavate area leaving small berm against existing channel

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Material Excavation Area - Leave small berm against existing channel

Material Stockpile Area for Reloading

Temporary culvert crossing

PROJECT SHALL BE RESPONSIBLE FOR EROSION CONTROL MEASURES ON THE DAM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION CONTROL MEASURES ON THE DAM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION CONTROL MEASURES ON THE DAM.

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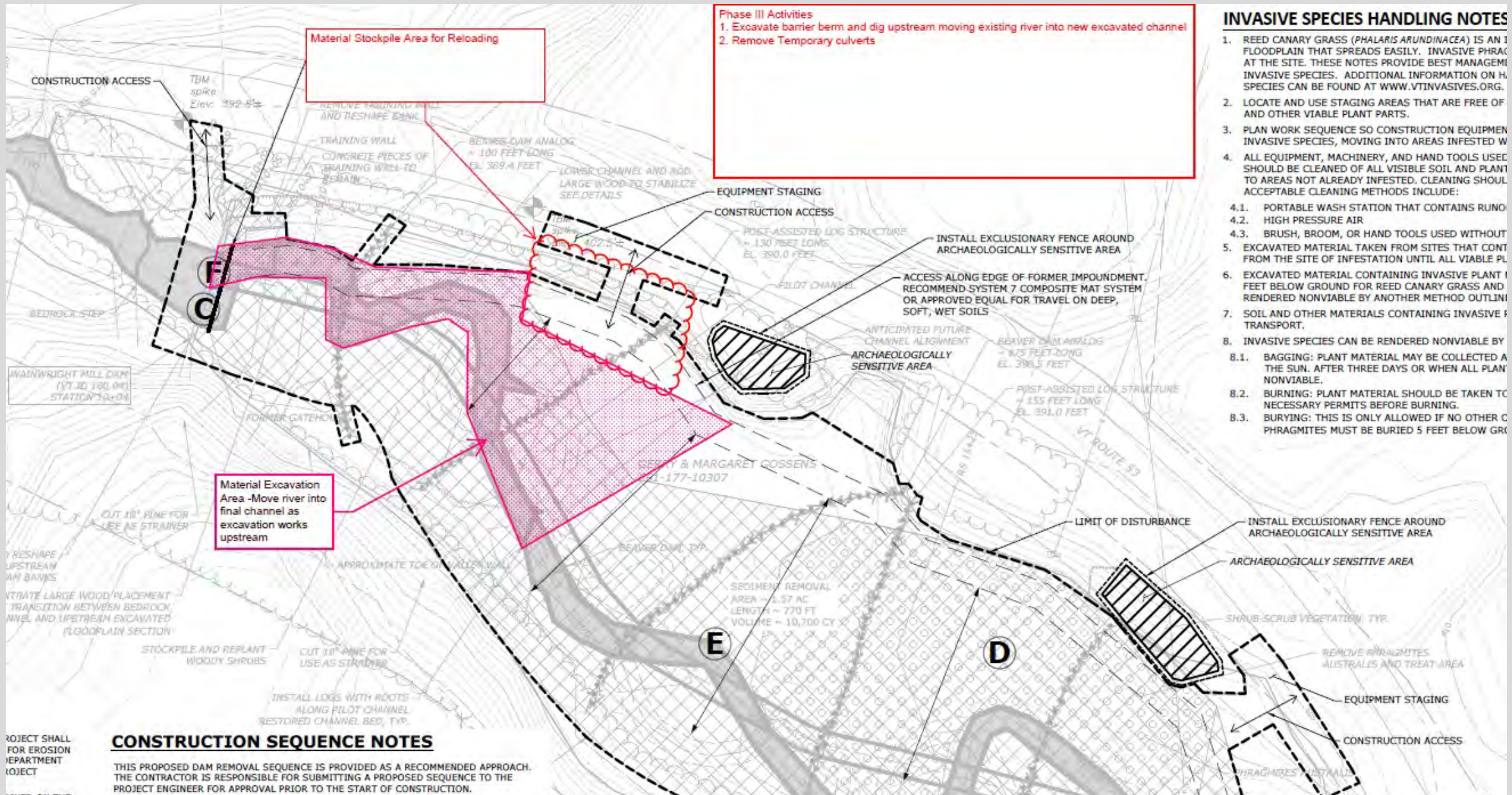
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PHASE III - Wainwright Mill Dam Removal

Phase III Activities
 1. Excavate barrier berm and dig upstream moving existing river into new excavated channel
 2. Remove Temporary culverts

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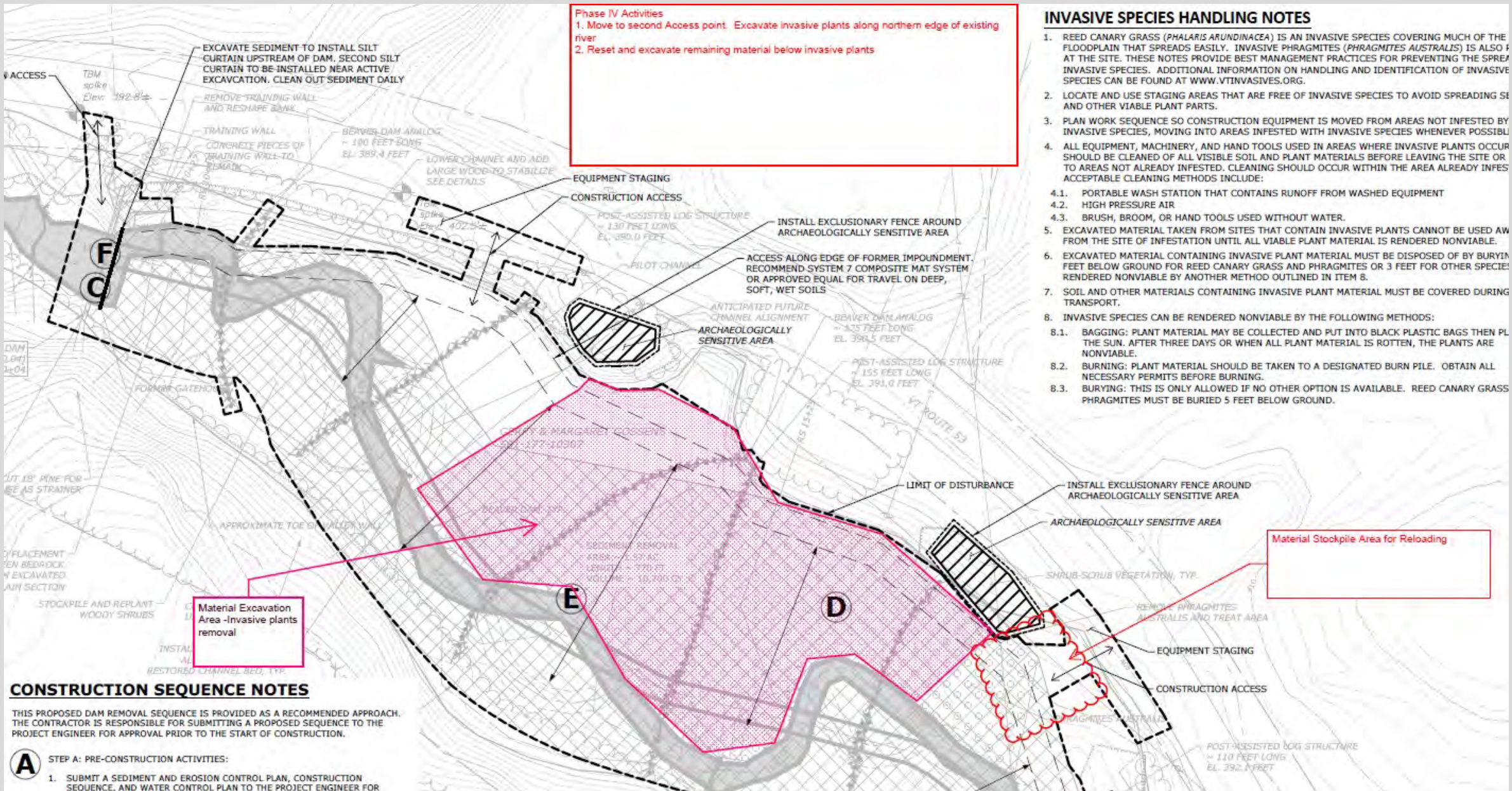
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PHASE IV - Wainwright Mill Dam Removal

Phase IV Activities
 1. Move to second Access point. Excavate invasive plants along northern edge of existing river.
 2. Reset and excavate remaining material below invasive plants

- INVASIVE SPECIES HANDLING NOTES**
1. REED CANARY GRASS (*PHALARIS ARUNDINACEA*) IS AN INVASIVE SPECIES COVERING MUCH OF THE FLOODPLAIN THAT SPREADS EASILY. INVASIVE PHRAGMITES (*PHRAGMITES AUSTRALIS*) IS ALSO FOUND AT THE SITE. THESE NOTES PROVIDE BEST MANAGEMENT PRACTICES FOR PREVENTING THE SPREAD OF INVASIVE SPECIES. ADDITIONAL INFORMATION ON HANDLING AND IDENTIFICATION OF INVASIVE SPECIES CAN BE FOUND AT WWW.VTINVASIVES.ORG.
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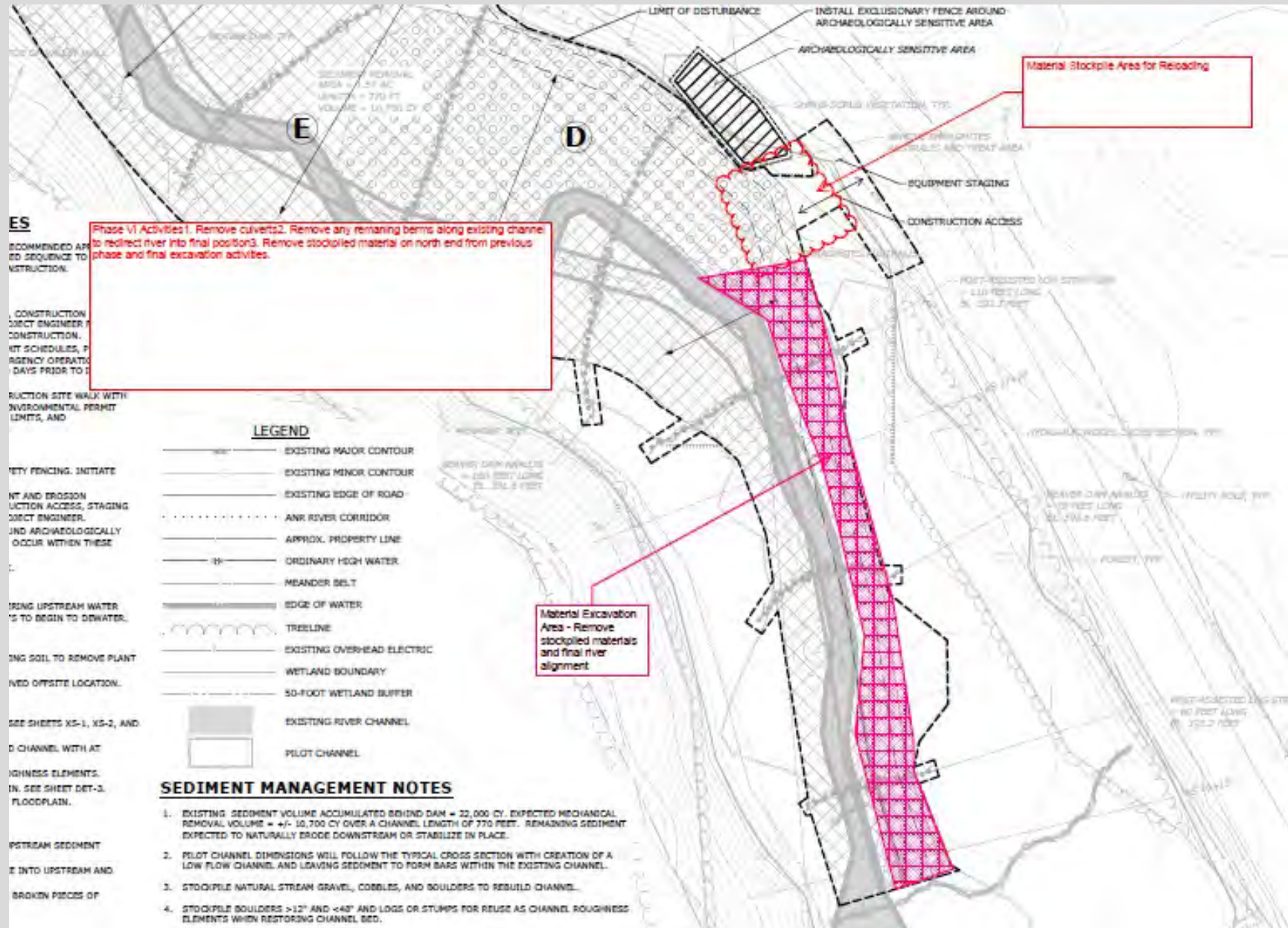
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PHASE VI - Wainwright Mill Dam Removal



Date & Time: Thu, Oct 31, 2024 at 12:44:11 EDT
Wainwright

