

**APPENDIX D**

**PILING REMOVAL BMPS**

**Washington Department of Natural Resources  
Puget Sound Initiative – Derelict Creosote Piling Removal**

**Best Management Practices  
For Pile Removal & Disposal**

The following Best Management Practices (BMPs) are adapted from EPA guidance (2005), Washington State Department of Transportation (WSDOT) methods and conservation activities as included in Joint Aquatic Resources Protection Application (JARPA) 2005, and Washington State Department of Resources (WADNR) “Standard Practice for the Use and Removal of Treated Wood and Pilings on and from State-Owned Aquatic Lands” 2005.

The purpose of these BMPs is to control turbidity and sediments re-entering the water column during pile removal, and prescribe debris capture and disposal of removed piles and debris.

**BMP 1. PILE REMOVAL**

**A. Vibratory extraction**

- 1) This is the preferred method of pile removal.
- 2) The vibratory hammer is a large mechanical device (5-16 tons) that is suspended from a crane by a cable. The hammer is activated to loosen the piling by vibrating as the piling is pulled up. The hammer is shut off when the end of the piling reaches the mudline. Vibratory extraction takes approximately 15 to 30 minutes per piling depending on piling length and sediment condition.
- 3) Crane operator shall be trained to remove pile slowly. This will minimize turbidity in the water column as well as sediment disturbance.
- 4) Operator will “Wake up” pile to break up bond with sediment.
  - Vibrating breaks the skin friction bond between pile and soil.
  - Bond breaking avoids pulling out a large block of soil – possibly breaking off the pile in the process.
  - Usually there is little or no sediment attached to the skin of the pile during withdrawal. In some cases material may be attached to the pile tip, in line with the pile.

**B. Direct Pull**

- 1) This method is optional if the contractor determines it to be appropriate for the substrate type and structural integrity of the piling.
- 2) Pilings are wrapped with a choker cable or chain that is attached at the top to a crane. The crane pulls the piling directly upward, removing the piling from the sediment.

### C. Clamshell Removal

- 1) Broken and damaged pilings that cannot be removed by either the vibratory hammer or direct pull shall be removed with either a clamshell bucket or environmental clamshell.
- 2) A clamshell is a hinged steel apparatus that operates like a set of steel jaws. The bucket is lowered from a crane and the jaws grasp the piling stub as the crane pulls up.
- 3) The size of the clamshell bucket will be minimized to reduce turbidity during piling removal.
- 4) The clamshell bucket will be emptied of material onto a contained area on the barge before it is lowered into the water.

### D. Cutting

- 1) Is required if the pile breaks off at or near the existing substrate and cannot be removed using a clamshell bucket.
- 2) Prior to commencement of the work the contractor will assess the condition of the pilings. Contractors will create a log outlining the location and number of pilings that need to be cut or broken off and have this log available to the agencies upon request.
- 3) Washington State Department of Fish and Wildlife (WDFW) will be consulted to determine if this is the preferred option at any specific site.
- 4) Every attempt will be made to completely remove the piling in its entirety before cutting. If a pile is broken or breaks above the mudline during extraction, one of the methods listed below should be used to cut the pile.
  - a. A chain should be used, if practical, to attempt to entirely remove the broken pile. (BMP 1-C)
  - b. If the entire pile cannot be removed, the pile should be cut at or below the mudline by using a pneumatic underwater chainsaw. Project-specific requirements for cutoff will be set by the project manager in consultation with WDFW and Washington Department of Ecology considering the mudline elevation and the presence of contaminants in the sediment. Generally, in subtidal areas with contaminated sediments, pilings should be cut off at the mudline to minimize disturbance of the sediment. In dry, intertidal areas, piling should be cut off at least 1 foot below the mudline. In uncontaminated, subtidal areas, piling should be cut off at least 1 foot below the mudline.
  - c. Piles shall be cut off at lowest practical tide condition and at slack water. This is intended to reduce turbidity due to reduced flow and short water column through which pile must be withdrawn.

d. In deep subtidal areas, if the piling is broken off below mudline greater than 1 foot, the piling may remain. In intertidal and shallow subtidal areas, seasonal raising and lowering of the beach could expose the pilings above the mudline and leach out PAH's or other contaminants. In this case, the piling should be cut off at least two feet below the mudline if it is accidentally broken off during removal.

e. Depending on future use, the removal contractor will provide the location of the broken pile using GPS. This will be necessary as part of debris characterization should future dredging be a possibility in the area of piling removal.

## **BMP 2. BARGE OPERATIONS, WORK SURFACE, CONTAINMENT**

- A. Barge grounding will not be permitted within project areas over eelgrass beds.
- B. Work surface on barge deck or pier shall include a containment basin for pile and any sediment removed during pulling.
  - 1) Containment basin may be constructed of durable plastic sheeting with sidewalls supported by hay bales or support structure to contain all sediment. Water run off can return to the waterway.
  - 2) Work surface on barge deck and adjacent pier shall be cleaned by disposing of sediment or other residues along with cut off piling as described in BMP #3.C below.
  - 3) Containment basin shall be removed and disposed in accordance with BMP #3.C below or in another manner complying with applicable federal and state regulations.
  - 4) Upon removal from substrate the pile shall be moved expeditiously from the water into the containment basin. The pile shall not be shaken, hosed-off, left hanging to drip or any other action intended to clean or remove adhering material from the pile.

## **BMP 3. DISPOSAL OF PILING, SEDIMENT AND CONSTRUCTION RESIDUE**

- A. Pulled pile shall be placed in a containment basin to capture any adhering sediment. This should be done immediately after the pile is initially removed from the water.
  - 1) Utilize basin set up on the barge deck or adjacent pier
  - 2) Basin may be made of hay bales and durable plastic sheeting.
- B. Piling shall be cut into 4' lengths with standard chainsaw.
  - 1) All sawdust and cuttings shall be contained in the container.
- C. Cut up piling, sediments, construction residue and plastic sheeting from containment basin shall be packed into container. For disposal, ship to Rabanco/Regional Disposal Subtitle D Landfill in Roosevelt, Washington.

#### **BMP 4. DEBRIS CAPTURE IN WATER**

- A. A floating surface boom shall be installed to capture floating surface debris. Debris will be collected and disposed of along with cut off piling as described in BMP #3.C above.
- B. The floating surface boom shall be equipped with absorbent pads to contain any oil sheens. Absorbent pads will be disposed as described in BMP #3.C above.

#### **BMP 5. RESUSPENSION/TURBIDITY**

- A. Crane operator shall be trained to remove pile from sediment slowly.
- B. Work shall be done in low water and low current, to the extent possible.
- C. Removed piles shall be placed in a containment facility.
- D. Sediments spilled on work surfaces shall be contained and disposed of with the pile debris at permitted upland disposal site.
- E. Holes remaining after piling removal shall not be filled.

#### **BMP 6. PROJECT OVERSIGHT**

- A. WADNR will have a project manager or other assigned personnel on site. Oversight responsibilities will include, but are not limited to the following:
  - 1) Water quality monitoring to ensure turbidity levels remain within required parameters.
  - 2) Ensure contractor follows BMPs
  - 3) Ensure contractor is in compliance with contract and permit requirements
  - 4) Ensure correct structures are removed
  - 5) Maintain contact with regulatory agencies should issues or emergencies arise