

7 REMEDIAL ACTION CONSTRUCTION ELEMENTS

The Contractor will be required to perform the following activities necessary to implement remedial actions identified in the Cleanup Action Plan:

- Demolition and clearing
- Excavation of existing soil, fill, and refuse
- Removal of excavated materials from the site and transport to appropriate offloading points
- Placement of backfill, capping materials, and habitat elements
- Installation of boardwalk structure and concrete elements
- Planting and landscaping

All related work will be conducted in strict accordance with the project plans and specifications, which contain specific detailed requirements to achieve the overall quality of the construction product. The following sections present a brief description of each construction element, including discussions of the following:

- *Description* – A description of the tasks for construction activities
- *Potential Issues, Concerns, and Solutions* – A description and evaluation of potential construction concerns, sources of information regarding potential problems, and common or anticipated remedies
- *Monitoring, Contingency Plans, and Corrective Actions* – A description of monitoring to be performed during remediation, required laboratory tests and their interpretation, a schedule of monitoring tasks and dates when they terminate, a description of threshold or triggering criteria, a contingency plan that describes construction alternatives in the event of a failure (to prevent undue hazard), and an evaluation of design vulnerability and environmental human health risks in the event of failure

7.1 Demolition and Clearing

7.1.1 Description

This element includes the removal of existing piles, debris, landscaping features, small structures, brush, and vegetation from specified areas along and within Whatcom Creek. Removed pilings and demolition debris will be disposed of off-site at a certified construction landfill.

The primary factors governing the selection of clearing and demolition techniques and equipment are the physical characteristics and size of those items requiring removal, existing slopes and topography, water depth and tidal variation, accessibility as dictated by existing structures, landscape features, and obstructions, equipment availability, and environmental factors such as minimizing contamination to Whatcom Creek.

Based on these factors, the majority of the demolition and clearing work will most likely be accomplished using a backhoe- or trackhoe-mounted bucket or handling tool with sufficient reach. In some cases, hand labor may be used to remove vegetation and the tops of piling.

7.1.2 Potential Issues, Concerns, and Solutions

The main concern in the demolition and clearing process is that the materials designated for removal (see specifications) are satisfactorily removed to the required depths and extents. A pre-construction condition survey will be performed by the City as the basis for contract or payment. The Contractor(s) will perform progress surveys every working day, to establish actual demolition/cleared extents and limits. Once the Contractor(s) has determined that demolition and clearing is complete in any given area, the City will perform a post-excavation survey in that area to confirm removal to the specified extents and limits.

The Contractor will be required to accurately locate the position of its excavation equipment at all times. This could include the use of differential global positioning system (DGPS) equipment, electronic positioning equipment (e.g., Mini Ranger) or stationing along the banks of Whatcom Creek. The method of positioning will be proposed by the Contractor in the Construction Plan, subject to review and approval by the City and Ecology.

The City will work with the Contractor's Quality Control Manager and survey crew to independently verify the extents and limits of demolition and clearing.

This may be done either by evaluation of the Contractor's daily progress surveys and/or positioning data, conducting independent surveys, or a combination of both methods. If the City determines that the Contractor is not removing materials to the proper extents, depths, or in the correct locations, they will immediately contact the Contractor's Superintendent to correct the situation. Any such direction and corrective action will be documented on the next Quality Assurance Report.

7.1.3 Water Quality Control and Monitoring

The Contractor will be responsible for monitoring water quality during demolition activities. Additional details on water quality protective measures and monitoring requirements are provided under Section 7.2.3.

7.2 Excavation of Existing Soil, Fill, and Refuse

7.2.1 Description

This element includes the removal of in-situ soil, fill materials, and solid waste refuse from selected bank areas of Whatcom Creek, to the extents and limits depicted in the contract plans and specifications. Excavated materials, including debris encountered, will be disposed of off-site at a certified solid waste landfill.

The primary factors governing the selection of excavation techniques and equipment are soil and refuse characteristics and gradation, existing slopes and topography, water depth and tidal variation, accessibility as dictated by existing structures, landscape features, and obstructions, equipment availability, and environmental factors such as the required cut depth and minimization of contamination to Whatcom Creek.

Based on these factors, the majority of the excavation work will most likely be accomplished using a backhoe- or trackhoe-mounted excavation bucket with sufficient reach. In some cases where longer reach is needed, such as situations where equipment access is on the opposite bank of the creek, a crane may be used to operate an excavation bucket (such as a small clamshell).

7.2.2 Potential Issues, Concerns, and Solutions

The main concern in the excavation process is that the materials designated for removal (see specifications) are satisfactorily removed to the required depths and extents. A Pre-Construction Survey will be performed by the City as the basis for contract or payment. The Contractor(s) will perform Post-Excavation Surveys as construction proceeds to establish actual excavated depths and limits and to confirm removal to the specified depths and limits.

Soil, fill, and refuse will be removed to the limits detailed in the contract plans and specifications. The Contractor will be required to accurately locate the position of its excavation equipment at all times. This could include the use of DGPS equipment, electronic positioning equipment (e.g., Mini Ranger) or stationing along the banks of Whatcom Creek. The method of positioning will be proposed by the Contractor in their Construction Plan and Schedule, a submittal which is subject to review and approval by the City and Ecology.

The City will work with the Contractor's Quality Control Supervisor and survey crew to independently verify the extents, limits, and depths of excavation. This may be done either by evaluation of the Contractor's daily progress surveys and/or positioning data, conducting independent surveys, or a combination of both methods. If the City determines that the Contractor is not excavating to the proper depth or in the correct location, they will immediately contact the Contractor's Superintendent to correct the situation. Any such direction and corrective action will be documented on the next CQC Report.

The Contractor's procedures for offloading excavated materials onto trucks or other containers for eventual disposal will be continuously observed to ensure appropriate methods are used. If any activities are determined unacceptable by the City, the Contractor will be instructed to stop work immediately and modify methods of transfer.

7.2.3 Water Quality Control and Monitoring

The Contractor will be responsible for monitoring water quality during excavation and construction activities. The Contractor will obtain and analyze water quality samples to monitor and control short-term water quality impacts from excavation and construction activities, and to invoke corrective actions or modify construction operations, if necessary, to bring construction activities into compliance with water quality performance criteria.

The purpose of the specified water quality monitoring is to provide ongoing assessment of the water quality during the work. The objectives of the monitoring program are as follows:

- Ensure water quality conditions are within prescribed limits
- Allow for appropriate adjustment of construction activities in a manner that ensures protection of the environment
- Document the results of the water quality performance monitoring

The Contractor shall ensure that water quality criteria are met at all stages during implementation of remedial action. The Contractor will be responsible for monitoring water quality in the Whatcom Creek Estuary during construction periods at all tide conditions. Monitoring stations will be established at locations approximately 200 feet upstream and downstream of the active construction area (final mixing zone boundaries and sampling plans will be determined by Ecology as part of substantive Water Quality Certification review of the draft final design submittal). At each sampling location, water quality parameters including temperature, salinity, pH, turbidity and dissolved oxygen (DO) will be monitored at a midpoint depth within the water column.

Based on the results the dredge elutriate test (DRET) performed on representative samples of solid waste collected from the site (see Appendix B of the Design Analysis Report), potential contact and mixture of freshly excavated solid waste with creek waters does not have the potential to result in exceedances of State Surface Water Quality Standards (WAC 173-301A) for metal (dissolved basis) or organic (total recoverable basis) chemical contaminants. The DRET

testing confirmed that if turbidity releases from the construction site are maintained below State Water Quality Standards, that overall water quality protection of the Whatcom Creek Estuary will be achieved. Thus, turbidity is the primary water quality indicator parameter for this remedial action.

The Contractor will be required to control potential turbidity releases from the construction area by restricting excavation work to times when water levels are at least one foot below the elevation of the working surface. Furthermore, freshly excavated surfaces will be rolled to a smooth condition prior to the next tidal inundation to reduce the potential for erosion.

For excavation below elevation +3 feet (required in localized areas along the South Bank), the Contractor may perform excavation below the water surface only if they demonstrate to the satisfaction of the Engineer that doing such excavation in the dry is infeasible. In this case, excavation +3 feet MLLW shall be accompanied by water quality monitoring, and the possible use of water quality conservation measures and Best Management Practices (BMPs), such as installation of silt fencing, subject to the discretion of the Project Engineer and Ecology.

As discussed above, the Contractor will be required to confirm that these measures provide adequate environmental protection by monitoring water quality within the Whatcom Creek Estuary at the boundary of the approved mixing zone during construction actions. In the unlikely event that the initial monitoring data reveal a turbidity (or other parameter) release that exceeds applicable water quality standards, the Contractor will be required to modify operations as appropriate to further reduce such releases (e.g., by placing temporary silt fences at the boundary of the excavation area during low tide conditions). Given the implementation of conservation measures and BMP outlined above to minimize the potential for water quality impacts, and the expected short duration of in-water work, negligible water quality impacts are anticipated as a result of implementation of the remedial action.

7.2.4 Description of Equipment, Monitoring, and Maintenance

Monitoring equipment will include DO, turbidity, temperature, salinity, and pH probe(s). Equipment will be maintained in good working order and in safe-working conditions at all times. Survey equipment will be maintained and calibrated for the life of the contract. Any calibration techniques necessary to ensure accuracy of performance will be prescribed in either the CQC Plan (dredging equipment and survey equipment) or the SAP and QAPP Addenda.

In addition to documentation requirements described in Section 5, the Contractor(s) will keep records of excavated and disposed volumes, and provide these records to the City. Pre- and post-construction surveys, however, will be the basis for payment to the Contractor.

The City will maintain water quality results, which will be submitted to Ecology on a weekly basis as part of the Daily CQC Reports.

7.3 Placement of Backfill and Capping Materials

7.3.1 Description

After excavation has been completed in any given area, capping and/or backfilling is required as documented in the project plans and specifications. In areas along the south bank of Whatcom Creek, placement of backfill materials will generally occur following little to no excavation. In all cases, placement of the material will likely be performed by mechanical methods, such as a bucket arm from a backhoe or trackhoe positioned on the bank being capped or backfilled, or from a crane.

7.3.2 Potential Issues, Concerns, and Solutions

The main concern in the placement of capping or backfilling materials is ensuring that the material is satisfactorily placed over the required areas and to the required thickness, as depicted on the contract plans. Furthermore, the Contractor will be required to minimize and monitor for possible release of suspended solids into Whatcom Creek, and in so doing to comply with water quality criteria (as discussed in Section 6.2.3).

7.3.2.1 Satisfactory Placement of Backfill and Capping Materials

To ensure that proper backfilling and capping is achieved, Contractor Quality Control grade surveys will be performed before and after backfill and capping materials are placed, to quantify actual cap/backfill thickness and extent. Other additional methods may be proposed by the Contractor (e.g., stakes). Wherever the material thickness is less than the specified amount, the Contractor will be required to add a sufficient amount of additional material to achieve the specified thickness in accordance with the terms of the contract. Final cap thickness determinations will be made after five complete tidal cycles.

The Contractor(s) will be required to employ an electronic positioning system for accurately locating and tracking the movement of its cap placement equipment. If the City determines the Contractor(s) is not placing cap materials in the correct location, the Contractor's General Superintendent will be immediately contacted to correct the situation. Any such direction and corrective action will be documented on the next Quality Assurance Report.

7.3.2.2 Release of Turbidity

In general, the Contractor will only be permitted to perform backfilling and cap material placement when the water level is at least one foot below the working surface. Cap placement work will therefore need to be timed so as to occur during sufficiently low tides. Potential limited exceptions to this may be granted for areas in which the initial lifts of rock material are placed below elevation +3 feet MLLW (i.e., in localized areas along the South Bank, and for the Gravel Berm along the North Bank). The Contractor may elect in these cases to place the necessary rock materials through water. In these areas, the Contractor(s) will be required to place materials in a manner that will minimize the release of turbidity (e.g., limiting the fall distance of aggregate materials through the water column). Water quality monitoring will be required as described in Section 6.2.3, and the Contractor may be

required to institute additional water quality conservation measures and BMPs, at the determination of the Project Engineer and Ecology.

7.3.3 Monitoring, Contingency Plans, and Corrective Actions

Potential import material used for capping and backfilling include:

- Fill materials and aggregates from quarries or pits
- Recycled dredge material from clean sources

Prior to the use of any imported material, its specified physical properties and gradation will be verified by laboratory testing. Furthermore, its chemical quality will be determined for a minimum of three composite (i.e., representative of all material being placed) samples.

7.3.4 Description of Equipment, Monitoring, and Maintenance

Backfilling and capping equipment will likely consist of either a front-end loader, backhoe, trackhoe, or bucket suspended from a crane. In accordance with the contract terms, the equipment will be maintained in good working order and in safe working condition at all times. Survey equipment will be maintained and calibrated for the life of the contract. Calibration techniques are prescribed to ensure that the equipment performs to the accuracy required by the specified order of survey.

7.3.5 Documentation

These requirements are described in Section 5. In addition, the Contractor(s) will keep records of capping material volumes or weights and provide these records to the City. These records will allow for a rough comparison of actual to theoretical cap volumes.