King County
PARKS
Your Big Backyard

Maury Island Open Space Remediation
Compliance Monitoring and Institutional Control Plan

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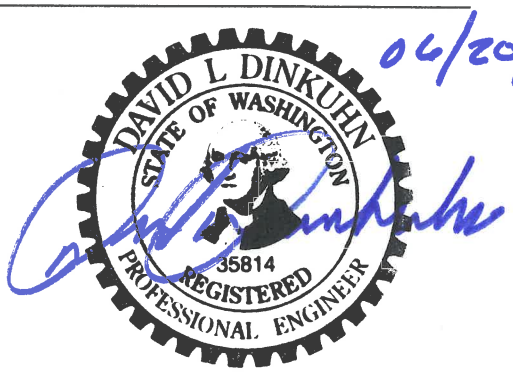
CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

Lindsey Miller 6/20/2019

Prepared by Lindsey Miller, King County Parks Project Manager

Checked by David Dinkuhn, Parametrix, P.E.



06/20/2019

Approved by David Dinkuhn, Parametrix, P.E.

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1. Introduction

This Compliance Monitoring and Institutional Control Plan describes the monitoring and maintenance of the Cleanup Action selected by the Washington State Department of Ecology (Ecology) for the Maury Island Open Space Cleanup Unit, Facility Site #2901216. The Cleanup Unit is 266 acres located on the southeast side of Maury Island in unincorporated King County (County), Washington (Figure 1), and lies within the larger Tacoma Smelter Plume. Sites within the Tacoma Smelter Plume often have surface soils with levels of arsenic, lead, and Polycyclic Aromatic Hydrocarbons (PAHs) that exceed safe levels for human exposure. A Remedial Investigation (RI) completed in 2014 (CDM Smith, 2014a). The Cleanup Action Plan was based on the RI, Feasibility Study (FS) (Parametrix, 2017), and Draft Cleanup Action Plan (DCAP) (Ecology, 2017) prepared per the requirements of Agreed Order No. DE 8439 (dated January 31, 2013), between Ecology and King County.

2. Site Details

2.1 Site Background

The Cleanup Unit consists of a 266-acre property located on the southeast side of Maury Island on a sea bluff overlooking Puget Sound. The property is the site of a former sand and gravel mine and is now currently operated as a King County Park with footpaths and graded gravel maintenance access roads that are used as walking and hiking trails. These trails connect to other trail networks outside the Cleanup Unit.

CalPortland operated the sand and gravel mine on the property until 2010. The most recent mining operations had been centrally located within the area referred to as the "South Pit." Currently, there are some mine-associated above-and-below-ground conveyor structures existing on the property. A partially reconstructed dock is located at the base of the South Pit. To the northeast of the South Pit is another abandoned gravel pit, referred to as the "North Pit," which had operated in the early 1900s. Most recently mined areas of the South Pit are sparsely vegetated, typically with scotch broom, sparse grasses, seedling Pacific madrone, and blackberry bushes. The North Pit is predominately vegetated with scotch broom, sparse grass, and a few mature trees (Pacific madrone, maple, and Douglas fir).

The majority of the upland areas are undisturbed by mining and covered by mature and semi-mature forest, which includes Pacific madrone, Douglas fir, Red alder, Black cottonwood, Western hemlock, and maple with an understory that includes salal, various ferns, huckleberry, oceanspray, and Oregon grape. The exceptions to this are an area north of SW 260th Street that was once used as a private skeet range and an area in the northeast corner of the Cleanup Unit; these areas are predominantly covered by blackberry bushes. Large stands of blackberry bushes and scrubby vegetation, such as poison oak, Himalayan blackberries, and scotch broom, cover the sea bluffs. A beach extends along the base of the bluff. The portion of property north of SW 260th Street also contains a wetland that is included in the National Wetlands Inventory (NWI).

2.2. Stakeholders Points of Contact

The current agency Point of Contacts for ongoing Operations and Maintenance of this site are listed below. If a Point of Contact is replaced, this report should be updated to reflect that change.

King County Parks and Recreation Division

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Washington Department of Ecology

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Cris.matthews@ecy.wa.gov

2.3. Summary of Contamination

2.2.1 Soil

As described in the Draft Cleanup Action Plan (Ecology 2017) Contaminates in duff and surface soil samples exceeded cleanup levels throughout the site. Contaminant concentrations declined rapidly with depth.

Contaminants Exceeding Cleanup Levels:

- Arsenic: Up to 2,600 mg/kg and 2,550 mg/kg in duff and surface soil respectively (Cleanup Level 20 mg/kg)
- Lead: Up to 2,600 mg/kg and 2,520 mg/kg in duff and surface soil respectively (Cleanup Level 250 mg/kg)
- PAHs (based on benzo(a)pyrene: Up to 112,617 µg/kg in forest duff (Cleanup Level 100 µg/kg)

Beach sands, the bluff areas, and many of the former maintenance access roads did not have contaminate concentrations that exceeded cleanup levels. Note that the levels of lead in the area formerly used as a skeet range were higher than in other parts of the site due to historical shooting activities.

2.2.2 Groundwater

The results of spring water sampling conducted for the RI and historical sampling data from seeps and on-site observation wells demonstrate that groundwater and spring water have not been impacted by metals and that ingestion of impacted groundwater is not a potential human exposure pathway at the site (Parametrix 2017). Groundwater was not evaluated for the presence of PAHs during the RI because these hazardous substances were not identified as contaminants of concern (COCs) for groundwater.

2.2.3 Wetland Soil

Arsenic and lead in most of the wetland soil samples exceeded cleanup screening levels and toxicity was observed in some of the bioassays. The bioassay toxicity appeared to be primarily related to elevated lead levels, but not related to arsenic.

2.3.4 Vegetation

Arsenic, lead, and cadmium concentrations were found to be greater in plant tissue samples from the Cleanup Unit as compared to the same plants grown on uncontaminated soils. Even so, metals concentrations are typically less than 1.0 mg/kg, with some concentrations between 1 and 3.5 mg/kg for arsenic and lead.

2.3 Risk Exposure Pathways

2.3.1 Human Health

As described in the Draft Cleanup Action Plan (Ecology, 2017). The potential human exposure pathways at the Cleanup Unit include: direct contact with soil/sediment; ingestion of soil particles; inhalation of soil particles; ingestion of water (groundwater/spring); ingestion of vegetation; and ingestion of marine organisms exposed to COC.

Soil: Because the current and future use of the Cleanup Unit is for passive recreation (e.g., primarily open space with walking trails), the primary concern for human health is direct exposure to contaminants in surface soil and duff. This may include skin contact, direct ingestion by hand-to-mouth contact, or inhalation. The COCs have a low risk of being a skin irritant. The primary risk of exposure is through incidental ingestion as a result of hand to mouth contact, such as from soil particles sticking to clothing, body parts, and pet fur. Children (and sometimes adults in instances of pica disorder) frequently ingest soil directly. Inhalation via dust may be significant if motorized off-road vehicles were to use the property. Bikes and horses may also tend to kick up dust, but to a much lesser extent.

Groundwater: Groundwater is not currently used at the site nor is it likely to be under any potential future site use scenario. Groundwater was not found to be impacted by site contaminants.

Vegetation: Plants growing in metals-enriched soils have an uptake of metals that is greater than in areas not impacted by the TSP. The primary concern of metals in vegetation would be from ingestion. While increased metals uptake in blackberries appears to be relatively low, the significance of this would need to be evaluated with regard to the degree of consumption and was not done so as part of the Remedial Investigation (CDM Smith 2014a).

Surface Water/Sediment: Risks posed as a result of ingestion of marine organisms appears low as the Puget Sound is not being impacted by metals originating from the Cleanup Unit.

2.3.2 Terrestrial Plant and Animal Health

Arsenic and lead are chemicals of ecological concern to terrestrial plants and animals across the Cleanup Unit, and PAHs are chemicals of ecological concern within a portion of Unit 5; however, the Model Toxic Control Act has a procedure called a Net Environmental Benefits Analysis (NEBA) for weighing the advantages of an active cleanup versus the impact that the cleanup might have on potentially valuable ecological receptor habitat.

In May 2014, CDM Smith completed a NEBA for the Cleanup Unit (CDM Smith 2014b.). The NEBA concluded that the bluffs and much of the upland areas are eligible for the application of NEBA because these areas contain “especially valuable habitat.” Therefore, a cleanup alternative involving removal of soil would result in greater environmental harm than an alternative of leaving the contaminated topsoil in place. Decision units within the Cleanup Unit that did not qualify for the NEBA included three upland

areas that have been cleared in the past and are now vegetated primarily with grass, blackberry bushes, and scotch broom. Therefore, based on the NEBA, remedial alternatives developed for the Cleanup Unit additionally took into account the protection of the environment for those Units that qualify for the NEBA.

3. Cleanup Action and Objectives

The proposed cleanup action involves vegetation restoration in contaminated areas, capping of contamination, and institutional controls including land use restrictions. The objective of the cleanup is to limit human exposure to the soil contaminants in a way that allows for continued use of the property as a park and avoids damage the valuable habitat within the park. The institutional controls and land use restrictions for the site are set in place to prohibit activities that may interfere with the cleanup action, operation and maintenance, or monitoring; or may result in the release of a hazardous substance that was contained as a part of the cleanup action.

Figure 2 shows the Cleanup Unit boundary, and general locations of the capping, vegetation restoration, and fencing. Final locations of the remediation and institutional controls including signage and fencing will be part of the construction record drawings and added as Appendix B to this report as the work is completed.

3.1 Capping

Existing trails throughout the Cleanup Unit, that had levels of contaminants above the cleanup, are being capped with three to four inches of compacted gravel, topped by three inches of a mineral soil combined with an additive that is used on baseball infields to bind the soil. Existing maintenance access roads will be capped with compacted gravel only.

In addition, Unit 5 a contaminated area large enough for a small parking area will be cleared and grubbed and capped with a minimum of six inches of compacted gravel.

3.2 Vegetation Restoration (includes Interim Action)

Limited soil removal will occur in Units 3c and 3e, along with clearing of invasive plants. The area will then be covered with three inches of a compost cap, and revegetated with native plants. The density of the mature native plantings will provide a physical barrier that will discourage foot traffic, and also provide especially valuable habitat through these units. Until the plantings mature, providing a physical barrier, the compost layer will provide a physical barrier that will reduce the potential for direct contact with underlying soils.

Limited removal of surface duff and some surface soil will also occur in the wetland in Unit 5. Only the minimum material necessary will be removed to bring lead levels below the Cleanup Level while protecting valuable habitat.

3.3. Institutional Controls

3.3.1 Physical Measures

A barrier fence will be installed around the gravel parking area to discourage access to the uncapped and contaminated portion of Unit 5. The barrier fence with be backed by dense thorny vegetation to further discourage access.

In addition, the vegetation in Units 3c and 3e will be planted especially dense to discourage access to the off-trail areas.

3.3.2 Educational Measures

Warning signs will be posted and maintained along trails throughout the Cleanup Unit to educate users to potential contaminants exposure risk if they leave the capped trail. The exact location of these signs will be chosen in the field during construction and noted in the construction record drawings.

3.3.3 Restrictive Covenant

A restrictive covenant will be executed and recorded with the register of deeds for King County. At a minimum, the restrictive covenant will describe procedures to be followed during any future Cleanup Unit excavation activities that could result in worker exposure or the transfer of contaminated soils to the ground surface. Such procedures shall include worker health and safety training requirements and contaminated soil management procedures. Future Cleanup Units use shall be restricted to that of an outdoor recreation area. While it is anticipated that the site will remain a park in perpetuity, the restrictive covenant will also require that Ecology be notified of King County's intent to convey any interest in the Cleanup Unit or to change land use from an outdoor recreational park to some other use. Final requirements for the restrictive covenant (or equivalent) will be negotiated by Ecology and the County.

4. Compliance Monitoring and Maintenance

At regular intervals, as shown in Table 1, the site should be evaluated and inspected to insure the cleanup measures are functioning as intended. Evaluations and inspections will be performed by King County staff at the intervals shown in Table 1 as part of the regular maintenance and operations activities in the park. Maintenance and repair activities will be triggered based on observations made during these evaluations. Specific criteria that would trigger a maintenance event or repair is described qualitatively in the following sections. The decision to perform maintenance shall be made by the Operations and Maintenance supervisor using best professional judgment. Minor repairs and ordinary maintenance will be performed by King County staff and completed as soon as feasible but no later than the next scheduled evaluation/inspection interval (i.e., typically quarterly).

Significant repairs, such as repairing major damage to the caps or replacing fencing, should be performed by experienced contractors that are licensed and bonded. Repairs should be conducted using the same procedures used during the cleanup action construction. Similarly, repair materials should be the functional equivalent of materials used during cleanup action construction. Significant repairs that require a licensed and bonded Contractor would require that County advertise and hire a Contractor using standard procurement procedures, which typically takes six to twelve months. Any repairs made by a Contractor would be warranted for one year and thus any repairs needed during that warranty period would be the responsibility of the Contractor.

A summary of Evaluation and Maintaince Schedule is provided in Table 1. Specific repair requirements are described below.

Table 1: Site Evaluation and Maintenance Schedule

Maintenance Item	Evaluation Frequency
Cap Inspection	Quarterly
Cap Repair or Maintenance	As-needed
Vegetation Restoration Inspections	Bi-Annually (spring and fall)
Vegetation Restoration Repairs or Maintenance	As-needed
Institutional Controls	
Physical Measures (Fences/Vegetative Barriers) Inspection	Quarterly
Physical Measures (Fences/Vegetative Barriers) Repair or Maintenance	As-needed
Educational Measures (Signs) Inspection	Quarterly
Education Measures (Signs) Repair or Maintenance	As-needed

4.1 Capping Evaluation

Surface evaluations shall be carried out at quarterly to look for eroded, damaged or bare areas in the cap. Repairs will be made to the cap surface on an as-needed basis to correct any erosion, deterioration, or settlement of the cap that causes ponding of water. Eroded and bare areas should be repaired.

In addition, access to the site shall be controlled to prevent the cap being disturbed by heavy machinery. The only equipment allowed to operate on capped trails shall be low impact equipment designed for maintenance of backcountry trails. On the maintenance access road, standard pickup trucks and similar maintenance vehicles will be allowed.

4.2 Vegetation Restoration Evaluation

Evaluations of vegetated areas will be done bi-annually, at the start and end each growing season, to insure that vegetation remains healthy and has not been damaged by storms, disease, drought, wildlife, vandals, or other similar items. Any damaged, dead, or dying vegetation would be replaced on as-needed basis during the dormant season as needed to maintain the health and density of the plant.

Regular maintenance during the growing season will including weeding and watering until the vegetation is mature and established, which usually takes about three to five years. Once vegetation is established regular maintenance is not typically needed.

4.3 Institutional Controls Evaluation

4.3.1 Physical Measures

Evaluations of the fencing and associated vegetative barriers will be inspected quarterly to look for damaged areas that are no longer providing the intended physical barrier. Repairs will be made to fencing on an as-needed basis to correct any damaged areas. Damage to vegetative barriers would be made during the dormant season when plants can be replanted with the highest likelihood of success.

4.3.2 Educational Measures

Formal evaluations of the signage will be done quarterly to look for damage, such as graffiti or physical damage that prevents the sign from providing the educational value. Informally, damage to signage would be noted as part of the regular maintenance and operations activities in the park. Repairs will be made to signage on an as-needed basis.

4.3.3 Restrictive Covenant

In accordance with the Restrictive Environmental Convent for the Site, the County will provide advanced notice to the Department of Ecology if the County leases or sells any portion of the property to a third party. The notice must also indicate if any of the County's obligations will be performed by the third party acquiring the real property.

In addition, Washington State law requires under Revised Code of Washington (RCW) 64.06 that sellers of improved or unimproved property must disclose environmental conditions at the time of sale, including groundwater contamination. This regulation ensures future owners of properties impacted by the Site will be informed and understand the environmental conditions that may affect the property.

4. Staffing Qualification and Training

Personnel for Operation and Maintenance activities include an evaluation team supervisor, and an evaluation team as described below.

4.1 Supervisor

The King County Parks and Recreation Point of Contact in Section 2 will assign a supervisor for Operations, Maintenance, and Evaluation activities. The supervisor should have the qualifications to perform the following: supervise and oversee inspection and monitoring personnel; prepare reports (both oral and written) for Department of Ecology; and understand and implement state regulations.

4.2 Evaluation Field Staff

Evaluation field staff should have knowledge of basic ecology and an understanding of the remediation activities performed as part of the cleanup action. Field experience in range condition assessments including vegetation community measurements, identification of noxious weeds, and experience identifying and correcting damage from erosion is desirable.

4.3 Training Requirements

Evaluation of this site is based on a range of qualitative estimates and observations including identifying erosion, assessing any site damage, identifying native plant communities, and identifying noxious weeds. Personnel will be trained on the use of the evaluation forms in Appendix A. Training shall be conducted by a knowledgeable person assigned by the supervisor with experience in the use of the forms. The purpose of the training is to achieve repeatable evaluations by staff.

5. Reporting

5.1 Annual Report

Inspection forms in Appendix A will be completed on the schedule described above in Table 1 and compiled at the end of each year into an annual report. All significant maintenance or repair events that occurred during a year should be documented by using the same form. Photos should be included for each event. These annual reports serve as maintenance records and would be included as an appendix to the Five Year Report.

5.2 Five Year Report

Sites with land use restrictions are subject to review by Ecology every five years. A five year review will be completed under the direction of the supervisor at five year intervals following completion of Phase 1

of the Remedial Action. The purpose of the review here would be to verify the effectiveness of soil containment, institutional controls, and land use restrictions. The five year report will evaluate the effectiveness of the first five years of monitoring and propose changes, additions, or deletion to the monitoring methods, frequency, and parameters.

The report should include:

- A brief Site history and a description of the Remedial Action performed.
- A brief description of the Operation and Maintenance requirements.
- A discussion of the recommendations and implementation provided in the prior Five Year Review Report.
- Any significant maintenance events, such as repairs that occurred and the with the associated maintenance records
- Any proposed changes, additions, or deletions of institutional controls as needed to continue to protect the Site and the remedial action.

The first report would be submitted to Ecology five years after the completion of Phase 1 of cleanup, which includes the trail and parking area capping.

6. References

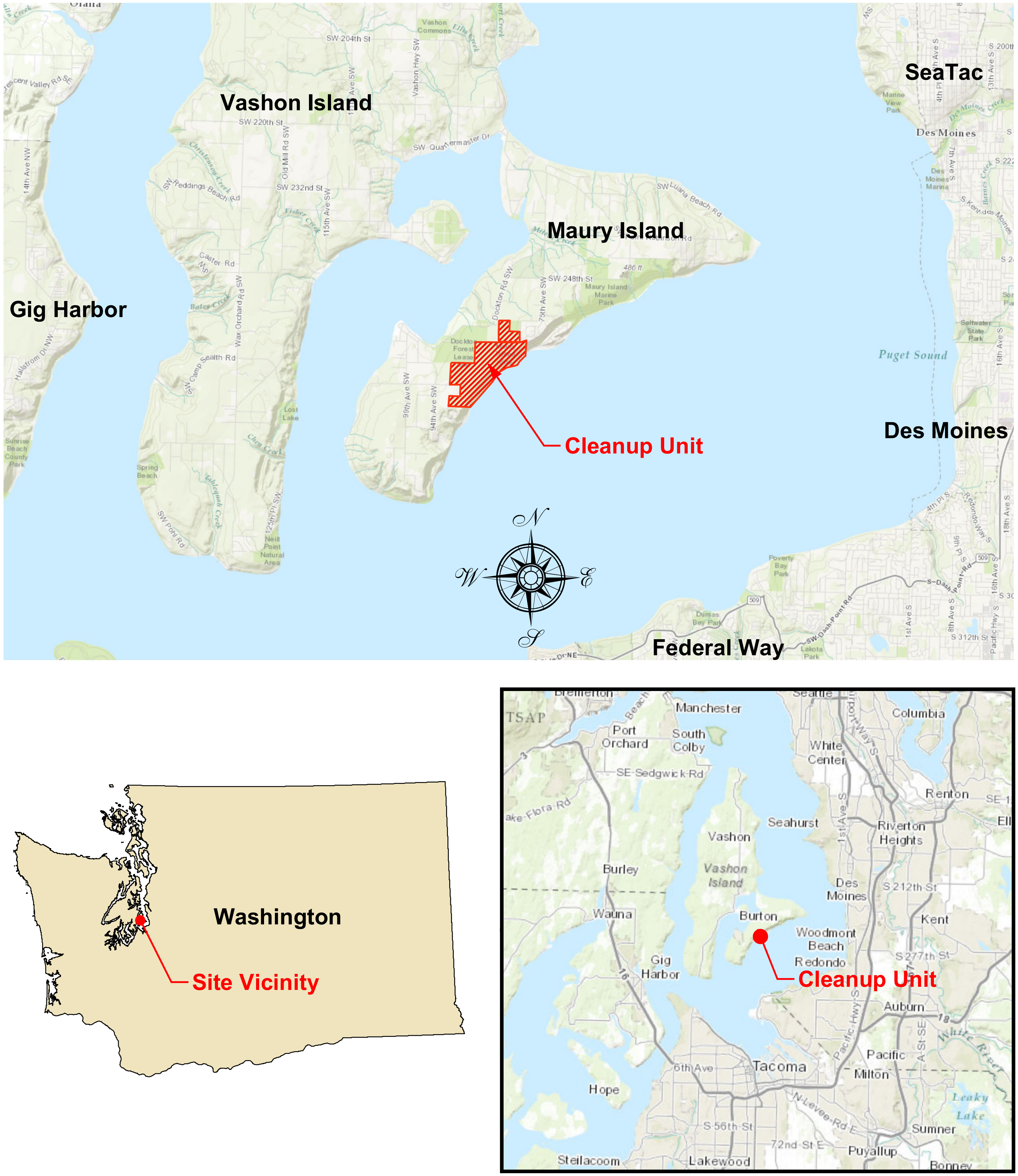
CDM Smith. 2014a. Final, Remedial Investigation, Maury Island Open Space Property, Maury Island, Washington. Project No. 19897-99064. June 2.

CDM Smith. 2014b. Draft Net Environmental Benefit Analysis, Maury Island Open Space Property, Maury Island, Washington. Project No. 19897-99064. May 29.

Ecology. 2013. Effective Date of Agreed order No. 8439 for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan, Maury Island Open Space Site, Maury Island, King County, WA. January 2013.

Ecology. 2017. Draft Cleanup Action Plan for Maury Island Open Space Property. Ecology Publication #18-09-200. September 2017.

Parametrix. 2017. Draft Final Feasibility Study, Maury Island Open Space Property, Maury Island, Washington. Project No. 233-1521-175. April 17.



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CDM Smith

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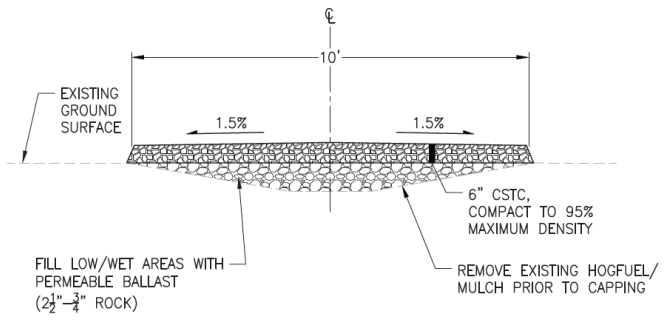
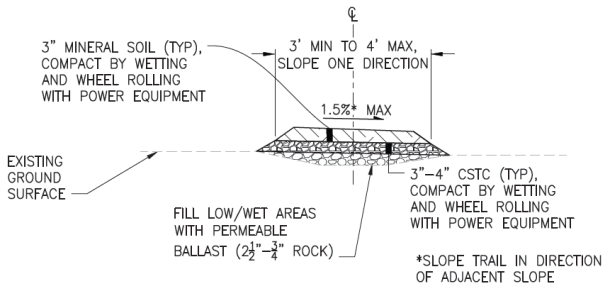
FIGURE 1
VICINITY AND LOCATION MAP
Maury Island Open Space Property
Compliance Monitoring Plan



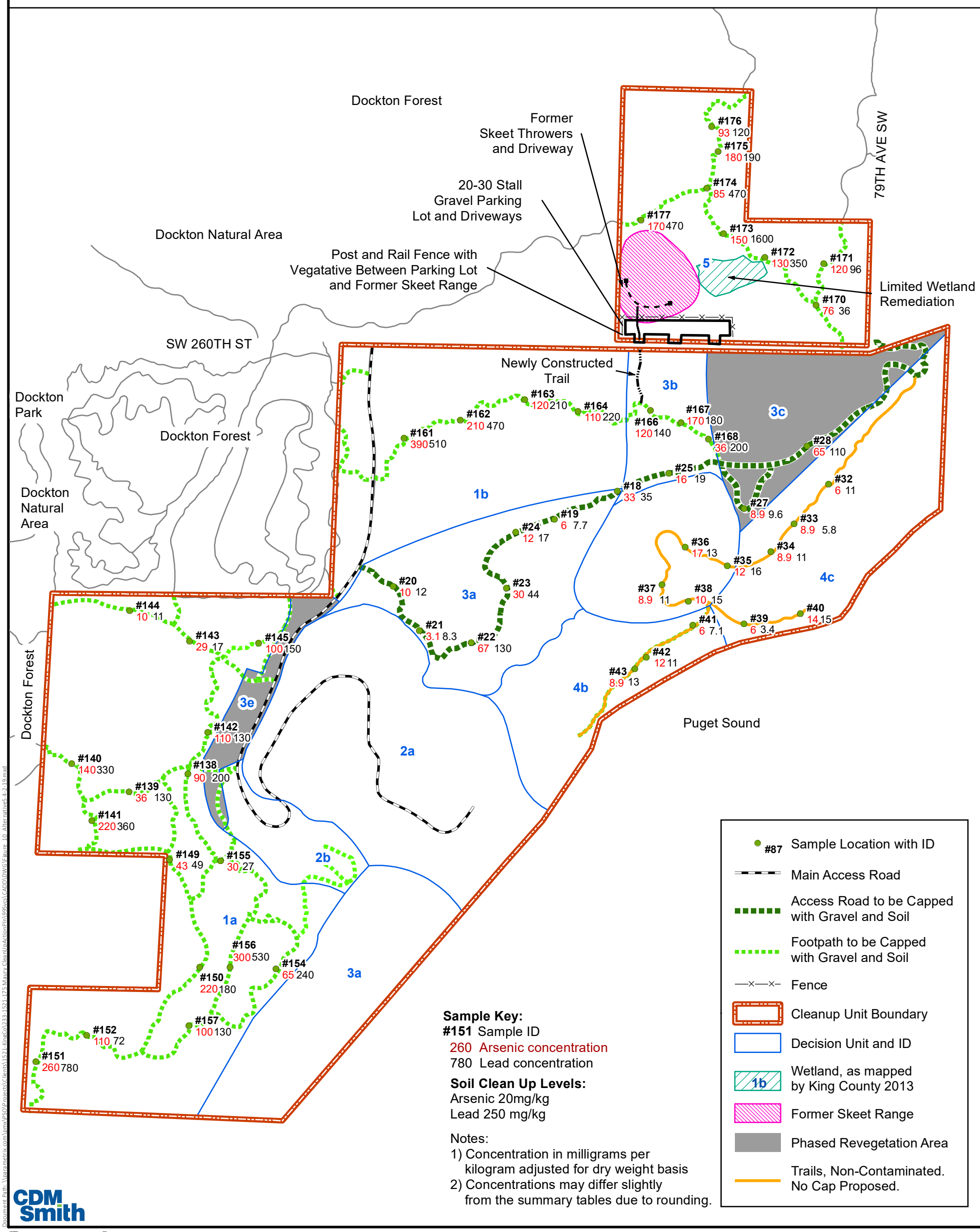
ACCESS ROAD GRAVEL CAP DETAIL 1 TYP
NO SCALE



TRAIL GRAVEL CAP DETAIL 2 TYP
NO SCALE

1

18"X12"



Sample Key:
#151 Sample ID
260 Arsenic concentration
780 Lead concentration

Soil Clean Up Levels:
Arsenic 20mg/kg
Lead 250 mg/kg

Notes:
1) Concentration in milligrams per kilogram adjusted for dry weight basis
2) Concentrations may differ slightly from the summary tables due to rounding.

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0 250 500 1,000 Feet

FIGURE 2
CLEANUP ACTION
Maury Island Open Space Property
Compliance Monitoring Plan

Appendix A – Monitoring and Inspection Forms

Quarterly Public Safety and General Maintenance Inspection Form

Site Name: **Maury Island Open Space (a.k.a. Maury Island Natural Area)**
Location: **Maury Island, WA**
Date of Remediation: 2019/2020
Date of Inspection: _____
Evaluator(s): _____
Permanent Photo Points:

Point	Subject	Location	GPS coordinates
1.			
2.			
3.			
4.			

A. Institutional Controls (Fences, Signs, Vegetative Barriers)

A1. Are fences/signs/vegetative barriers intact? [ ] Yes [ ] No
A2. If fences/signs/vegetative barriers are damaged, are there risks to public safety? [ ] Yes [ ] No
A3. Is damage affecting effectiveness of remediation work? [ ] Yes [ ] No
A4. Is the condition of the fences/signs/vegetative barriers leading to undesirable site access by park users? [ ] Yes [ ] No

Provide a brief description of fences/signs/vegetative barriers damage, if applicable:

_____
_____
_____

Describe proposed maintenance to correct damage to fences/signs/vegetative barriers, if applicable:

_____
_____
_____

Attach digital photo(s) of fences/signs/vegetative barriers before condition and after correction and record GPS coordinates:

_____

B. Capping

B1. Are trails, maintenance roads, and parking area caps in good condition? [ ] Yes [ ] No
B2. If caps are damaged are there risks to public safety? [ ] Yes [ ] No
[ ] Yes [ ] No
B4. Is damage or poor condition affecting reclamation work? [ ] Yes [ ] No

Provide a brief description of trails, maintenance roads, and parking area caps if applicable:

_____
_____
_____

Describe proposed maintenance to correct damage to trails, maintenance roads, and parking area caps, if applicable:

_____
_____
_____

Attach digital photo(s) of fences/signs/vegetative barriers current condition and after correction condition, if applicable, and record GPS coordinates:

_____

C. Vegetation Restoration Areas

C1. Are weedy, undesirable species or noxious species present? [ ] Yes [ ] No
C2. Are these species dominating the native revegetation plant community(ies)? [ ] Yes [ ] No
C3. Is maintenance recommended for weed control? [ ] Yes [ ] No
C4. Are the planted native species thriving and healthy?
C5. Is maintenance recommended to maintain health of native revegetation plant species? [ ] Yes [ ] No

Provide identification of weedy species and noxious weeds, if possible.

_____
_____
_____

Describe proposed maintenance to remove weeds and/or maintain the health of the native revegetation plant species, if applicable:

_____
_____
_____

Attach digital photo(s) of revegetation areas current condition and after correction condition, if applicable, and record GPS coordinates:

_____

Quarterly Summary of Public Safety and General Maintenance

Site Name: **Maury Island Open Space (a.k.a. Maury Island Natural Area)**
Location: **Maury Island, WA**
Date of Inspection: _____
Evaluator(s): _____

Evaluation Area	Public Safety Concerns [Y/N]	Describe and Categorize Remediation Concerns and Maintenance Performed/Scheduled		
		None [√]	Routine [√]	Critical [√]
A. Fences, Signs, Vegetative Barriers				
B. Caps				
C. Vegetation Restoration				

Appendix B – Construction Record Drawings

To be updated as construction activities are completed.