State of Oregon
Department of Environmental Quality

Memorandum

Date: February 23, 2011

To: Nina DeConcini, NWR Administrator

From: Jennifer Sutter, Project Manager
Northwest Cleanup Section

Subject: No Further Action Recommendation
Ross Island Sand and Gravel site
ECSI #2409

APPROVED Nina DeConcini
Nina DeConcini, NWR Administrator
DATE 3/6/11

Purpose

This memo provides a brief summary of investigation and cleanup action conducted at the Ross Island Sand and Gravel (RISG) site located at River Mile 15 of the Willamette River, about one mile upstream of downtown Portland. RSIG has been working under Order on Consent No. WMCVC-NWR-99-09 with the Oregon Department of Environmental Quality (DEQ), dated November 9, 1999, to complete environmental work at the site. Multiple phases of site investigation and cleanup have been completed with Cleanup Program oversight. A no further action (NFA) determination is proposed for the site which requires the approval of the DEQ Northwest Region Administrator. A certification of completion is also proposed regarding RISG's obligations under DEQ Consent Order No. WMCVC-NWR-99-09, which consent order required the remedial action and other measures. A public notice of these proposed determinations is attached.

Background

The subject property is located in the Section 14, Township 1 South, Range 1 East, in Multnomah County, Oregon. The Ross Island area includes Ross, Hardtack, Toe and East Islands. An earthen dike was constructed between Ross and Hardtack Islands in 1926-27, creating the Ross Island lagoon. The lagoon is connected to the Willamette River through a 500-foot-wide mouth that opens eastward to Holgate Slough. The total area owned by RISG within the Willamette River is 390 acres, about half of which is upland and the other half lagoon. Toe Island was deeded to the Nature Conservancy in 1979. The RISG site consists of Ross and Hardtack Islands, and the enclosed lagoon. Toe and East Islands are not considered part of the site. The site location is shown in Figure 1.

The RISG facility is a major supplier of aggregate in the Portland area. Mining and processing of sand and gravel from the Willamette River at the site began in the 1920s and continued until the summer of 2001. Between 1926 and the early 1980s, noncommercial sand/silt material that had been separated from commercial-grade material during on-site aggregate processing was placed back in the lagoon as fill. In 1979, the City of Portland issued a Conditional Use Permit to RISG requiring the reclamation of uplands and in-water areas that had been mined. To meet these

requirements, RISG began importing fill material. Between the early 1980s and 1998, fill material is documented to have come primarily from:

- Non-commercial material generated from on-site processing that had historically been used as fill,
- Material dredged from other local sites as part of maintenance activities, and
- Waste rock from a U.S. Army Corp of Engineers navigation project at Bonneville Locks.

In five cases, the fill material used to reclaim the lagoon was judged to be unsuitable for unconfined open water disposal due to the presence of contaminants. This material was placed in depressions within the lagoon and covered with clean material creating "confined aquatic disposal" sites (CADs). Concern about the lack of long-term monitoring of the effectiveness of these disposal sites generated the initial requirement for environmental investigation at the RISG site.

Land use in the Ross Island vicinity is mixed industrial, commercial, and residential. The Brooklyn and Sellwood-Moreland neighborhoods are located to the east of the island (separated from the site by the Holgate Slough), and the Seymour, Corbett-Terwiliger, and Lair Hill neighborhoods are located to the west (separated from the site by the main stem of the Willamette). Several riverfront parks are also located nearby. These include the Oaks Bottom Wildlife Refuge and Riverside Park along the Willamette River east bank, as well as Willamette Park along the west bank and slightly upstream of Ross Island, and South Waterfront Park located downstream of Ross Island on the west. Recreational uses of the Willamette River near Ross Island include boating and water sports, wildlife viewing, fishing, and hiking. The islands are posted to prevent trespass for insurance and safety reasons, but RISG does not maintain a policy of asking trespassers to leave unless they are in areas near the processing plant or on-going reclamation activities. Some recreational use of the island does occur, particularly along the shoreline beach areas.

Regional Geology/Hydrogeology

In general, regional geology is characterized by fill and unconsolidated river alluvium overlying sedimentary rocks of the Troutdale Formation. Alluvial material typically consists of stream-deposited sand and gravel with minor silt, and varies in thickness to a maximum of about 200 feet in the lower Willamette Basin. The alluvial deposits overlie non-cemented to partially-cemented sandstone and conglomerate of the Troutdale Formation. The thickness of the Troutdale Formation varies from about 100 to 350 feet. Sedimentary materials are underlain at depth by Miocene-age basalts of the Columbia River Basalt Group.

Shallow unconfined groundwater occurs within alluvial materials and fill. Deeper groundwater occurs as a regional aquifer in the Troutdale Formation. Groundwater may be continuously present downward through the alluvial system into the Troutdale Formation. Unconfined groundwater typically occurs within about 10 to 30 feet of ground surface; and, depending on local topography, recharge sources are from precipitation and streams. Perched groundwater is also common in shallow water-bearing units throughout much of the Portland Basin. Perching zones are often

related to silt/sand/clay lenses and are laterally discontinuous. The unconsolidated nature of alluvial sands and gravels provides for relatively high permeability and hydraulic conductivity.

Data collected from monitoring well clusters and lagoon piezometers as part of the Port and Ross Island investigations indicate that hydraulic gradients are consistently upward from the Troutdale Formation to the overlying Alluvial Aquifer and there is a net upward hydraulic gradient through upland fill and the Alluvial Aquifer to the lagoon. During transitional periods of the tidal cycle when the lagoon water level is decreasing rapidly, downward hydraulic gradients are temporarily present from the shallow wells to the deeper alluvium wells. Tidal responses in piezometers placed in the lagoon generally mimic the responses in the upland wells, generally indicating a small, but predominantly upward, gradient which was corroborated by data from flux meters placed in the lagoon.

The average horizontal hydraulic gradient in the deep, regional Troutdale Aquifer, is to the northwest with and average magnitude of 0.0002. This generally follows the course of the Willamette River as it approaches the Columbia River. Along the southern portions of the island, in the area of the disposal cells, Willamette River levels are higher than lagoon levels, causing a horizontal hydraulic gradient across the island from the river to the lagoon. The lagoon water level is controlled by the river elevation at the lagoon opening. Also, hydraulic head in the lagoon is generally lower than heads in upland monitoring wells screened in fill or native alluvium indicating that net horizontal flow is inward toward the lagoon.

Summary of Hazardous Substance Investigation and Cleanup History

Three primary investigations have been completed at the RISG site:

1. Port of Portland Confined Aquatic Disposal Cell investigation (2000)
2. Breach Investigation (1999), and
3. RISG Phase I and II Remedial Investigations (1999 - 2002).

Port of Portland Investigation (2000)

The initial focus of environmental investigation at the site was the evaluation of the five (5) confined disposal cells used to isolate contaminated material brought to the site from Port of Portland (POP) shipping facilities. The five disposal areas, shown in Figure 2, contain material generated from the following sources:

1. Cell 5 – Sediments from maintenance dredging of the POP Ship Repair Yard Dry Docks 1 and 4, at Swan Island.

2. Cells 1 and 2 – Pencil pitch spill and associated sediments dredged from POP Terminal 4, Slip 3.

3. Cell 1 – Sediments from maintenance dredging of POP Ship Repair Yard, Dry Dock 3, at Swan Island.

4. Cell 3 – Sediments from maintenance dredging of POP Terminal 2, Berths 204, 205, and 206.

5. Cells 3 and 4 – Sediments from maintenance dredging of POP Terminal 4, Berths 410/411.

Between January and November, 2000 the POP conducted an extensive field exploration program to evaluate the effectiveness of the caps in preventing contaminants associated with the dredged material from moving into the lagoon. Groundwater, surface water, and sediment samples were collected. Monitoring wells in the upland areas and piezometers in the lagoon were installed and sampled to assess vertical movement of contaminants. Flux chambers were placed on the sediment surface above capped areas to assess movement of water at the groundwater/surface water interface. Bioassay and bioaccumulation testing was performed to assess impacts of contaminants found in sediments on aquatic organisms.

The overall conclusion of the POP CAD study was that, when undisturbed, sediment caps above the CAD cells are effective in isolating contaminants from the surrounding environment. Some concerns about the stability of the confined cells considering adjacent slopes in the lagoon were raised, and the need for long-term monitoring of the cells was identified.

Breach Investigation (1999)

Based on data collected during the POP investigation, it was discovered that RISG mining activities had extended into one of the capped areas resulting in a breach of a confined cell. DEQ required follow-up investigations associated with this finding. RISG collected samples in the vicinity of the breach and constructed a new cap over the breach area. Confirmation sampling conducted after placement of the new cap indicated that it covered the majority of the exposed area, though some limited residual contamination was identified in surface sediments on the periphery of the cap.

The breach material (inadvertently removed from the CAD cell) included clean cap material, adjacent non-contaminated fill material, and approximately 6,300 cubic yards of previously contaminated material from CAD cell 5. Investigation into the disposition of the approximately 62,250 cubic yards of breached material concluded that, following being run through the on-site processing plant for extraction of usable sand and gravel, the majority was discharged to the main aggregate settling pond located south of the sand and gravel processing facilities. Elevated levels of tributyl tin (TBT) subsequently discovered in settling pond sediment were believed to be associated with the breach material. RISG closed the eastern portion of the settling pond where the highest concentrations of contaminants associated with the breach were detected, and capped the contaminated material with non-contaminated sand and silt dredged from the western portion of the pond.

RISG Phase I and II Remedial Investigations (1999 - 2002)

Research of fill records during the POP study indicated that other fill used for reclamation might contain contaminants. Based on this finding, DEQ required RISG to conduct a broader remedial

investigation of the reclamation areas and processing plant portion of the site. Further evaluation of contaminants remaining outside of the breach area cap would be included as part of this investigation.

RISG completed a broader investigation of contaminant concentrations within or associated with the fill and processing areas in two phases. Phase I was initiated in 1999 in conjunction with the POP confined disposal site study to take advantage of the equipment and sampling opportunities provided. Phase II was completed between 2000 and 2002 to fill remaining data gaps in the characterization of the site. Both phases included the collection of groundwater, soil, and sediment samples from throughout the lagoon and upland areas as well as areas expected to serve as background sampling locations. In addition to chemical analysis, bioassays and bioaccumulation testing was performed on select samples.

Investigation Findings

DEQ determined that the above investigations adequately characterized the nature and extent of contamination at the site. A risk assessment identified several areas/media as having contamination posing unacceptable risk to human health or the environment as described below:

1. Elevated concentrations of zinc and arsenic were detected in surface soil samples collected in the vicinity of the processing plant. (Figure 3, Area A1).

2. Polynuclear aromatic hydrocarbons (PAHs) were detected in surface soil immediately adjacent to the southern portion of the lagoon at concentrations that could pose a threat to ecological receptors within the lagoon if the soil migrated to the lagoon by erosion. (Figure 3, Area A2).

3. As discussed above, the former eastern portion of the main process settling pond was capped to cut off exposure to material removed from lagoon disposal Cell 5 during mining activities. This material could pose unacceptable risk if the cap is not properly maintained. (Figure 3, Area B).

4. PAHs were detected at levels slightly exceeding USEPA Ambient Water Quality Criteria (AWQC) in a grab groundwater sample collected adjacent to the southern portion of the lagoon. Because of the proximity to the lagoon, a potential threat to sediment-dwelling organisms via groundwater discharge was identified. (Figure 3, Area C).

5. Elevated concentrations of PAHs, metals, and polychlorinated biphenyls (PCBs) were detected in a limited number of surface sediment samples collected from the southern portion of the lagoon where reclamation filling has occurred and in the vicinity of the recapped breach area. (Figure 2, Area D/E[*]).

[*] To facilitate implementation, the zone of elevated contamination (Area D) was combined with the zone of elevated pH (Area E).

6. Several areas along the southern shoreline of the lagoon had elevated pH assumed to result from the placement of cement wastes as fill. (Figure 2, Area D/E).

7. As discussed above, highly contaminated material remains in the five confined disposal cells used for management of material dredged from Port of Portland facilities. This material could pose an unacceptable risk if the caps are disturbed. (Figure 2, Area F).

Record of Decision

RISG completed a Feasibility Study in the Fall 2005 which evaluated alternative remedial actions for each of the areas of concern identified above using remedial evaluation criteria specified in OAR 340-122-0090. In December 2005, DEQ issued a Record of Decision (ROD) for the site that described the following selected actions to address contamination at the site posing a threat to human or ecological receptors:

1. Upland Surface Soil – Process Plant Area (Area A1): Capping of contaminated soil.
2. Upland Surface Soil – Adjacent to Lagoon (Area A2): Stabilization and capping.
3. Breach Material Contained in Former Settling Pond Area (Area B): Maintain existing cap.
4. Groundwater (Area C) – Adjacent to the Lagoon: Monitoring.
5. Lagoon Surface Sediment (Area D) – CAD/Breach Areas: Capping.
6. Lagoon Surface Sediment (Area E) – Shoreline Areas: Capping.
7. Lagoon Confined Disposal Cells (Area F): Maintenance of existing caps.

The ROD was approved by DEQ's Northwest Region Administrator following a 30-day public comment period. During the public comment period DEQ presented the proposed remedial action at a meeting of the Brooklyn Neighborhood Association and at a City-sponsored brown bag meeting. DEQ responded to a verbal comment received at the City meeting in the ROD. No other comments were received. RISG prepared a Remedial Action Work Plan outlining the implementation steps for the selected site remedy which was approved with comment by DEQ on February 14, 2006. Implementation occurred in a number of phases between 2005 and 2010, as is discussed below.

Implementation of Remedial Action

The remedial actions selected in the 2005 ROD, and detailed in Remedial Design Reports (*Final Design Report, Remedial Action Areas A1, A2, and C* (February 2007), *Final Design Report, Remedial Action Areas D, E, and F* (May 2007), *Addendum 1* (August 2007), and *Addendum 2* (October 2007)) and Construction Completion Reports (*Construction Completion Report, Remedial Action Areas A1, A2, and C* (October 2007), *Construction Completion Report, Remedial Action Upland Area A2-2 and In-Water Areas D, E, and F* (January 2010), and *Addendum* (October 2010)), have been completed as described below.

Upland Surface Soil – Process Plant Area (Area A1)
In June and July 2007, approximately 900 cubic yards of metals-impacted soil was removed from area A1 (Figure 3) to a minimum depth of 3 feet below ground surface (bgs). The impacted soil was transported to a prepared area located within the capped former settling pond (Area B) for disposal. The containment area was created by excavating an area adjacent to the former settling pond. The excavation was limited to 2 feet bgs to ensure that the cap was not breached. Excavated material was used to form a berm around the designated containment area. A permeable, black, woven geotextile fabric was placed in the excavation and up the sidewalls of the berm as a demarcation layer. Impacted soils were placed in approximate 12-inch lifts within the containment area, compacted, and covered with a permeable geotextile fabric. Approximately 640 cubic yards of clean fill was then placed on top of the area to achieve a 3-foot-thick soil cap. Side slopes on the north side of the containment area were incorporated into the berm and sloped at a minimum 3:1 slope. Once the impacted soil was removed from Area A1, the excavation was backfilled with clean fill.

Upland Surface Soil – Adjacent to Lagoon (Area A2)
This area was subdivided into 3 subareas, A2-1, A2-2, and A2-3 (Figure 3), reflecting different techniques used for stabilization.

Area A2-1 is occupied by an access road that slopes from the processing plant toward a ramp leading to a floating dock on the water. The remedial action in this area was to construct drainage berms in the area east of the access road designed to slow and redirect stormwater runoff to an existing vegetated swale area. In June 2007, RISG excavated a series of approximately 2-foot-side trenches in the access ramp to depths of approximately 8 inches. Sixteen-inch-diameter, concrete-filled steel pipes were placed end to end in the trenches to form continuous berms approximately 8 inches above grade. Each trench was backfilled and manually compacted with the generated trench spoils. Along the west side of the road, existing ecology blocks were realigned to create a more uniform barrier. In July 2007, a shallow trench was excavated to a depth of approximately 6 inches adjacent to the row of ecology blocks. Two rows of bark-chip filled, biofilter bags were placed in the trench so that stormwater runoff will pass through the biofilter bags to remove/reduce sediment prior to reaching the lagoon. Approximately 6 inches of crushed rock was then placed on the access road, overlain by approximately 2 inches of crushed rock gravel to allow vehicle traffic to operate smoothly in the area without damaging the berms. These features are shown in Figure 4.

Area A2-2 includes a dike between the settling pond and the lagoon. The remedy in this area was to stabilize the slope to prevent erosion of contaminated soil. In October 2007, RISG created an approximate 12-foot-wide level bench at the base of the slope extending approximately 60 feet. This foundation was enhanced by placing 12-foot-long ecology blocks at approximate 6-foot intervals within the bench oriented perpendicular to the shoreline. RISG then placed two rows of 6-foot-long ecology blocks on top of the 12-foot long ecology blocks parallel to the shoreline. Approximately 15,000 tons of clean fill material were then backfilled between, behind, and over the top of the ecology blocks creating an approximate 4-to-1 slope.

Area A2-3 consists primarily of a gravel access road. Remedial action in this area consisted of stabilizing the slopes and controlling run-off to prevent contaminated soil from entering the lagoon. In July 2007, approximately 6 inches of 3-inch pit run material were placed on the access road and graded. Approximately 2 inches of ¾-inch to ½-inch minus gravel were placed over the pit-run material to improve access for standard road vehicles over the roadway. Some compaction of the material was achieved during grading, and will be further achieved over time as equipment is driven over the material. In addition, a trench approximately 18 inches wide and 6 inches deep lined with straw was constructed on the south side of the access road to collect and filter runoff. These remedial components are shown in Figure 5.

The remainder of Area A2 as illustrated in Figure 3 has been covered with clean fill as part of reclamation activities which will continue for some time in this area. The majority of this area will eventually merge into created emergent wetland and shallow water habitat that will be relatively flat (i.e., sloped between 30:1 and 50:1), thus providing a very stable surface.

Capped Breach Material – Area B

Area B is the former eastern portion the main process settling pond where contaminated material from the CAD Cell No. 5 breach was relocated. This area is shown in Figure 6. Breached material was determined to have been processed on Hardtack Island and discharged to the settling pond with the residuals from other mined materials, based on: historical information regarding management of sediments at Ross Island; data on the quantity, physical characteristics, and chemical quality of the breach material; and analytical data collected during the settling pond investigation conducted in October 1999. Contaminants consistent with the material from CAD Cell 5 (TBT, the PCB arochlor 1254, and several semi-volatile organic compounds) were detected in the eastern portion of the settling pond at a depth corresponding to the depth expected based on the time frame during which breach material would have been processed. Leachate testing and groundwater modeling indicated that the contaminated material does not pose a threat to the lagoon via groundwater migration.

In the summer of 2000, RISG dredged sediments from the western half of the settling pond and used this material to cap and close the impacted eastern portion of the pond. A minimum of 10 feet of clean material covers the breach material. Modeling was based on a minimum 200-foot horizontal buffer between the buried material and the lagoon which will be maintained as part of the long-term management of the site. This area has since become covered with a dense forest of black cottonwood (Populus trichocarpa) trees.

Impacted Groundwater Adjacent to the Lagoon – Area C

The remedial action in this area required additional groundwater monitoring to assess whether the detection of PAHs in a grab groundwater sample warranted cleanup or controls. In May 2007, RISG installed four temporary monitoring wells along the lagoon shoreline in this area. Locations are shown in Figure 7. RISG developed and sampled the wells and submitted samples to a laboratory for analysis of PAHs and manganese. Manganese was evaluated to assess the

significance of elevated concentrations of this metal detected in monitoring wells located further inland in this area. Low levels of several PAHs were detected, but concentrations did not exceed risk-based screening levels for aquatic life or human health exposure scenarios pertinent to this site (construction worker and volatilization to outdoor air). Dissolved manganese was detected in monitoring well TW-1 at a concentration that exceeds the screening level for impacts to aquatic life. However, concentrations in the remaining 3 wells did not exceed this screening level. Because TW-1 is located further from the shoreline than the other three wells, it was concluded that manganese does not pose an unacceptable risk to ecological receptors. While no action was determined to be needed to address contaminants in groundwater in this area, pH was found to be elevated (ranging up to 11.39) and the shoreline adjacent to this area was identified for inclusion in Area E, addressed below, where elevated pH along the shoreline posed an unacceptable risk to benthic organisms.

Lagoon Sediment – Areas D, E, and F

Due to overlapping areas and consistent remedial elements the lagoon sediment contamination was addressed as one area. The CADs were already adequately capped with material placed after their original creation and, for CAD Cell 5, material placed in 1999 to repair the breach, but required stabilization of adjacent slopes and long-term monitoring.

The remedial action in this area required placement of a three foot cap of clean sediment over the southern portion of the lagoon, covering an area of approximately 1,556,000 square feet and requiring an estimated 173,000 cubic yards of material. Stable slopes adjacent to the capped area would be achieved by creating a minimum 3 to 1 slope adjacent to caps. It was recognized that this slope would be achieved at the completion of reclamation activities but that a stable foundation would need to be created to ensure that cap placement would not induce sloughing of material along the edge of the containment zone.

Between 2001 and 2010, approximately 2,400,000 tons of fill were placed in Ross Island lagoon to meet remedial action and reclamation objectives, approximately 805,000 tons of which were placed on the north/northwest shoreline of the lagoon which is outside the remedial action area. Between 87,000 and 118,000 cubic yards of this material was used to stabilize slopes around the CAD cells. Fill material largely consisted of material generated from the City of Portland's Eastside Combined Sewer Overflow (ESCSO) project, but also included dredged material from other projects in the Willamette and Columbia Rivers, other City sewer projects, and material generated during RISG processing. All material was determined to meet Class A criteria for placement in the lagoon (without any controls) as specified in the applicable Department of State Lands (DSL) Removal/Fill Permit. Fill documentation is provided in Ross Island Annual Reports submitted to the DSL under the permit.

The bathymetric survey completed in 2001 was established as the baseline for determining when the minimum 3-foot cap had been placed. Comprehensive bathymetric surveys were generally completed every 2 years with the most recent survey conducted in December 2009. Comparison of the bottom elevations between 2001 and 2009 indicated that 17 to 25% of the in-water area

requiring a cap had less than the 3-foot minimum. RISG placed additional cap material in those areas in 2010 and completed additional subsurface elevation monitoring. This monitoring indicated at least 96% of the remediation area had a minimum 3-foot cap and much the remaining area had 1 to 2 feet of cap. Considering the large area involved (more than 25 acres), the relatively low levels of contamination present in most of the areas identified for capping, the results of surface sampling discussed below, and the reclamation requirements for placement of additional fill in these areas, DEQ considers the in-water capping to be complete.

In June 2010, RISG collected surface samples of the cap to confirm that the new sediment surface reflected the clean fill placed as a cap and that lateral movement of contaminated material had not occurred. Sample results indicate no detections of contaminants at levels that exceed the in-water clean fill criteria with the exception of two PAHs, phenanthrene and pyrene which were detected in one sample at concentrations essentially equal to the screening criteria. The results are considered acceptable.

pH monitoring conducted between 1999 and 2009 throughout the southern shoreline area indicates a decline in pH to less than 8.5 (level determined to be protective of freshwater aquatic life), in conjunction with the placement of clean fill. As areas with historically elevated pH have been covered, the surface pH has been reduced. In conjunction with the confirmation sampling described above 60 locations in the southern lagoon were tested for pH. All but five had pH less than 8.5. Additional fill was placed in these areas and pH monitored again in September 2010. In all five areas, surface sediment pH levels were found to be below 8.5. pH will continue to be monitored over time as part of long-term monitoring to ensure that these levels are stable.

Long-Term Monitoring and Maintenance Plan

RISG prepared a *Long-Term Monitoring/Maintenance and Contingency Plan* (February 2011) for the site addressing each aspect of the remedial action. Basic elements of the plan for each remedial action element are identified below. In addition to the regular monitoring described, inspections of caps and stormwater controls will be conducted after any extreme events including: seismic events of magnitude 6 or greater, rainfall exceeding 3.4 inches or greater in a 24-hour period, and Willamette River levels equivalent to a 100-year flood or higher.

Area A1: Contaminated soil was removed from this area and added to the capped area associated with Area B. Consequently, long-term monitoring and maintenance associated with this material is address in the elements associated with Area B.

Area A2-1: Biofilter bags placed along the west side of the access road will be inspected quarterly to assess effectiveness and replaced when they become clogged. Any ponding of water adjacent to surface water control structures will be evaluated and stormwater runoff controls replaced as warranted to prevent erosion of soil to the lagoon.

Area A2-2: The side slopes extending from the upland into the lagoon will be visually inspected for minor rills or other signs of erosion or sloughing. Additional fill material will be added to

restore the surface to eliminate any conditions resulting in erosion. Slopes will be inspected quarterly, including at least one inspection during a low water period when the full slope into the lagoon can be observed.

Area A2-3: The erosion control trench and road surface will be inspected quarterly. Additional pit run rock and/or ¾-inch gravel will be placed periodically to maintain the access road and prevent erosion.

Area B: The cap will be inspected quarterly to ensure cap integrity, adequate vegetation, and maintenance of the buffer between the cap and the lagoon.

Area C: No long-term monitoring was determined to be necessary for groundwater.

Areas D, E, F: Bathymetric surveys will be conducted annually and the surface elevations compared to 2001 and 2010 bathymetry data. Cross–sections will be prepared to document progress in achieving 3 to 1 slopes adjacent to in-water caps.

Monitoring reports will be submitted to DEQ annually for a period of 5 years at which time the frequency of submittal and monitoring events will be re-evaluated.

The long-term monitoring and maintenance plan includes discussion of contingency measures that will be implemented should monitoring indicate the remedy is not performing as designed. Contingency measures may include placement of additional cap material in areas where there appear to be losses, repair of erosion control infrastructure, sediment amendments to reduce pH, and sampling as necessary to assess any potential contaminant releases associated with the impacted area. RISG will notify DEQ within one week of identifying any problem related to site engineering controls, along with a plan for fully evaluating the impacts and restoring protective features.

Easement and Equitable Servitude (EES)

An EES documenting the locations of containment areas and stabilization elements and referencing the long-term maintenance and monitoring plan has been prepared and will be filed with Multnomah County, and a certified copy of the recorded document provided to DEQ.

DEQ Conclusions

The remedial actions selected in the December 2005 ROD have been successfully implemented. Remedial action objectives of preventing current or future human and ecological receptor exposures to contaminants that exceed DEQ risk-based concentrations, and preventing future releases and migration of hazardous substances to the environment have been achieved. The site remedy relies, to a great extent, on engineering controls as residual site contamination generally has been capped rather than excavated or otherwise treated. The approved long-term maintenance and monitoring plan, if properly implemented, will ensure that remedy elements

remain effective over the long-term. On-going reclamation within the lagoon and on slopes adjacent to the in-water containment area will further stabilize residual contamination and minimize the potential for future releases. DEQ will continue to provide oversight through review of monitoring reports, annual reclamation reports submitted to DSL, and periodic site inspections.

DEQ Recommendations

No further action is required at the RISG site beyond ongoing long-term monitoring and maintenance. Issuance of a conditional NFA determination, and a Certification of Completion for RISG obligations under the 1999 Consent Order, is therefore recommended. DEQ will prepare a new Consent Order to cover implementation and oversight related to long-term monitoring and maintenance activities.

References

Baseline Sediment Characterization, In-Water Clear Zone Sampling Results, Ross Island Lagoon, Prepared by Landau Associates, January 2000.

Beneficial Water Use Determination, Ross Island Sand and Gravel Co. – Technical Memorandum prepared by Landau Associates, May 2000.

Biological Assessment, Ross Island Sand and Gravel Company Removal/Fill Permit Renewal. Prepared by CH2M Hill, November 1999.

Consent Order between DEQ and Ross Island Sand and Gravel, WMCVC-NWR-99-09, dated November 9, 1999.

Construction Completion Report Remedial Action Areas A1, A2, and C, Prepared by GeoDesign, Inc., October 2007.

Construction Completion Report Addendum No. 1 - Remedial Action Upland Area A2-2 and In-Water Areas D, E, and F, Prepared by GeoDesign, Inc., July 23, 2010.

Construction Completion Report Remedial Action Upland Area A2-2 and In-Water Areas D, E, and F, Prepared by GeoDesign, Inc., January 2010.

Easement and Equitable Servitude, to be recorded with Multnomah County, February 2011.

Ecological Survey, Fall 1999 and Spring 2000, Ross Island Sand and Gravel, Prepared by Landau Associates, November 2000.

Feasibility Study – Ross Island Sand and Gravel Co., Portland, OR. Prepared by GeoDesign, August 2005.

Feasibility Study Addendum – Ross Island Sand and Gravel Co., Portland, OR. Prepared by GeoDesign, October 2005.

Final Sampling and Analysis Plan – Baseline Surface Sediment Sampling Event, Ross Island Sand and Gravel. Prepared by GeoDesign, June 2010.

Long-Term Monitoring, Maintenance, and Contingency Plan, Ross Island Sand and Gravel. Prepared by GeoDesign, February 2011.

Quarterly Groundwater Monitoring Progress Reports, Water Pollution Control Facilities Permit No. 101782, Ross Island Sand and Gravel Co., Hardtack Island Facility, Prepared by Landau Associates, 2000-2002, prepared by GeoDesign 2002 – 2005.

Record of Decision – Remedial Action for Ross Island Sand and Gravel, Oregon DEQ, December 2005.

Remedial Investigation- Phase I, Ross Island Sand and Gravel Co., Prepared by Landau Associates, September 2000.

Remedial Investigation/Risk Assessment – Ross Island Sand and Gravel Co. Portland, OR. Prepared by Landau Associates, October 2002.

Removal/Fill Permit, RF-26 COE No. 1999-01500, Oregon Division of State Lands, January 2006.

Ross Island Annual Monitoring Reports submitted to Oregon Division of State Lands, February 2004, January 2005, October 2006, April 2007, March 2008, May 2009, February 2010.

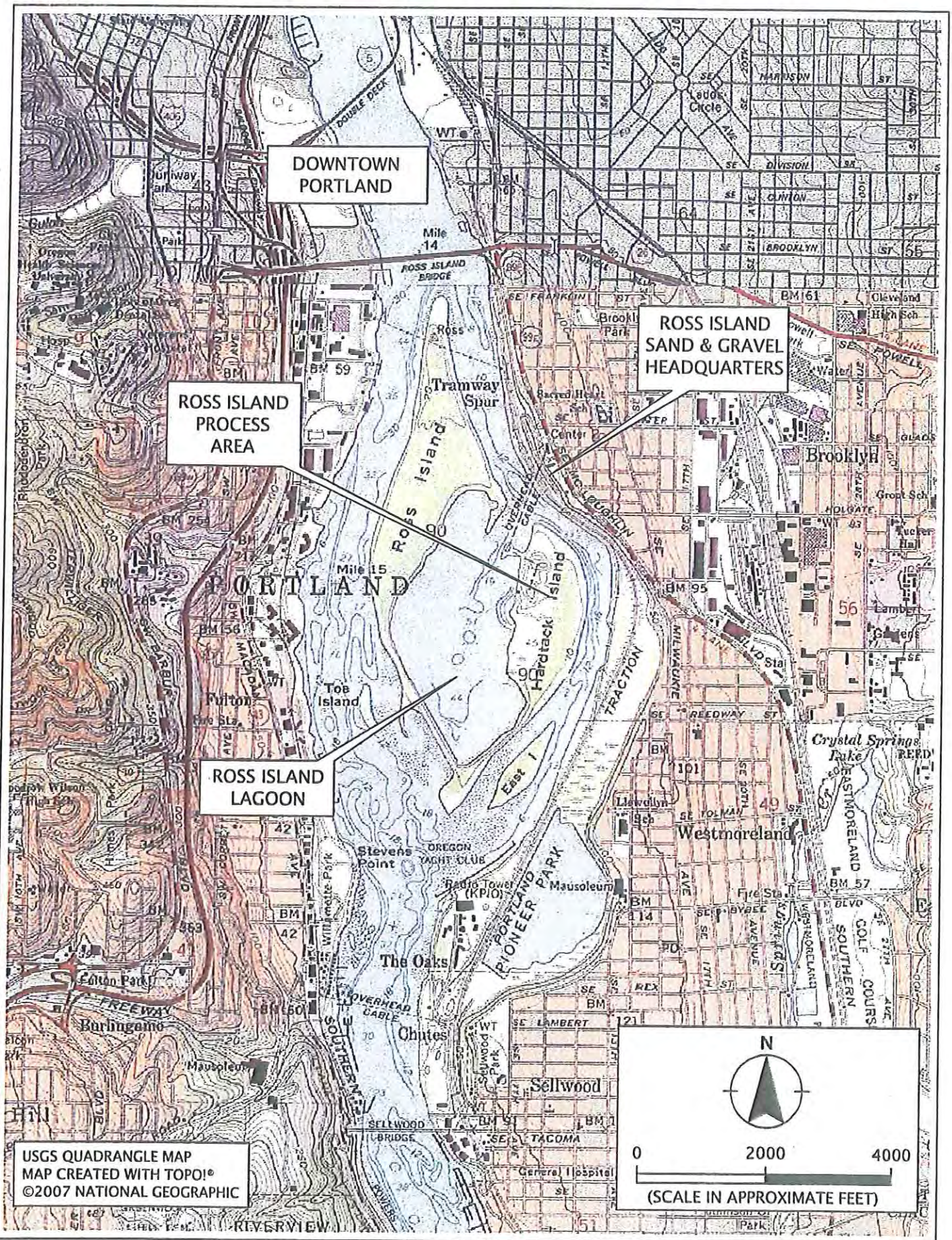
Ross Island Reclamation Plan. Prepared by Landau Associates, Pacific Habitat Services, Inc., Pam Wiley, September 2002.

Sediment Cap Breach Repair Completion, Ross Island Sand and Gravel Co., Prepared by Landau Associates, October 1999.

Settling Pond Dredge Material and Land Farm Area Sampling – Technical Memorandum prepared by Landau Associates, October 2001.

Settling Pond Investigation, Ross Island Sand and Gravel Co., Prepared by Landau Associates, December 2001.

Site Investigation Report - Final, Port of Portland Confined Dredged Material Disposal, Ross Island Facility, Portland, OR. Prepared by HartCrowser, November 2000.



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ROSSISLAND-2-04-05	VICINITY MAP	
DECEMBER 2010	ROSS ISLAND SAND & GRAVEL PORTLAND, OR	FIGURE 1

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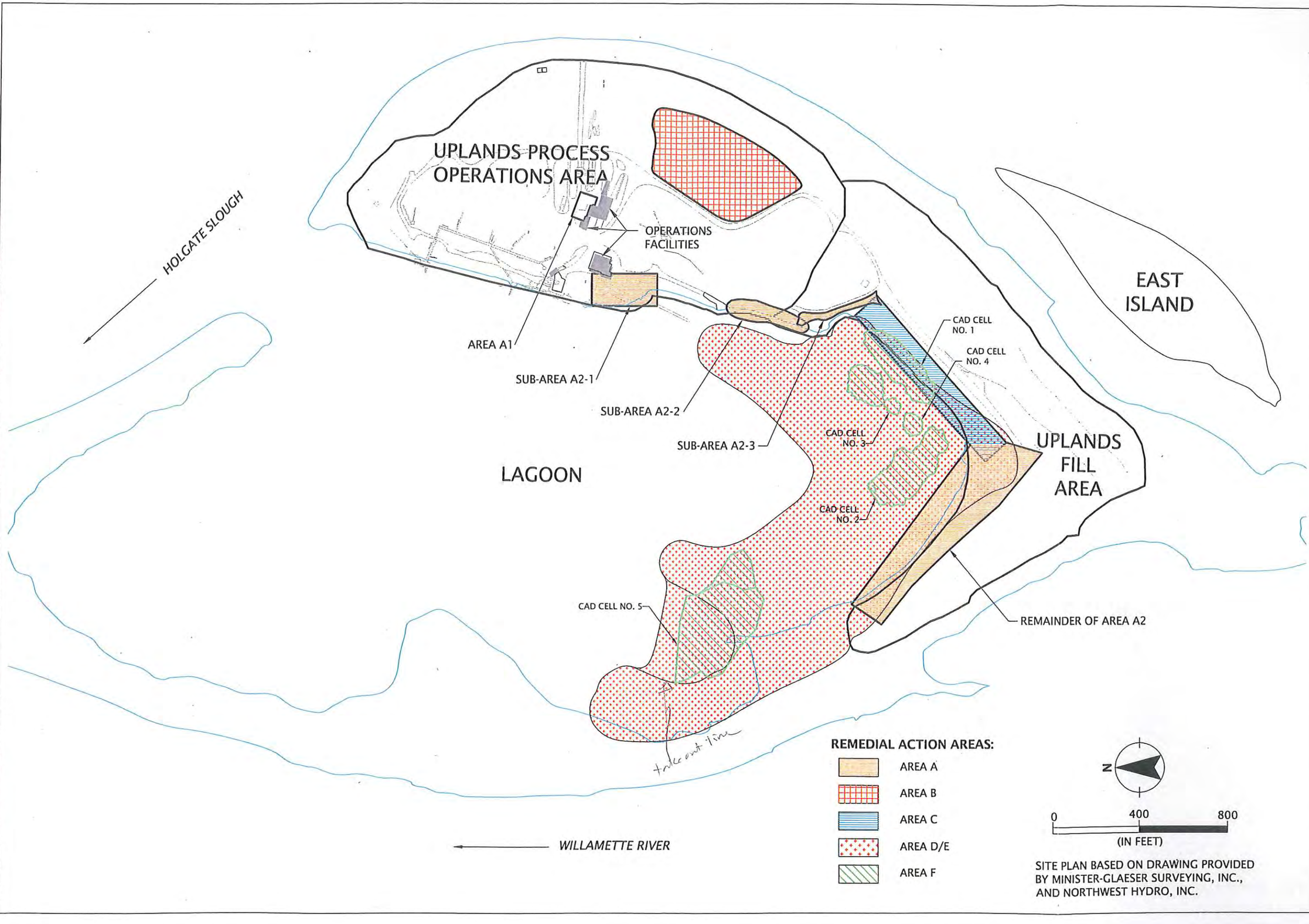
Name: X:\mcoenen\Public\Ross Island\CCR No. 2\CAD\RossIsland-2-04-05-VM01.dwg | Layout: FIGURE 1



UPLAND GEOGRAPHICAL AND REMEDIAL ACTION AREAS

ROSS ISLAND SAND & GRAVEL
PORTLAND, OR

FIGURE 2

ROSSISLAND-2-04-04

MARCH 2011

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Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

Printed By: aday | Print Date: 3/3/2011 4:33:04 PM
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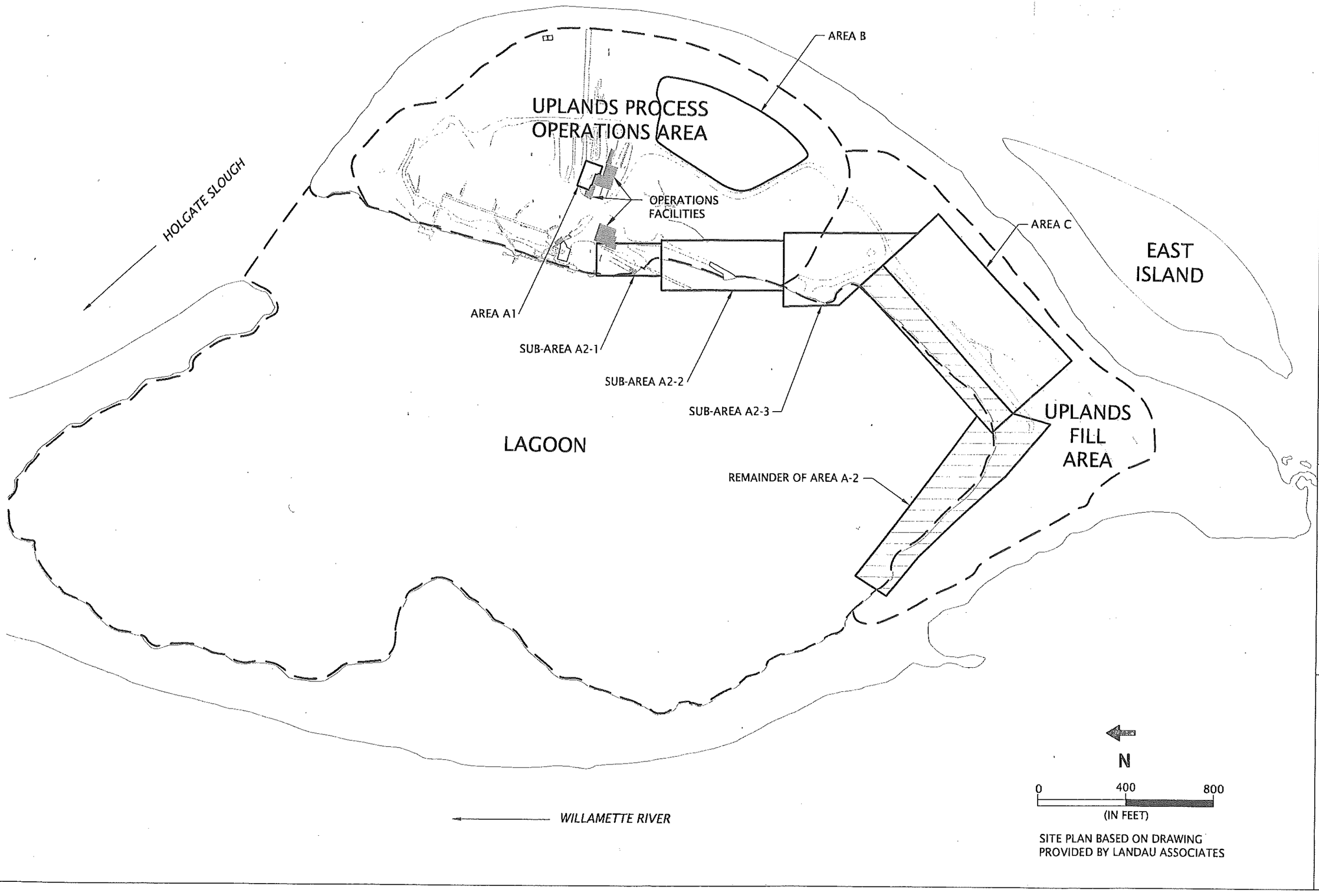

SITE PLAN - REMEDIAL ACTION AREAS

ROSS ISLAND SAND & GRAVEL
PORTLAND, OR

FIGURE 3

MARTEN-LG-2-02-12

OCTOBER 2007

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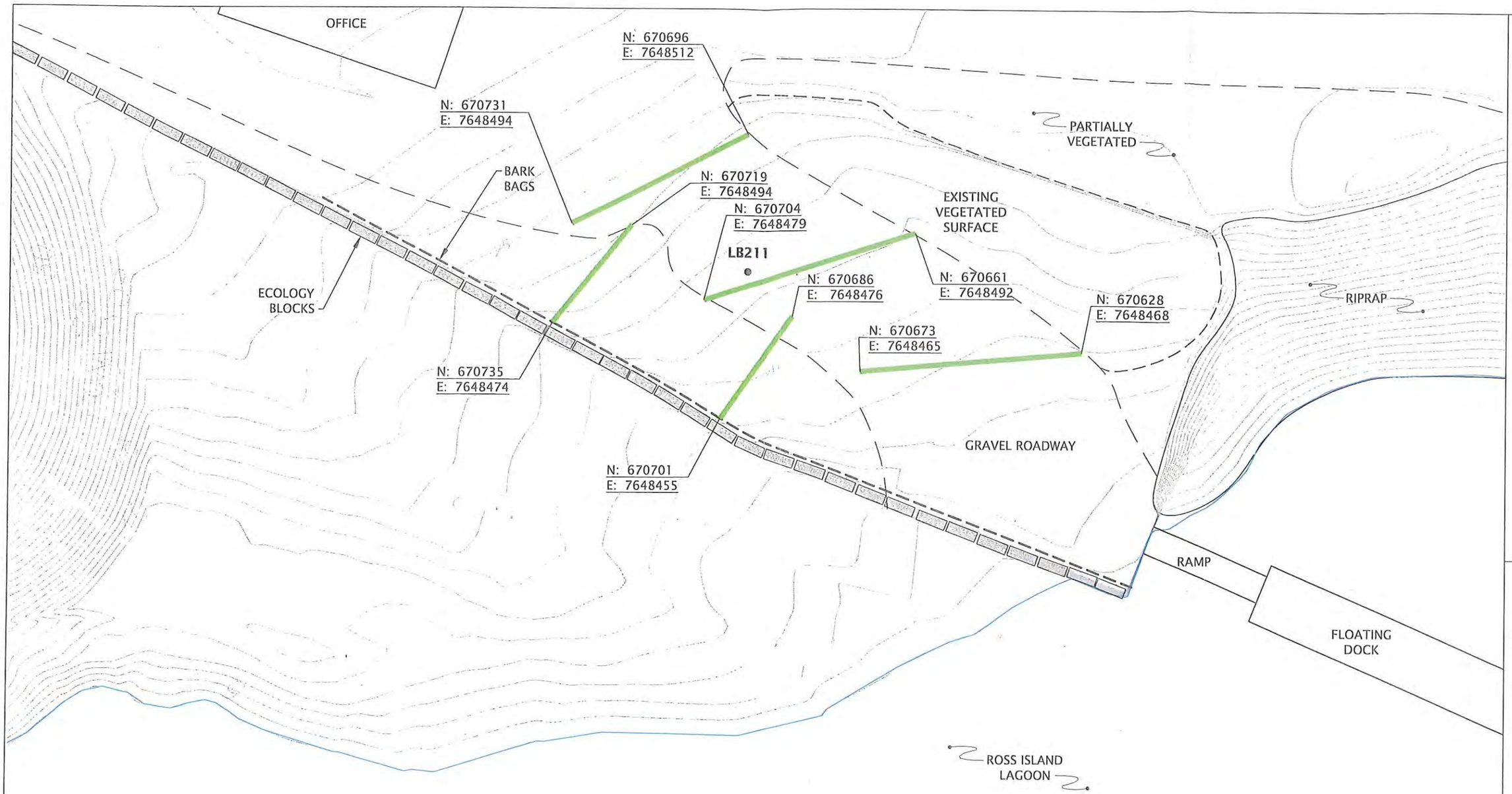
DWG Name: MartenLG-2-02-12-F2-SP.dwg | Layout: FIGURE 2 | Updated By: rfreeman | Date: 10/11/2007 8:19:56 AM



NOTES:

1. TOPOGRAPHY FROM (3DI), EUGENE, OR AND MINISTER-GLAESER SURVEYING, INC.,VANCOUVER, WA, DECEMBER 2005.
2. HORIZONTAL DATUM = NAD83 OR SPS N ZONE, INTERNATIONAL FEET.
3. VERTICAL DATUM = ROSS ISLAND DATUM (NGVD -1.55 FEET).

EXPLANATION:

- LB211 ● SAMPLE LOCATION (2001)
- DRAINAGE BERM
- 2005 TOPOGRAPHIC NAD83 UPLAND
- APPROXIMATE SHORELINE DURING 2005 SURVEY

N

0 20 40

(IN FEET)

SITE PLAN BASED ON DRAWING PROVIDED BY MINISTER-GLAESER SURVEYING, INC.

FIGURE 4

SUB-AREA A2-1

ROSS ISLAND SAND & GRAVEL
PORTLAND, OR

MARTEN-LG-2-02-12

OCTOBER 2007

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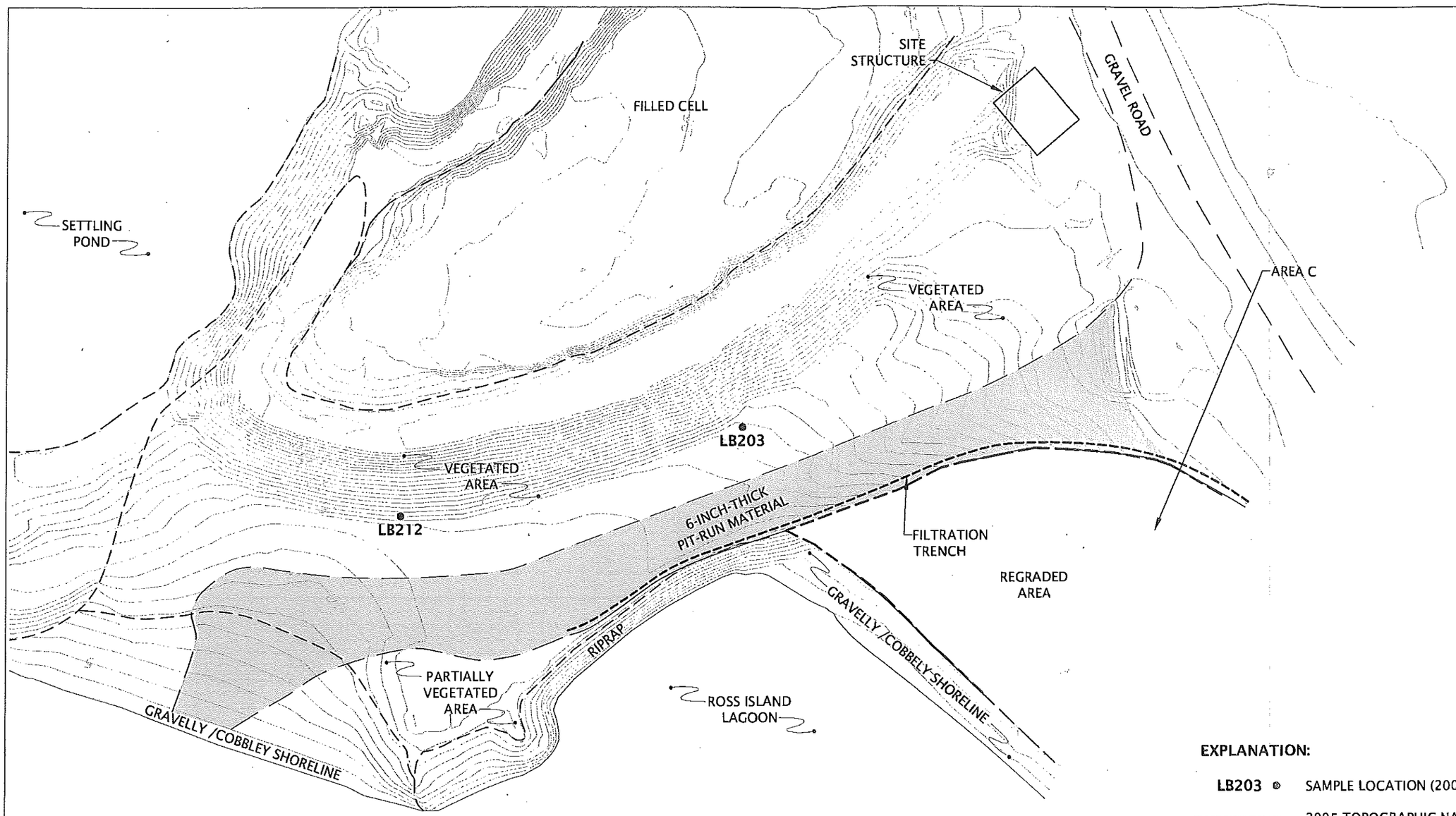
DWG Name: MartenLG-2-02-12-F6-7-SP.dwg | Layout: Figure 6 | Updated By: rfreeman | Date: 10/11/2007 8:22:43 AM



NOTES:

1. TOPOGRAPHY FROM (3DI), EUGENE, OR AND MINISTER-GLAESER SURVEYING, INC.,VANCOUVER, WA, DECEMBER 2005.
2. HORIZONTAL DATUM = NAD83 OR SPS N ZONE, INTERNATIONAL FEET.
3. VERTICAL DATUM = ROSS ISLAND DATUM (NGVD -1.55 FEET).

EXPLANATION:

- LB203 ⊙ SAMPLE LOCATION (2001)
- 2005 TOPOGRAPHIC NAD83 UPLANDS
- APPROXIMATE SHORELINE DURING 2005 SURVEY

N

0 40 80

(IN FEET)

SITE PLAN BASED ON DRAWING PROVIDED BY MINISTER-GLAESER SURVEYING, INC.

FIGURE 5

SUB-AREA A2-3 AND AREA C

ROSS ISLAND SAND & GRAVEL
PORTLAND, OR

MARTEN-LG-2-02-12

OCTOBER 2007

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N

0 400 800

Scale in Feet

Source: 2003 Aerial Photograph, PSR LLC, Eugene, Oregon

Landau Associates

Ross Island Sand & Gravel
Portland, Oregon

Site Plan

FIGURE 6

EXPLANATION

- LB206 DIRECT-PUSH BORING AND GRAB-GROUNDWATER SAMPLE (2001)
- TW-2 DIRECT-PUSH BORING AND TEMPORARY MONITORING WELL
- MW04A SHALLOW MONITORING WELL
- ASPHALT REMOVAL AREA
- REGRADED AREA
- ONE FOOT TOPOGRAPHIC CONTOURS
- N 690369 E 7587476 GEODESIGN GPS WAYPOINTS; NORTHING AND EASTING

NOTES:
1. TOPOGRAPHY FROM (3DI), EUGENE, OR AND MINISTER-GLAESER SURVEYING, INC., VANCOUVER, WA; DECEMBER 2005
2. HORIZONTAL DATUM = NAD83 OR SPS N ZONE, INTERNATIONAL FEET
3. VERTICAL DATUM = ROSS ISLAND DATUM (NGVD - 1.55 FEET)

0 20 40 80 120 160 FEET

1 INCH EQUALS 80 FEET

BOUNDARIES ARE APPROXIMATE

BASEMAP: USGS MAY 2002 ONE FOOT RESOLUTION COLOR ORTHO IMAGERY

REMEDIAL ACTION AREA C

ROSS ISLAND SAND & GRAVEL
PORTLAND, OREGON

FIGURE 7

MARTENLG-2-02-12

OCTOBER 2007

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October 12, 2007 Figure_8_Martenl G-2-02_Area_C_072707.mxd Updated by CAB