INTERIM ACTION REPORT

Mercury Soil Treatment and Disposal Project, Chlor-Alkali RAU, Georgia-Pacific West Site, Bellingham, Washington

Prepared for: Port of Bellingham

Project No. 070188-001-28 • March 8, 2018 Final

earth + water

Aspect CONSULTING

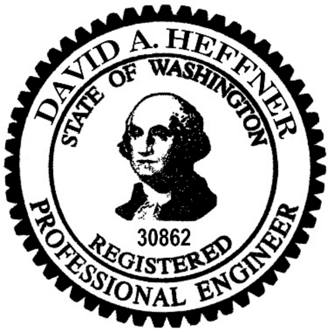
INTERIM ACTION REPORT

Mercury Soil Treatment and Disposal Project, Chlor-Alkali RAU, Georgia-Pacific West Site, Bellingham, Washington

Prepared for: Port of Bellingham

Project No. 070188-001-28 • March 8, 2018 Final

Aspect Consulting, LLC



David A. Heffner, PE
Associate Remediation Engineer
dheffner@aspectconsulting.com

Steve Germiat, LHG, CGWP
Principal Hydrogeologist
sgermiat@aspectconsulting.com

V:\070188 Port Bellingham\Deliverables\2017 Hg Soil IA Report\Hg Soil IA Rpt_Final_20180308.docx

Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

This report documents an interim action (Interim Action) completed by the Port of Bellingham (Port) and managed by Aspect Consulting, LLC (Aspect) in late 2017 within the Chlor-Alkali Remedial Action Unit (RAU) of the Georgia-Pacific (GP) West Site (Site) in Bellingham, Washington (Figure 1). The Interim Action primarily involved treatment and off-Site disposal of mercury-contaminated soil and debris stored under a polyethylene cover within the footprint of the former Cell Building. To address Subtitle C (hazardous waste) landfill disposal requirements and to meet the respective federal land disposal restriction (LDR) treatment standards, contaminated soil was treated on-Site and oversize debris was macroencapsulated at the landfill facility. The footprint of the former Cell Building was then paved with asphalt as the final step of the Interim Action. Additional cleanup of mercury-contaminated soil within the footprint of the former Cell Building will be conducted as a component of the final cleanup action for the RAU.

1.1 Background

The Interim Action area (Project Site) at the start of construction is depicted on Figure 2. When the floor slab of the Cell Building was removed in a previous (2013-2014) interim action (Aspect, 2014), extensive mercury contamination was unexpectedly observed in the subgrade, and underlying impacted soils and building foundation components were removed in selected areas. Due to the unexpected conditions, approximately 430 cubic yards of soil and debris were left in the northern[1] portion of the Cell Building footprint at the end of that interim action, and 19 steel road plates (generally 20 feet by 8 feet and 1 inch thick) were placed across grade beams that remained in place to cover open excavation areas. Crushed brick generated from demolition of the former pulp mill was placed and graded to generally level the area. The entire Cell Building footprint, including the soil/debris pile, was then covered with a 12-mil-thick polyethylene cover, which was anchored around its perimeter with approximately 50 ecology blocks.

When the prior interim action was completed in 2014, the intent was to address the approximately 430 cubic yards of soil and debris as part of the final cleanup action for the RAU. However, due to a number of factors, it became apparent by 2016 that development of the final cleanup action would take longer than expected. Therefore, the Washington State Department of Ecology (Ecology) required the Port to remove that soil and debris prior to the final cleanup action (i.e., in the current Interim Action).

The Interim Action was conducted by the Port (the current owner of the Site) in accordance with the Interim Action Work Plan (Work Plan; Aspect, 2016), which went through public comment and was then approved by Ecology. The Work Plan included general approaches for soil treatment, waste designation, control of air emissions, and

[1] Consistent with prior environmental documentation for the Site, directional references in this report are relative to “Mill North,” which is 45 degrees northwest of True North (see north arrows on figures).

compliance monitoring. The Port's Special Provisions and Technical Specifications (collectively termed Specifications) provided instructions for the selected contractor, Engineering/Remediation Resources Group, Inc. (Contractor), to complete the Interim Action. Ecology reviewed the Specifications prior to start of construction.

Ecology also reviewed and approved the Compliance Monitoring Plan (CMP; Aspect, 2017b), which described the construction management and monitoring procedures implemented during the Interim Action. Aspect served as the Port's authorized on-Site representative (Engineer), conducting oversight and monitoring throughout the Interim Action in accordance with the CMP.

2 Construction Preparation

2.1 Remedial Action Management Plan (RAMP)

The Specifications were largely performance-based, in that they specified required outcomes, but relied on the Contractor to propose the most efficient means and methods to meet the defined cleanup goals. Therefore, prior to start of construction, the Contractor prepared a draft Remedial Action Management Plan (RAMP) that proposed detailed construction means and methods for completing the Interim Action work. Aspect reviewed and provided comments on the draft RAMP, which were addressed by the Contractor in subsequent RAMP revisions. The finalized RAMP was provided to Ecology, and is included as Appendix B to this report[2].

2.2 Temporary Erosion and Sedimentation Controls

The Contractor implemented temporary erosion and sedimentation controls (TESC) to reduce the likelihood of offsite migration of contaminated materials. The TESC measures included placing inlet filters in catch basins[3], building sandbag berms to minimize overland migration of surface water and sediment from the Project Site, and keeping soil piles covered when not in use to minimize wind erosion. During loadout activities, trucks leaving the Project Site were inspected for soil adhered to tires to prevent tracking of sediment onto public roads. All waste loads were covered prior to leaving the Project Site.

2.3 Treatment Enclosure, Air Treatment System, and Waste Storage Area

As depicted on Figure 2, the Contractor established a waste storage area and erected a treatment enclosure (tent) over the area where contaminated soil was to be treated. In addition to protection from the weather, the treatment enclosure provided containment of mercury vapor generated during the soil treatment process. Air from inside the enclosure

[2] The Contractor also prepared a Site-Specific Health and Safety Plan (HASP), which they appended to the RAMP. Appendix B to this report does not include the Contractor's HASP.

[3] As discussed in Section 8, surface water was managed by routing it to the Site stormwater system via existing catch basins. Inlet filters were used to minimize sediment discharge.

was treated prior to discharge to atmosphere by a system consisting of a large-capacity blower, a vessel containing sulfur-impregnated granular activated carbon, and interconnecting ductwork. During working hours, enclosure air was continuously routed through the carbon vessel, where vapor-phase mercury was adsorbed onto the carbon. As discussed in Section 7, the discharge from the air treatment system was monitored for mercury to ensure that performance criteria (air action levels) were achieved, in accordance with the CMP.

3 Health and Safety

The Contractor established the health and safety exclusion zone for the construction area and a contamination-reduction area at the entrance to the exclusion zone. Due to the hazardous nature of mercury vapors, personnel entering the exclusion zone wore the following personal protective equipment:

- Full-face air purifying respirator (APR) with mercury vapor cartridges;
- Tychem suit with hood; and
- Steel-toed rubber boots, nitrile inner gloves, and rubber outer gloves.

Workers also wore hearing protection as part of general construction health and safety measures. Hard hats were generally not worn, as wearing them interfered with the fit and function of the full-face respirators.

An important element of the health and safety program was measuring and recording mercury concentrations in breathing-zone air during the work activities, in accordance with the air monitoring requirements described in the CMP. Mercury vapor monitoring is discussed in Section 7.

4 Decommissioning Above-Grade Features

Since the Port intends to use the Project Site for log storage and other activities involving vehicular traffic, the work included decommissioning of inactive above-grade features, including several post indicator valves, a fire hydrant, and associated steel and concrete traffic-protection barriers (bollards). The post indicator valves and the hydrant were removed to about 2 feet below grade, and the remaining pipe was filled with concrete. The void in the soil was then backfilled with gravel borrow and compacted with an excavator bucket. The bollards were uprooted and the resulting soil voids were backfilled with gravel borrow and compacted with the excavator bucket.

5 Debris Segregation and Soil Treatment

Debris segregation and soil treatment was accomplished as follows (refer to Appendix A for the construction photographs called out in parentheses):

- The polyethylene cover was pulled back to expose a portion of the soil/debris pile, and an excavator operating outside the treatment enclosure was used to load contaminated material onto a screen-covered mixer (Enterra BMX-600 cement mixer) mounted on a skid-steer that was positioned on a truck scale at the entrance to the treatment enclosure (Photos 3 and 4). (Two identical mixer-mounted skid-steers operated inside the treatment enclosure.) Prior to loading, the weight of the skid-steer with empty mixer was recorded on a printed scale ticket.

- As the excavator loaded the material into the mixer, the mixer was tilted and shaken to allow 3-inch-minus material to fall through the screen into the mixing compartment and larger material to fall to the ground. The larger material was periodically moved to an adjacent “Oversize Debris” stockpile under the polyethylene cover for subsequent management as a separate waste stream. When the appropriate weight of contaminated soil was placed in the mixer, the total weight of the loaded skid-steer was recorded on a second scale ticket. The difference between the two scale ticket weights was the wet weight of the untreated soil “Batch” (typically between 0.7 and 0.8 tons).

- The skid-steer was driven to the soil treatment area inside the enclosure, where treatment reagents were added to the mixer and mixed into the soil Batch (Photo 5). Reagents were added at the following approximate dosages (as a percentage of the untreated wet soil weight)[4] that were selected by the Contractor:

    - 2 weight percent (wt%) elemental sulfur;
    - 25 wt% Portland cement; and
    - 10 wt% water.

  Mixing continued until all reagents appeared to be thoroughly incorporated, based on visual observation. The treated soil Batch was then discharged from the mixer into a polypropylene bulk “Super Sack” (Photo 6).

- Super Sacks, each containing one Batch of treated soil, were labeled with a unique identifying number and arranged into “Treatment Lots” weighing roughly 31 tons (typically 30 sacks). Aspect collected one representative 10-point composite sample from each Treatment Lot in accordance with the CMP. After curing for a minimum of 5 days, the composite sample was submitted to Edge Analytical Laboratory in Burlington, Washington, for toxicity characteristic leaching procedure (TCLP) mercury analysis (U.S. Environmental Protection Agency [EPA] Methods 1311 and 7470A). TCLP mercury results for the treated

[4] These are the reagents and dosages that consistently achieved the TCLP mercury target at the bench scale in Phase 3 of the *Pilot Test of Mercury-Contaminated Soil Treatment* (Aspect, 2017a).

soil are summarized in Table 1, and laboratory reports are provided as Appendix C.

- The Super Sacks of treated soil were stored on-Site, either inside the treatment enclosure (Photo 7) or outside in the waste storage area, until Aspect received the TCLP mercury result and designated the Treatment Lot for off-Site disposal, as described in Section 6.

The treatment objective was a TCLP mercury result of 0.25 milligrams per liter (mg/L) or less, which achieves EPA's alternative LDR treatment standard for mercury-contaminated soils (remediation waste) and allows for land disposal at a Subtitle C (hazardous waste) landfill.

5.1 Treatment Test Run

In accordance with the Specifications, prior to initiating full-scale treatment, the Contractor conducted a test run that produced three smaller Treatment Lots (Lots 1 through 3), weighing a total of 11.5 tons. The test run evaluated different cure times and tested two alternate forms of elemental sulfur: (1) powdered; and (2) a granular form containing bentonite, identified by the supplier as disintegrating sulfur. Based on test run results, a minimum cure time of 5 days was implemented[5], and the granular sulfur was selected for full-scale treatment because it was observed to disintegrate quickly upon hydration and presented less of an explosion hazard than powdered sulfur.

5.2 Soil Treatment Summary

Soil treatment is summarized in Table 1. A total of 532.8 tons of contaminated soil (wet weight) was treated in 28 Treatment Lots between October 19 and November 16, 2017. All except Lot 4 achieved the TCLP mercury treatment objective. The TCLP mercury result for Lot 4 was more than three times the treatment objective, whereas results for the other 27 Lots were all more than an order of magnitude below the treatment objective. The Lot 4 TCLP extract was reanalyzed for mercury in duplicate, which yielded similar results (Table 1). It is not known why treatment of this lot, the first processed at full-scale following the treatment test run, was unsuccessful. Lot 4 treated soil was designated as toxicity-characteristic hazardous waste (D009 waste designation) and treated via macroencapsulation by Chemical Waste Management prior to Subtitle C landfill disposal (refer to Section 6).

In addition to meeting the treatment standard to allow land disposal, all Treatment Lots except Lot 4 successfully removed the toxicity characteristic (achieved TCLP mercury concentrations below 0.002 mg/L), and they were therefore no longer characteristic hazardous waste (D009). However, the total mercury concentrations in the treated soil remained greater than 1,000 milligrams per kilogram (mg/kg), and all Treatment Lots except Lot 4 were therefore designated as state-only toxic dangerous waste (WT02 waste designation) in accordance with the Work Plan and the CMP.

[5] Refer to Treatment Lots 1 through 3 in Table 1.

6 Waste Disposal

Hazardous waste resulting from the Interim Action was transported to the Waste Management Subtitle C landfill in Arlington, Oregon, for disposal. Hazardous waste manifests and certificates of disposal are provided in Appendices G and H, respectively. Waste load dates and weights are summarized in Table G-1 at the beginning of Appendix G. As delineated in the table, all hazardous waste was designated as one of two waste categories:

- **State-Only Dangerous Waste (WT02)**. All successfully treated soil, weighing a total of 703 tons, was disposed of as WT02 waste.
- **Macroencapsulated Hazardous Waste Debris (D009).** The 33 tons of unsuccessfully treated (Lot 4) soil and 181 tons of Oversize Debris[6] were macroencapsulated by Chemical Waste Management at the landfill and disposed of as D009 waste.

In addition to the hazardous waste described above, a small quantity (18 tons) of miscellaneous non-hazardous waste[7] was disposed of at the Waste Management Subtitle D landfill in Arlington, Oregon.

7 Air Monitoring

Mercury concentrations in air were monitored throughout the contaminated material handling and soil treatment activities in accordance with the CMP. The air monitoring data were used to assess Contractor compliance with air quality performance standards (action levels) established in the Work Plan and required in the Specifications. The air monitoring locations and the respective action levels for mercury in air were as follows:

- Within the worker breathing zone: 100 micrograms per cubic meter ($\mu g/m^3$);
- Within 10 feet of the discharge from the air treatment system: 50 $\mu g/m^3$; and
- At the Project Site perimeter: 5 $\mu g/m^3$.

Real-time monitoring was conducted using a hand-held mercury air monitoring instrument (Lumex®). In addition, composite air samples were collected daily at four fixed monitoring stations (A through D) located at the perimeter of the Project Site. Station locations are indicated on Figure 2, and a photograph of Station A is provided in Appendix A (Photo 1). Sorptive cartridges were deployed daily and, following a sample collection period of approximately 24 hours, were submitted to Brooks Applied Labs in Seattle, Washington, for analysis of total mercury using EPA Methods 324 and 1631.

---

[6] Oversize Debris primarily consisted of material from the soil/debris pile that did not pass through the 3-inch screen when soil was loaded into the mixer. The polyethylene cover was also cut up and disposed of as Oversize Debris.

[7] This included the granular activated carbon used to treat air discharged from the treatment enclosure, based on sampling results; refer to Section 10.1.

Laboratory reports for the perimeter air monitoring data are provided in Appendix D, and results are summarized in Table D-1 at the beginning of that appendix.

Based on the results of both real-time monitoring and composite sampling at the Project Site perimeter, the above action levels were never exceeded. The highest mercury concentrations detected in air over the course of the Interim Action are summarized as follows:

- **Worker Breathing Zone.** The Lumex® instrument detected 50 µg/m^3 mercury inside the excavator cab on November 2, 2017, and 62 µg/m^3 inside the treatment enclosure on November 7, 2017 (both below the action level of 100 µg/m^3).
- **Within 10 Feet of the Discharge from the Air Treatment System.** The Lumex® instrument detected 0.03 µg/m^3 mercury in the exhaust from the vapor-phase GAC canister on November 6, 2017 (below the action level of 50 µg/m^3)[8].
- **At the Project Site Perimeter.** The Lumex® instrument detected 1.7 µg/m^3 mercury at Station C on November 10, 2017, and a maximum 24-hour composite concentration of 0.116 µg/m^3 was measured at the same station on November 16, 2017, the final day of soil treatment (both below the action level of 5 µg/m^3).

Section 3.6 of the CMP stated that perimeter air monitoring would continue on work days until the oversize debris and treated soil were removed from the Project Site. However, given the relatively low mercury concentrations measured at the Project Site perimeter on days when soil treatment was ongoing, Aspect submitted the monitoring results to Ecology on November 27, 2017 (11 days after all soil had been treated, but some treated soil and debris had not yet been loaded out), along with a request to terminate perimeter monitoring. Ecology concurred on November 27, 2017, and perimeter air monitoring was terminated on November 28, 2017.

8 Surface Water Management

All water accumulating in the construction area was conveyed to the Port's pump station for the Aerated Stabilization Basin (ASB), in accordance with the Port's National Pollutant Discharge Elimination System (NPDES) permit for the ASB facility. The existing drainage system (catch basins and associated subsurface piping) provided the primary means of conveyance. During and following periods of heavy precipitation, however, blockages in the drainage system resulted in water ponding in both the waste storage area and the treatment enclosure. Upon authorization by the Port, the Contractor jetted a portion of the drain lines within the Project Site (with some success) and

[8] The Lumex® instrument was changed out on November 7. The instrument used through November 6 had a detection limit of less than 0.01 µg/m^3, whereas the replacement instrument had a detection limit of 0.1 µg/m^3, which is still well below all action levels.

mobilized a vacuum truck to remove and haul ponded water to a functioning on-property catch basin situated closer to the pump station.

9 Subgrade Preparation and Paving the Cell Building Footprint

Following removal of the stockpiled soil and debris, the polyethylene cover, and the ecology blocks, the Specifications called for the following activities to restore the Project Site and conclude the Interim Action:

1. Remove and stage (in a location specified by the Port) the crushed brick material and the steel road plates;
2. Place imported gravel borrow in the void spaces that had been covered by the steel plates, to match surrounding grade;
3. Place a separation geotextile over the Cell Building footprint to provide a separation layer between contaminated soils and overlying “clean” materials (described below);
4. Place additional imported gravel borrow in a layer of variable thickness, tapering from zero at the north and south edges of the surfacing area to 9 inches at the center crown, to achieve a 1-percent slope in both directions;
5. Place a 3-inch thickness of Crushed Surfacing Base Course (CSBC); and
6. Pave over the CSBC with a 3-inch thickness of Hot Mix Asphalt (HMA). Taper the pavement around the edges to match existing grade, creating a smooth transition that is drivable by automobiles.

With approval from the Port, the actual work differed from the above in several respects. These are described below, along with reasons for the changes:

1. The crushed brick material within the Cell Building footprint and soils generated during the Bellingham Shipping Terminal (BST) Phase 1 stormwater improvements project were used in lieu of imported gravel borrow to fill the void spaces. Beneficially reusing the on-Site stockpiled soils was done primarily to reduce project costs, as well as to reduce off-Site impacts from mining and importing native aggregate for the same purpose. Prior to making this change, the Port provided BST soil sampling results to Ecology in a letter proposing that a portion of the stockpiled BST soils be used for this purpose (Port, 2017); Ecology approved the change. Soils from the “TW,” “LP,” and “MFD” stockpiles referenced in Port (2017) were used to fill voids beneath the pavement.
2. The steel road plates were placed on the ground surface in the northern portion of the Cell Building footprint (beneath the geotextile) instead of staging them elsewhere. This was done to help stabilize the ground surface in that area prior to paving, as the dredge fill soils there were extremely soft and thus incapable of supporting equipment loads during subsequent pavement construction.

3. Additional thickness of CSBC was placed on the geotextile in lieu of imported gravel borrow. This was also done to help stabilize the ground surface across the entire area prior to paving. While the northern portion of the Cell Building footprint exhibited the worst conditions, the ground surface throughout the area to be paved was observed to be soft and lacking in load-bearing capacity. The total volume of CSBC placed was equivalent to roughly a 12-inch thickness over the entire Cell Building footprint; however, the CSBC layer was thicker in the center and tapered at the edges to promote drainage from the final paved surface.

4. Slope orientation was adjusted so that drainage of precipitation from the paved surface would be primarily to the northeast and southwest rather than to the north and south. This was done so that stormwater would be more efficiently directed to existing catch basins with demonstrated drainage capacity.

Photos 8 through 10 in Appendix A show paving in progress and the finished paved surface. Paving was completed under less-than-ideal conditions with respect to ambient temperature (colder than optimal) and precipitation (intermittent light rainfall), as well as the poor condition of the subgrade soil noted above. However, the only alternative would have been to wait until spring/summer of 2018 to pave, as the asphalt plant was about to shut down for the winter.

Figure 3 depicts in plan view the as-built pavement covering the former Cell Building footprint. Approximate locations of the steel road plates beneath the pavement are shown for future reference. Figure 4 is a schematic cross section depicting a generalized vertical sequence of subgrade materials beneath the new pavement, recognizing that the distribution and thickness of subgrade materials are variable across the paved area (see notes on Figure 4). During the final cleanup action currently planned for the RAU, all materials beneath the separation geotextile will be considered contaminated and thus will be remediated, whereas the materials above the separation geotextile will be considered uncontaminated.

10 Demobilization

10.1 Sampling of Granular Activated Carbon

Following completion of soil treatment, the granular activated carbon used to treat air discharged from the treatment enclosure was chemically tested to profile it for landfill disposal. The carbon was divided into six Super Sacks, and a grab sample was collected from each sack. The six grab samples were composited, and the composite sample was submitted to Edge Analytical for analysis of total mercury by EPA Method 7471A. The laboratory report is provided as Appendix E. The detected mercury concentration of 2.484 mg/kg is less than 20 times the 0.2 mg/L TCLP mercury threshold for designation as toxicity-characteristic hazardous waste under the Resource Conservation and Recovery

Act (RCRA)[9]. This result was used to profile the carbon and dispose of it off-Site as non-hazardous waste.

10.2 Equipment Decontamination

Prior to demobilization, Contractor personnel decontaminated their equipment by pressure washing and other means. Aspect then collected wipe samples from 100-square-centimeter areas of the decontaminated equipment surfaces, and submitted the samples for analysis of total mercury by EPA Method 1631. The laboratory report is provided in Appendix F to this report, and results are summarized in Table F-1 at the beginning of that appendix. All wipe samples contained less than 1 mg mercury, thereby meeting the equipment decontamination requirement in the Specifications.

[9] The TCLP analysis includes a 20:1 liquid-to-soil ratio. Therefore, a total mercury result below 4 mg/kg confirms that TCLP testing would produce a result below 0.2 mg/L (https://archive.epa.gov/epawaste/hazard/web/html/faq_tclp.html)

11 References

Aspect Consulting, LLC (Aspect), 2014, Caustic Plume/Cell Building Interim Action Report, Georgia-Pacific West Site, Bellingham, Washington, October 10, 2014.

Aspect Consulting, LLC (Aspect), 2016, Interim Action Work Plan, Removal of Mercury-Contaminated Soil at Cell Building, December 26, 2016.

Aspect Consulting, LLC (Aspect), 2017a, Pilot Test of Mercury-Contaminated Soil Treatment, Chlor-Alkali RAU, Georgia-Pacific West Site, Bellingham, Washington June 16, 2017.

Aspect Consulting, LLC (Aspect), 2017b, Compliance Monitoring Plan, Removal of Mercury-Contaminated Soil at Cell Building, July 12, 2017.

Port of Bellingham (Port), 2017, Letter from Port of Bellingham (B. Howard) to Washington State Department of Ecology (B. Sato) re: Mercury Soil Treatment and Disposal Interim Action – Subgrade Backfill Material, November 30, 2017.

Limitations

Work for this project was performed for the Port of Bellingham (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

TABLES

Table 1 - Soil Treatment Summary

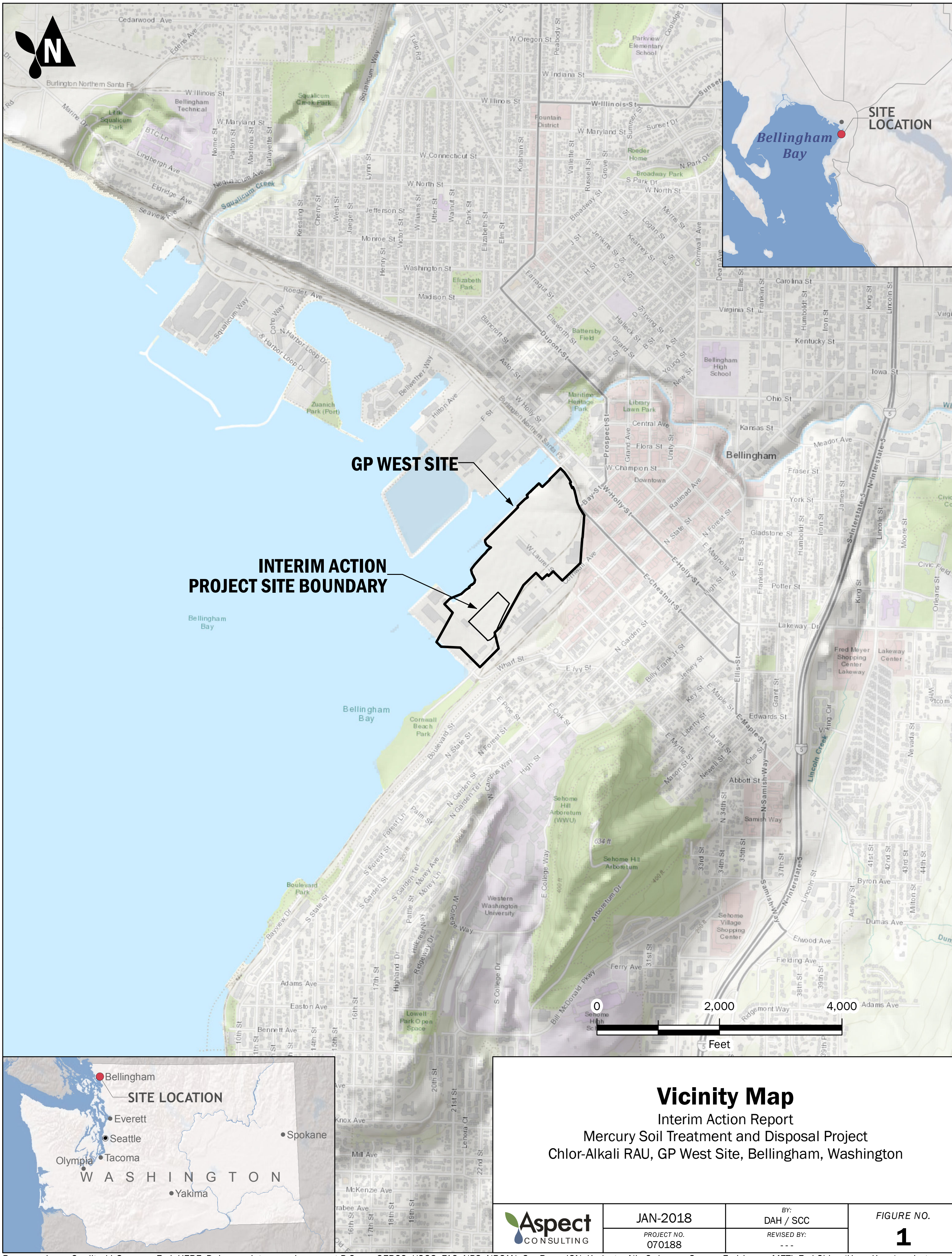
Project No. 070188, Mercury Soil Treatment and Disposal Project, Bellingham, Washington

Treatment Lot No.	Treatment Dates		Untreated Soil Weight (tons)		TCLP Hg[1,3] (mg/L)
	Start	Finish	Current Lot	Cumulative	
1[2,3]	10/19/17	10/19/17	4.39	4.4	0.00306
2[2]	10/20/17	10/20/17	4.61	9.0	0.00270
3[2]	10/20/17	10/20/17	2.52	11.5	0.00243
4	10/31/17	10/31/17	22.06	33.6	**0.822**[4]
5	11/01/17	11/01/17	21.64	55.2	0.00246
6	11/01/17	11/02/17	21.89	77.1	0.00169
7	11/02/17	11/02/17	21.35	98.5	0.00107
8	11/02/17	11/03/17	22.02	120.5	0.00311
9	11/03/17	11/03/17	19.57	140.1	0.00350
10	11/06/17	11/06/17	20.95	161.0	0.00361
11	11/06/17	11/06/17	19.41	180.4	0.00337
12	11/07/17	11/07/17	21.17	201.6	0.00358
13	11/07/17	11/08/17	21.85	223.4	0.00294
14	11/08/17	11/08/17	21.94	245.4	0.00337
15	11/08/17	11/08/17	21.71	267.1	0.00372
16	11/08/17	11/09/17	21.86	288.9	0.0240
17	11/09/17	11/09/17	21.64	310.6	0.00300
18	11/09/17	11/10/17	21.85	332.4	0.00227
19	11/10/17	11/10/17	21.87	354.3	0.00987
20	11/10/17	11/13/17	22.00	376.3	0.0116
21	11/13/17	11/13/17	22.04	398.3	0.00629
22	11/13/17	11/15/17	21.90	420.2	0.00658
23	11/15/17	11/15/17	21.60	441.8	0.00637
24	11/15/17	11/15/17	21.73	463.6	0.00977
25	11/15/17	11/16/17	21.59	485.2	0.00399
26	11/16/17	11/16/17	22.04	507.2	0.00457
27	11/16/17	11/16/17	22.04	529.2	0.00400
28	11/16/17	11/16/17	3.58	532.8	0.00116

Hg mercury
mg/L milligrams per liter
TCLP toxicity characteristic leaching procedure

Notes:
1) Bolded TCLP Hg results indicate exceedance of the 0.25 mg/L target leachability for offsite disposal of the treated soil.
2) Lots 1, 2, and 3 constitute the Treatment Test Run (see Section 5.1).
3) Lot 1 treated soil was analyzed for TCLP Hg after 4- and 5-day cure times. The lab result for the 4-day sample was 0.0815 mg/L. Based on the Treatment Test Run results, a minimum cure time of 5 days was implemented for all subsequent treatment lots.
4) Following receipt of the high TCLP Hg result, Lot 4 extract was reanalyzed for Hg in duplicate. Reanalysis yielded similar TCLP Hg results (0.824 and 0.814 mg/L).

FIGURES



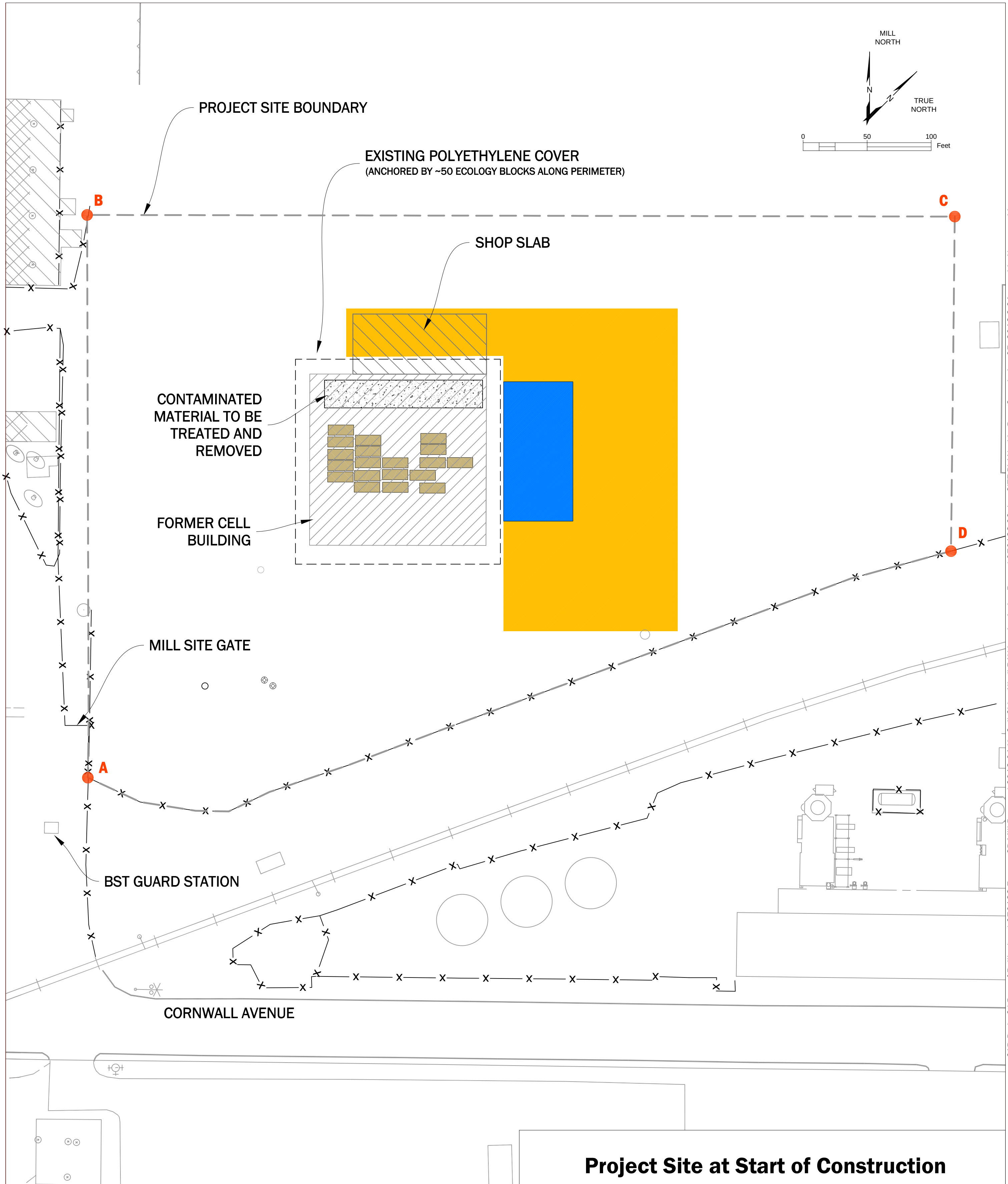
Vicinity Map

Interim Action Report
Mercury Soil Treatment and Disposal Project
Chlor-Alkali RAU, GP West Site, Bellingham, Washington

Aspect CONSULTING	JAN-2018	BY: DAH / SCC	FIGURE NO. 1
	PROJECT NO. 070188	REVISED BY: - - -	

GIS Path: Q:\Port of Bellingham\070188 Former GP Mill Property\2018-01 Hg Soil-Chlor-Alkali RAU-Interim Action Report\GIS\Vicinity Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/9/2018 || User: scudd || Print Date: 1/9/2018

Basemap Layer Credits || Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



LEGEND

FENCE

A PERIMETER AIR MONITORING STATION

STEEL ROAD PLATE (COVERING VOID SPACES)

TREATMENT ENCLOSURE

WASTE STORAGE AREA

Project Site at Start of Construction

Interim Action Report

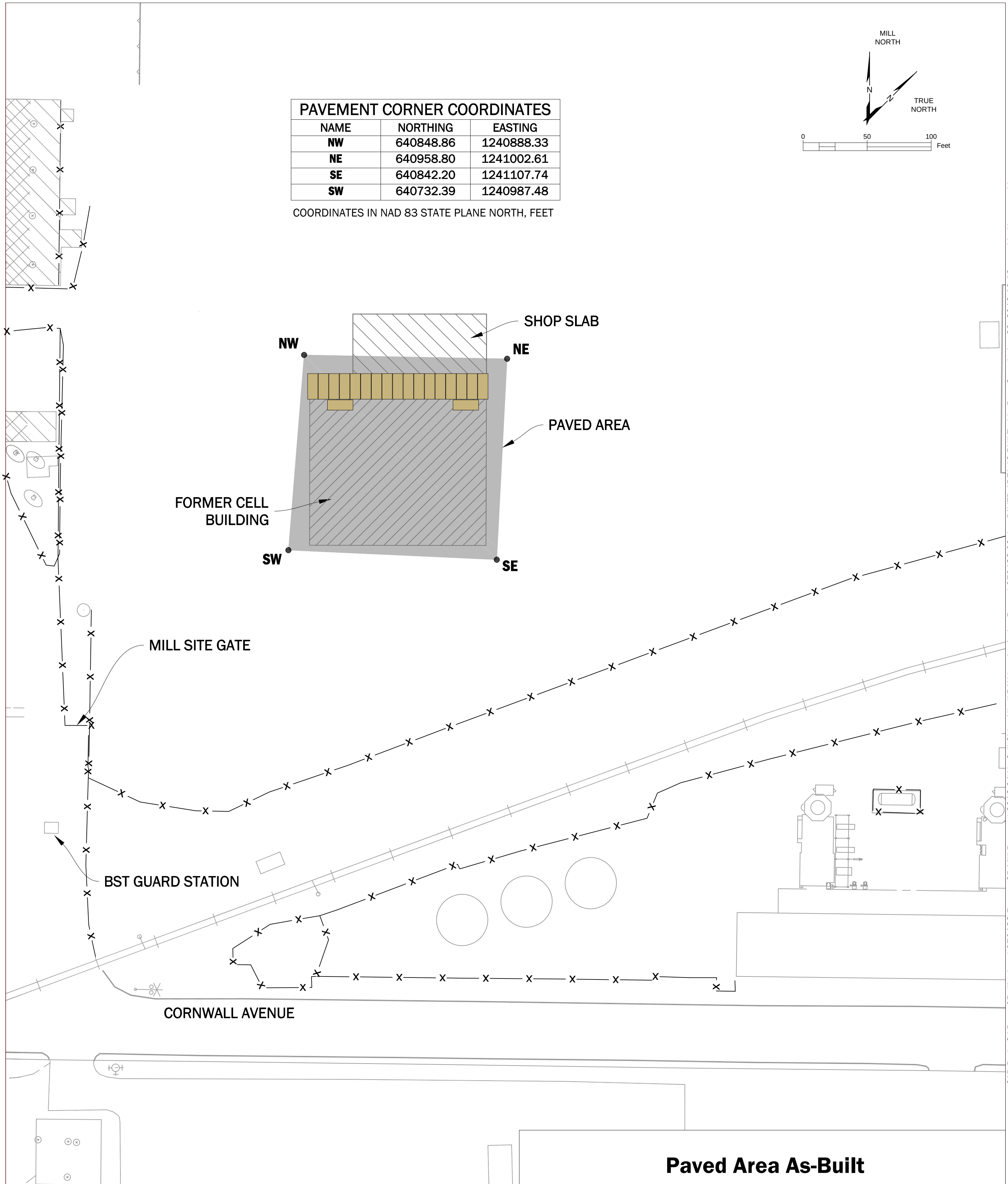
Mercury Soil Treatment and Disposal Project

Chlor-Alkali RAU, GP West Site, Bellingham, Washington

Aspect CONSULTING	Jan-2018	BY: SJG/SCC	FIGURE NO.
	PROJECT NO. 070188	REVISED BY: SCC	2

PAVEMENT CORNER COORDINATES		
NAME	NORTHING	EASTING
NW	640848.86	1240888.33
NE	640958.80	1241002.61
SE	640842.20	1241107.74
SW	640732.39	1240987.48

COORDINATES IN NAD 83 STATE PLANE NORTH, FEET



LEGEND

—x— FENCE

STEEL ROAD PLATE BENEATH PAVEMENT AND CRUSHED SURFACING BASE COURSE

Paved Area As-Built

Interim Action Report

Mercury Soil Treatment and Disposal Project

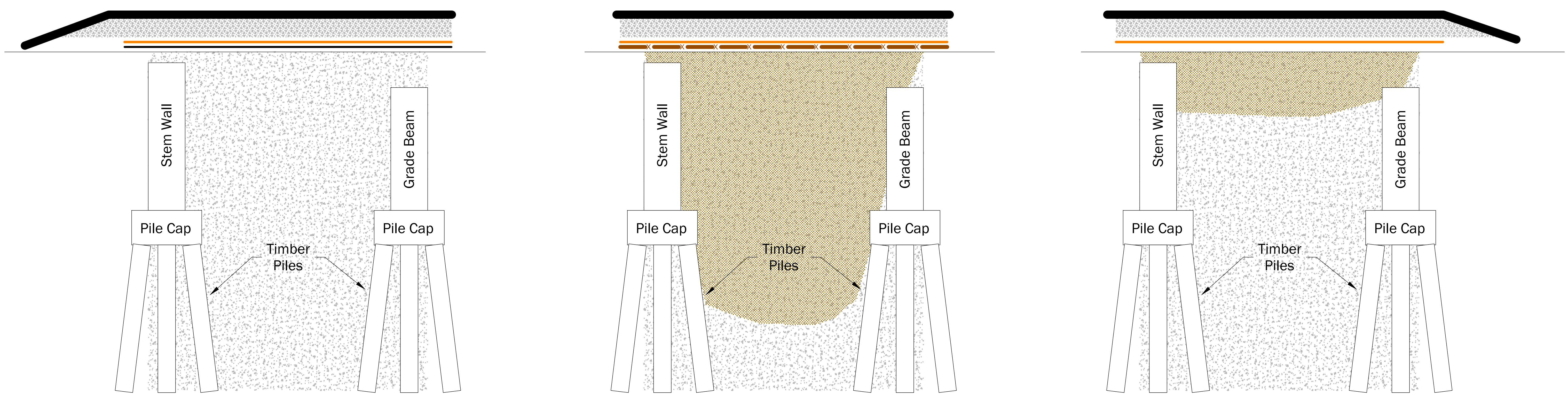
Chlor-Alkali RAU, GP West Site, Bellingham, Washington

Aspect CONSULTING	Jan-2018	BY: DAH/SCC	FIGURE NO.
	PROJECT NO. 070188	REVISED BY: SCC	3

CAD Path: Q:\Port of Bellingham\070188 Former GP Mill Property\2018-01 Hg Soil-Chlor-Alkali RAU-Interim Action Report\070188-02.dwg PAVED AREA AS-BUILT || Date Saved: Jan 09, 2018 10:12am || User: scudd

← Mill North | Mill South →

North Portion | **Central Portion** | **South Portion**



Not to Scale

	Placed (not compacted) during Interim Actions	**Placed during 2017 Interim Action**
Soft, wet, silty, dredge-spoils fill	Crushed Brick	Hot Mix Asphalt (HMA) 3" Thickness
	Sandy, gravelly fill	Crushed Surfacing Base Course (CSBC) Variable Thickness
		Separation Geotextile
		8' x 20' Steel Road Plate

Notes:

1. This figure is a schematic representation of subgrade conditions for the mill-northern, mill-central, and mill-southern portions of the Cell Building footprint. Subgrade conditions will vary from those shown, depending on location.
2. Subgrade conditions across the former Cell Building footprint are variable because, during the 2013-2014 interim action, some foundation elements (grade beams, pile caps) were removed and some contaminated dredge-spoils fill was excavated to variable depths. Some of the excavations were backfilled with imported gravel borrow and some were left open (voids) until backfilled with onsite stockpiled soil during the 2017 interim action. Also, note that the nature of the dredge-spoils fill is variable.

Schematic Cross Section of As-Built Pavement and Subgrade Conditions

Interim Action Report
Mercury Soil Treatment and Disposal Project
Chlor-Alkali RAU, GP West Site, Bellingham, Washington

Aspect CONSULTING

Jan-2018	BY: MAV/SCC	FIGURE NO.	4
PROJECT NO. 070188	REVISED BY: -		

CAD Path: Q:\Port of Bellingham\070188 Former GP Mill Property\2018-01 Hg Soil-Chlor-Alkali RAU-Interim Action Report\070188-03.dwg 11x17 Landscape || Date Saved: Jan 16, 2018 11:45am || User: scudd