



WASHINGTON STATE
DEPARTMENT OF
E C O L O G Y

**CLEANUP ACTION PLAN,
PULP/TISSUE MILL
REMEDIAL ACTION UNIT
Georgia-Pacific West Site
Bellingham, Washington**

October 30, 2014 Final

Washington State Department of Ecology
3190 160th Avenue Southeast
Bellevue, Washington 98008-545

Contents

1	Introduction and Background	2
2	Remedial Action Objectives	4
3	The Selected Cleanup Action	4
3.1	Description of Selected Cleanup Action.....	4
3.2	Contamination Remaining in the RAU	6
3.3	Other Remedial Alternatives Evaluated	7
3.4	Rationale for Selecting Cleanup Action	7
3.5	Compliance with WAC 173-340-360.....	8
3.6	Compatibility with Whatcom Waterway Remedial Activities	9
4	Cleanup Standards.....	9
4.1	Soil	9
4.2	Groundwater.....	9
5	Applicable State and Federal Laws	10
6	Cleanup Implementation Schedule.....	11
7	References.....	11

List of Tables

- 1 Soil and Groundwater Cleanup and Remediation Levels

List of Figures

- 1 GP West Site with Remedial Action Units
- 2 Areas Exceeding Cleanup Levels
- 3 Selected Cleanup Action

1 Introduction and Background

This Cleanup Action Plan (CAP) defines the cleanup action selected by the Washington State Department of Ecology (Ecology) for the portion of the Georgia-Pacific West Site (Site) referred to as the Pulp/Tissue Mill Remedial Action Unit (RAU). The Site is being cleaned up under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D of the Revised Code of Washington, and the Model Toxics Control Act Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC).

The Port of Bellingham (Port) acquired the former Georgia-Pacific Mill property located at 300 West Laurel Street in Bellingham, Washington, in January 2005. In August 2009, Ecology and the Port entered into Agreed Order No. DE 6834 (Order), which requires the Port to perform a Remedial Investigation (RI) and a Feasibility Study (FS) for the Site. The Site is defined by the extent of contamination caused by the release of hazardous substances from the former industrial facility (refer to Figure 1).

In August 2013, a Site-wide RI was completed (Aspect, 2013) and an amendment to the Order separated the Site into the Pulp/Tissue Mill and Chlor-Alkali RAUs. Figure 1 shows the boundaries of the two RAUs. Remediation of contamination in the Chlor-Alkali RAU is expected to be considerably more complex than that in the Pulp/Tissue Mill RAU. The FS evaluations and selection/implementation of cleanup remedies for the two RAUs are now on separate tracks, which will allow cleanup and redevelopment at the Pulp/Tissue Mill RAU to proceed more quickly¹. As such, the Chlor-Alkali RAU will be addressed in a separate CAP.

The RI identifies the following subareas of contamination within the Pulp/Tissue Mill RAU, which are shown on Figure 2:

- Bunker C subarea;
- Dioxin-Contaminated Debris subarea (within the Bunker C subarea footprint);
- Acid Plant subarea; and
- LP-MW01 subarea.

Soils in the Bunker C Subarea are impacted by carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and total petroleum hydrocarbon (TPH) in the Bunker C oil range, including non-aqueous-phase liquid (NAPL). In addition, dioxins/furans are a concern in soils within a small portion of this subarea, which is designated the Dioxin-Contaminated Debris subarea. In late 2011, the Port conducted an interim action in the Bunker C Subarea pursuant to the amended Order. The interim action involved the excavation and off-site treatment/disposal of greater than 5,000 tons of TPH-impacted soil and debris from beneath the former Bunker C Tank and achieved soil cleanup levels within the excavation footprint (see Figure 2).

¹ The boundary between the two RAUs, which was originally defined in the Second Amendment to the Order, has been redrawn to further expedite cleanup at the Pulp/Tissue Mill RAU. Refer to Section 1 of the FS for the Pulp/Tissue Mill RAU (Aspect, 2014).

Soils in the Acid Plant subarea contain acidic (low) pH and elevated concentrations of metals, including arsenic, cadmium, copper, mercury, and lead. Shallow groundwater in the immediate vicinity and downgradient of these soils is acidic and impacted by dissolved metals at concentrations of concern based on marine protection. (As discussed in Section 4.2, RAU groundwater is nonpotable.) The RI data indicate that the dissolved metals are mobile due to the low groundwater pH, and that both metals concentrations and low pH attenuate naturally before the groundwater reaches the shoreline.

In the LP-MW01 subarea, vinyl chloride and tetrachloroethene (also known as perchloroethene or PCE) were detected in shallow groundwater from a single monitoring well at concentrations of concern based on vapor intrusion (VI) and marine protection. The RI data indicate that soil contamination above cleanup levels was not detected in this subarea, and that the extent of contaminant migration in groundwater is extremely limited due to natural attenuation.

The RI also identifies metals at concentrations of concern based on marine protection in shallow groundwater in the general vicinity of the LP-MW01 Subarea. The estimated extent of these elevated concentrations is labeled Miscellaneous Dissolved Metals Exceedances on Figure 2. In addition, soil throughout the Pulp/Tissue Mill RAU was found to contain widely scattered contaminant concentrations exceeding soil cleanup levels for unrestricted land use.

Detailed information is presented in the Site-wide RI (Aspect, 2013). Section 7 of the RI presents the conceptual site model for subareas within the Pulp/Tissue Mill RAU, which discusses contaminants of concern and their historical source(s), nature and extent of contamination, contaminant fate and transport, and environmental exposure pathways and receptors.

The FS for the Pulp/Tissue Mill RAU (Aspect, 2014) was completed in accordance with the amended Order. The FS, subject to public comment concurrent with this CAP, develops cleanup alternatives for the RAU and evaluates them with respect to criteria specified in the Washington State Model Toxics Control Act regulations (MTCA; Chapter 173-340 WAC). A “preferred alternative” was identified based on the results of that evaluation, which is the cleanup action selected for implementation.

This CAP describes the Ecology-selected cleanup action for the Pulp/Tissue Mill RAU and provides additional information in accordance with WAC 173-340-380(1)(a).

Consistent with Chapter 70.105D RCW, “Model Toxics Control Act”, as implemented by Chapter 173-340 WAC, Model Toxics Control Act Cleanup Regulation”, it is determined that the proposed cleanup actions are protective of human health and the environment, attain federal and state requirements that are applicable or relevant and appropriate, comply with cleanup standards, provide for compliance monitoring, use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns raised during public comment.

2 Remedial Action Objectives

Remedial Action Objectives (RAOs) are specific goals for protecting human health and the environment. RAOs for the Pulp/Tissue Mill RAU were developed in the FS, and include the following:

- Prevent direct contact with, and erosion of, impacted soils throughout the RAU, which includes known contaminated soils within the Bunker C, Dioxin-Contaminated Debris, and Acid Plant subareas;
- Meet groundwater cleanup levels throughout the RAU;
- Within the Bunker C Subarea, prevent direct contact with TPH/cPAH-contaminated soils, and prevent the accumulation of NAPL for groundwater protection;
- Within the Dioxin-Contaminated Debris Subarea, prevent direct contact with, and erosion of, dioxin/furan-contaminated soils; and
- Within the Acid Plant Subarea, prevent direct contact with, and leaching of, metals-contaminated soils.

3 The Selected Cleanup Action

3.1 Description of Selected Cleanup Action

The selected cleanup action design concept is presented on Figure 3. The cleanup action consists of the following elements:

Soil Removal from the Bunker C Subarea. In addition to soils that were removed from beneath the former Bunker C Tank in the completed interim action, the cleanup action includes removal of all remaining soils with TPH concentrations exceeding 10,000 mg/kg (the subarea-specific residual saturation remediation level) from the Bunker C Subarea. These soils have an estimated in-place volume of 2,000 cubic yards (CY).

RAU-wide Capping. Capping to control soil direct-contact exposure and soil erosion pathways will consist of a combination of existing pavement and building foundations, new buildings and pavement, and new soil caps. Most of the RAU is currently capped with pavement and building foundations which, subject to long-term inspection and maintenance, should provide the required isolation of underlying contaminated soil to achieve environmental protection. Integration of the existing RAU surfaces - with repair, replacement, and installation of new cap materials and erosion controls as needed to achieve protectiveness - will constitute the RAU-wide cap pending redevelopment. When redevelopment modifies these conditions such that cap protectiveness is compromised, new capping would be implemented.

New hard caps will be composed of a minimum 3 inches of concrete, asphalt, paving blocks, or building foundations. New soil caps will be composed of a minimum 24

inches of uncontaminated soil cover with a geotextile separation layer to distinguish the capping material from the underlying soil. Uncontaminated soil may include RAU soil confirmed to meet applicable soil cleanup levels (soil reuse) as well as imported uncontaminated soil.

The redevelopment plans for the Port property include increasing grade elevation to mitigate the impact of potential sea level rise and to reduce the grade separation with the downtown Bellingham Central Business District. RAU grading will be designed to maintain the required remediation performance standards, and will be integrated with redevelopment aesthetics and drainage. It is anticipated that impacted soil generated during redevelopment projects can be reused beneath new capping systems. In general, soil generated from a defined project area can be subsequently reused beneath a new capping system within the same project area without additional chemical testing. Soil may be temporarily stockpiled for a time period of up to 2 years; however, Ecology must approve reuse of any material that is placed outside of the project area from which it is generated, based on chemical testing data for that material. In addition, material removed from the source area of the Acid Plant Subarea (low-pH, metals-contaminated soil; Figure 2., requires chemical testing and Ecology approval prior to any reuse of that material.

Proper management of potentially contaminated materials remaining beneath the RAU-wide cap after cleanup is necessary to ensure that future redevelopment-related activities are consistent with this CAP. The Contaminated Materials Management Plan (CMMP), included as an exhibit to the Pulp/Tissue Mill RAU Consent Decree, defines the procedures required for managing contaminated materials (soil, debris, and water) encountered during post-cleanup redevelopment-related activities, including chemical testing, and requirements for restoration of the RAU-wide cap if disturbed by redevelopment, within the Pulp/Tissue Mill RAU.

- **Monitored Natural Attenuation (MNA) of Groundwater.** MNA will be applied to address residual contamination in groundwater that exceeds applicable groundwater cleanup levels. Based on the RI data, the contaminants that exceed cleanup levels in upland groundwater include pH and selected metals in the Acid Plant Subarea, PCE and vinyl chloride in the LP-MW01 subarea, and selected metals in the Miscellaneous Dissolved Metals Exceedances area. Contaminants are expected to continue to naturally attenuate through a combination of sorption, bioattenuation, volatilization, dispersion, and tidal mixing. The RI data indicate that natural attenuation is effectively reducing concentrations of groundwater contaminants in each of these areas.
- Contingent actions will be considered for implementation if MNA fails to restore groundwater at a reasonable rate and is determined not to be protective of human health and the environment (remedy failure). Contingent actions could include enhanced source attenuation or downgradient groundwater treatment and/or control. Design of a contingent action would be conducted if potential failure of MNA is indicated based on groundwater compliance monitoring results, at which time substantial additional information would be available to determine the causes of failure and, therefore, the most effective and practicable means to remedy it.

- **Institutional Controls.** The Port and Ecology will develop an Institutional Controls Plan for the RAU that includes environmental covenants in accordance with WAC 173-340-440 and RCW 64.70. Institutional controls will:
 - Provide notification regarding the presence of residual contaminated materials, and regulate the disturbance/management of those materials and the cleanup action components;
 - Prohibit activities such as utility excavations or site grading that could cause preferential pathways for contaminant migration or run-off and sediment impacts to Whatcom Waterway;
 - Prohibit extraction of groundwater for drinking or any other use;
 - Provide for long-term monitoring and stewardship of the cleanup action;
 - Require that VI potential be evaluated and/or VI controls constructed beneath future buildings in the LP-MW01 subarea if groundwater compliance monitoring indicates that vinyl chloride and PCE concentrations have not naturally attenuated to below cleanup levels in that subarea;
 - Prohibit activities that may impact or interfere with the remedial action and any operation, maintenance, inspection or monitoring without prior written approval from Ecology;
 - Prohibit activities that may threaten continued protection of human health or the environment without prior written approval from Ecology;
 - Prohibit conveyance of any interest in any portion of the Property without providing for the continued adequate and complete operation maintenance and monitoring of remedial actions and continued compliance with the restrictive covenant;
 - Restrict any lease for any portion of the Property to uses and activities consistent with the restrictive covenant and notify all lessees of the restrictions on the use of the Property; and
 - Amendments to the restrictive covenant will require public comment and Ecology approval.

3.2 Contamination Remaining in the RAU

- The extent of contaminated soil and groundwater exceeding cleanup levels following completion of the Bunker C Subarea interim action was estimated in the FS (Aspect, 2014). As noted above, additional contaminated soils in the Bunker C subarea, with an estimated volume of 2,000 CY, will be removed under the selected cleanup action. Therefore, using the FS estimates as a basis, soil contamination exceeding cleanup levels for unrestricted land use (Table 1) will remain in the RAU as follows (refer to Figure 2):
 - An estimated 4,600 CY of TPH-contaminated soil will remain in the Bunker C Subarea;

- An estimated 100 CY of dioxin-contaminated soil will remain in the Dioxin-Contaminated Debris Subarea; and
- An estimated 3,700 CY of soil with acidic pH and metals contamination will remain in the Acid Plant Subarea.
- In addition, soils throughout the 31-acre RAU contain scattered contaminant concentrations exceeding soil screening levels for unrestricted land use. These scattered exceedances occur from the existing ground surface down to an estimated average depth of 12 feet. This equates to an RAU-wide impacted soil volume of approximately 600,000 CY. Exposure to, and erosion of, contaminated soils remaining in the RAU following implementation of the cleanup action will be controlled through capping and institutional controls.
- With respect to groundwater, plumes exceeding cleanup levels (Table 1) will be present at the beginning of remedy implementation as follows (refer to Figure 2):
- Acidic pH and dissolved metals covering an estimated 2.1 acres in the Acid Plant Subarea;
- Dissolved vinyl chloride and PCE covering an area estimated at less than 0.1 acre in the LP-MW01 Subarea; and
- Dissolved metals covering an area estimated at 2.5 acres in the Miscellaneous Dissolved Metals Exceedances area.
- The RI data indicate that none of the plumes are approaching the shoreline, and that natural attenuation is effectively reducing contaminant concentrations in each of the plumes.

3.3 Other Remedial Alternatives Evaluated

The FS evaluates four remedial alternatives (Alternatives 1 through 4), the first of which corresponds to the selected cleanup action described above. Alternatives 2 and 3 would include the same remedial components as Alternative 1 but, in addition, would provide active treatment in the Acid Plant Subarea. In Alternative 2, a hydraulic cap would be installed over impacted vadose zone soils to control acidic leaching, and crushed limestone would be placed beneath the water table to provide *in situ* buffering of acidic groundwater. *In situ* buffering of acidic groundwater would also be provided in Alternative 3, but impacted vadose zone soils would be removed rather than capped.

Finally, the most aggressive remedial alternative, Alternative 4, involves removal and off-site disposal/reuse of contaminated soils throughout the RAU to a depth of 15 feet below ground surface (bgs), or deeper if needed to address groundwater risk.

3.4 Rationale for Selecting Cleanup Action

In the FS comparative evaluation, the four remedial alternatives were evaluated against the following MTCA criteria in accordance with WAC 173-340-360(2):

Threshold Criteria

- Protection of human health and the environment;

- Compliance with cleanup standards and applicable state and federal laws;
- Provision for compliance monitoring;

Other Criteria

- Use of permanent solutions to the maximum extent practicable;
- Provision for a reasonable restoration time frame; and
- Consideration of public concerns.

It was determined that all four alternatives would meet the requirements of the “threshold criteria.” Estimated restoration time frames, which range from 3–6 years in Alternative 4 to 16–36 years in Alternative 1, were all determined to be reasonable.

Consideration of public concerns is an inherent part of the cleanup process under MTCA. The FS report was issued for public review and comment along with this CAP. Ecology determined whether changes to the documents were needed in response to public comments.

A disproportionate cost analysis (DCA) was conducted to assess the extent to which the remedial alternatives would use permanent solutions to the maximum extent practicable. The DCA quantified the environmental benefits of each alternative, and then compared alternative benefits versus costs. Costs are disproportionate to benefits if the incremental cost of a more permanent alternative over that of a lower-cost alternative exceeds the incremental benefits achieved by the more permanent alternative. Based on the results of the DCA, Alternative 1 was determined to be the most cost effective. Therefore, under MTCA, Alternative 1 has been identified as the alternative that is permanent to the maximum extent practicable. Additional details on the DCA and the alternatives that were evaluated are included in the FS (Aspect Consulting 2014).

3.5 Compliance with WAC 173-340-360

The selected cleanup action complies with the provisions of WAC 173-340-360. It will be protective of human health and the environment, comply with cleanup standards and applicable state and federal laws, and provide for compliance monitoring.

All soils with TPH concentrations above the residual saturation remediation level (Aspect 2013) of 10,000 mg/kg TPH will be removed. Remaining soils with hazardous substance concentrations that exceed soil cleanup levels will be contained through capping. Institutional controls will provide notification regarding the presence of residual contaminated soils, regulate the disturbance/management of those soils and the cleanup action components, and provide for long-term monitoring and stewardship of the cleanup action. MNA will address residual contamination in groundwater that exceeds applicable groundwater cleanup levels, and a compliance monitoring plan will specify contingency actions to be considered in the event that potential contaminant migration is indicated.

As discussed above, the selected cleanup action is also considered to use permanent solutions to the maximum extent practicable, provides for a reasonable restoration time frame of 16-36 years, and considers public concerns.

3.6 Compatibility with Whatcom Waterway Remedial Activities

The Pulp/Tissue Mill RAU is adjacent to the Whatcom Waterway cleanup site, which has a cleanup remedy and schedule defined under a Consent Decree with Ecology. The selected cleanup action for the Pulp/Tissue Mill RAU has overlap with the planned cleanup of the Whatcom Waterway site, in terms of integrating the RAU-wide soil cap with planned capping of the south bank of the Whatcom Waterway. The cleanup action for the Pulp/Tissue Mill RAU is compatible with the Whatcom Waterway cleanup.

If the Whatcom Waterway cleanup is not initiated by the time the Pulp/Tissue Mill RAU cleanup is conducted, the upland area within the planned clarifier cutback footprint (planned for removal/regrading under the Whatcom Waterway cleanup) will be remediated consistent with the surrounding portion of the RAU (all part of the Bunker C Subarea).

4 Cleanup Standards

Cleanup standards consist of cleanup levels for hazardous substances present at a site, the location where cleanup levels must be met (point of compliance), and other regulatory requirements that apply to the site (“applicable state and federal laws”). Soil and groundwater cleanup standards applicable to the Pulp/Tissue Mill RAU are outlined below.

4.1 Soil

Table 1 lists soil cleanup levels and remediation levels for the soil contaminants identified in the RI. The standard point of compliance for the direct-contact exposure pathway (i.e., throughout the Site from the ground surface to 15 feet bgs) is not applicable to this containment (i.e., capping) remedy. Per WAC 173-340-700(4)(c):

Where a cleanup action involves containment of soils with hazardous substances above cleanup levels, the cleanup action may be determined to comply with cleanup standards provided the compliance monitoring program is designed to ensure the long-term integrity of the containment system, and the other requirements for containment in this chapter are met.

Institutional controls shall be used to limit or prohibit activities that may interfere with the integrity of the cleanup action and provide inspection and maintenance of the RAU-wide cap to assure both the continued protection of human health and the environment.

4.2 Groundwater

Table 1 also lists groundwater cleanup levels for the groundwater contaminants identified in the RI. As described in Section 5.2 of the RI, the highest beneficial use of Site groundwater is discharge to marine water—not potable use. Under MTCA, however, the standard point of compliance for groundwater cleanup levels is throughout Site groundwater, regardless of whether the groundwater is potable (WAC 173-340-

720(8)(b)). As noted in Section 3.4, a restoration time frame of 16 to 36 years has been estimated for MNA to achieve groundwater cleanup levels throughout the RAU under the selected cleanup action. A groundwater compliance monitoring plan will be developed and implemented to evaluate the performance of the MNA remedy. The Groundwater MNA Monitoring Compliance Plan will present the locations of monitoring wells, monitoring frequency, location-specific monitoring analytes, and analytical methods.

Compliance with groundwater cleanup standards also encompasses the MTCA requirement to remove soil with NAPL exceeding residual saturation. This requirement will be addressed through removal of remaining soils with TPH concentrations exceeding the RAU-specific residual saturation remediation level (RI Section 7.5.2.1 Aspect 2013) of 10,000 mg/kg for the Bunker C Subarea.

5 Applicable State and Federal Laws

Cleanup standards established for the Pulp/Tissue Mill RAU incorporate applicable state and federal laws and regulations in the form of chemical-specific regulatory criteria for soil and groundwater as described in Section 2.6 of the FS. In addition, there may be location- and action-specific requirements for completing a cleanup action.

In accordance with MTCA, the Port would be exempt from the procedural requirements of Chapters 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 of the Revised Code of Washington (RCW), and of any laws requiring or authorizing local government permits or approvals. However, the Port must still comply with the substantive requirements of such permits or approvals (WAC 173-340-520). The permits, approvals, and substantive requirements that are known at this time to apply to the selected cleanup action are listed as an exhibit to the Consent Decree.

6 Cleanup Implementation Schedule

A schedule of deliverables will be included as an exhibit to the Consent Decree. However, it is anticipated that cleanup implementation will generally proceed according to the following schedule:

- Complete pre-design investigation and then design of the cleanup action construction components (i.e., TPH-impacted soil removal from the Bunker C Subarea and RAU-wide capping) within 12 months of Consent Decree execution;
- Complete soil removal from the Bunker C Subarea and initiate RAU-wide capping within 24 months of Consent Decree execution;
- Develop a Groundwater MNA Compliance Monitoring Plan within 10 months and initiate compliance monitoring within 24 months² of Consent Decree execution; and
- Develop and initiate implementation of an Institutional Controls Plan within 30 months of Consent Decree execution.

Groundwater MNA compliance monitoring will continue until groundwater cleanup levels are achieved throughout the Site. The FS estimated that this may take up to 36 years, with the limiting factor being groundwater natural attenuation in the Acid Plant Subarea.

Post-cleanup property redevelopment will maintain the RAU-wide cap by replacing the capped surfaces with new redevelopment elements (pavements, building foundations, and new soil caps). Therefore, the Institutional Controls Plan will include controls to prevent direct contact with, and erosion of, impacted soils in the interim. Requirements for periodic inspection and maintenance of the RAU-wide cap will also likely be detailed in the Institutional Controls Plan. These requirements would remain in effect in perpetuity.

7 References

Aspect, 2013, Remedial Investigation, Georgia-Pacific West Site, Bellingham, August 5, 2013, Final, Volume 1 of RI/FS.

Aspect, 2014, Feasibility Study, Pulp/Tissue Mill Remedial Action Unit, Vol. 2a of RI/FS, Georgia-Pacific West Site, Bellingham, Washington, April 15, 2014, Draft Final.

² Initiated after completion of RAU-wide capping to avoid potential destruction of newly installed monitoring wells during capping.

TABLES

Table 1 - Soil and Groundwater Cleanup and Remediation Levels

Pulp/Tissue Mill RAU Cleanup Action Plan, GP West Site

Constituent of Concern	Soil Cleanup Level (mg/kg)		Soil Remediation Level (mg/kg)	Groundwater Cleanup Level (µg/L)
	Unsaturated Soil	Saturated Soil		
Total Petroleum Hydrocarbon (TPH)				
Diesel-Range TPH	2,000	2,000		--
Oil-Range TPH	2,000	2,000		--
Bunker C in Bunker C Subarea	3,100	3,100	10,000	--
Heavy Metals				
Arsenic	20	20		5
Cadmium	1.2	1		8.8
Chromium (Total)	5,200	260		260
Copper	36	36		3.1
Lead	250	81		8.1
Mercury	2	0.1		0.059
Nickel	48	48		8.2
Selenium	7.4	1		71
Silver	0.32	0.02		1.9
Zinc	100	85		81
Volatile Organic Compounds				
cis-1,2-Dichloroethene (DCE)	2.5	0.14		--
Tetrachloroethene (PCE)	0.3	0.015		3.3
Trichloroethene (TCE)	0.056	0.005		1.5
Vinyl chloride	0.006	0.005		0.5
Polycyclic Aromatic Hydrocarbons (PAHs)				
Acenaphthene	5.2	0.26		3.3
Anthracene	71	3.5		9.6
Fluoranthene	52	2.6		3.3
Fluorene	7.4	0.37		3
Pyrene	330	16		15
1-Methylnaphthalene	35	35		--
2-Methylnaphthalene	320	320		--
Naphthalene	32	1.6		83
Benz(a)anthracene	1.4	0.12		0.02
Benzo(a)pyrene	0.14	0.14		0.02
Benzo(b)fluoranthene	1.4	0.38		0.02
Benzo(k)fluoranthene	7.7	0.38		0.02
Chrysene	2.6	0.13		0.02
Dibenzo(a,h)anthracene	0.14	0.14		0.02
Indeno(1,2,3-cd)pyrene	1.4	1.1		0.02
Total cPAHs (TEQ) ⁽²⁾	0.14	0.14		0.02
Dioxins/Furans				
Total 2,3,7,8 TCDD (TEQ)	1.3E-05	1.3E-05		1.0E-05 ⁽³⁾
Conventional				
pH (in Standard pH Units)	>2.5 and <11.0	>2.5 and <11.0		>6.2 and <8.5

cPAH carcinogenic PAH TEQ toxic equivalent
 mg/kg milligrams per kilogram µg/L micrograms per liter
 TCDD tetrachlorodibenzodioxin

Notes:

1. Refer to Section 5 of the remedial investigation report (Aspect, 2013) for derivation of soil and groundwater screening levels that are adopted as cleanup levels and remediation levels for unrestricted land use.
2. The Total cPAHs (TEQ) is calculated from the concentrations of seven cPAHs using the toxicity equivalency factor method described in WAC 173-340-708. The groundwater cleanup level for Total cPAHs (TEQ) is the practical quantitation limit (PQL).
3. The groundwater cleanup level for dioxins/furans (Total 2,3,7,8 TCDD (TEQ)) is the PQL.

FIGURES



WHATCOM WATERWAY

**PULP/TISSUE MILL
REMEDIAL ACTION UNIT**

**CHLOR-ALKALI
REMEDIAL
ACTION UNIT**

Note:
Refer to Section 1 discussion of the
Remedial Action Unit boundaries.

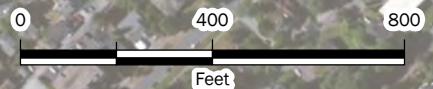
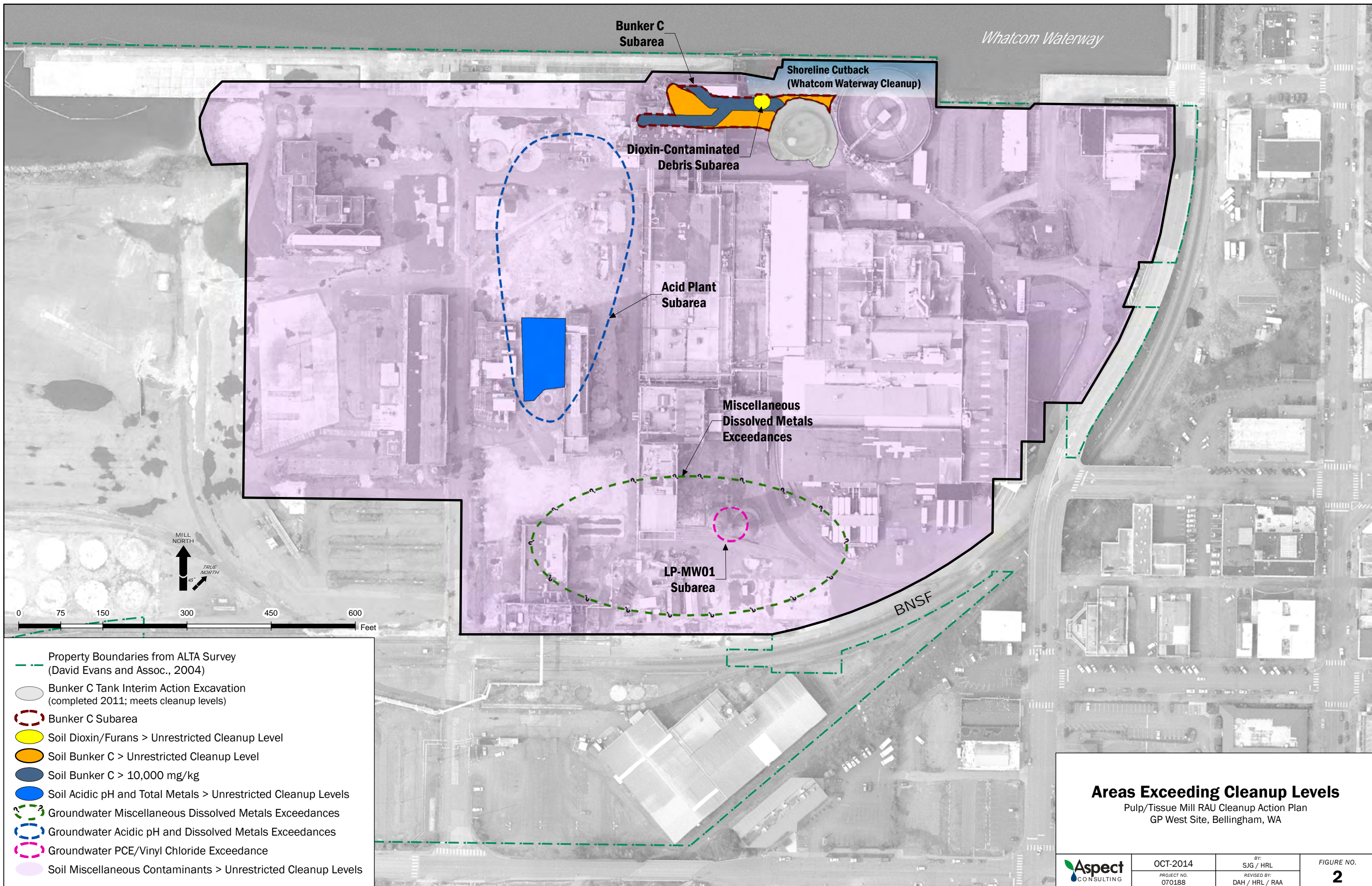


FIGURE NO.
1

GP West Site with Remedial Action Units
Bellingham, Washington



Bunker C Subarea

Whatcom Waterway

Shoreline Cutback
(Whatcom Waterway Cleanup)

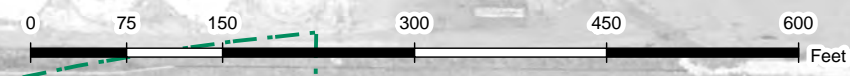
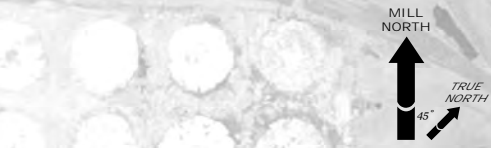
Dioxin-Contaminated
Debris Subarea

Acid Plant
Subarea

Miscellaneous
Dissolved Metals
Exceedances

LP-MW01
Subarea

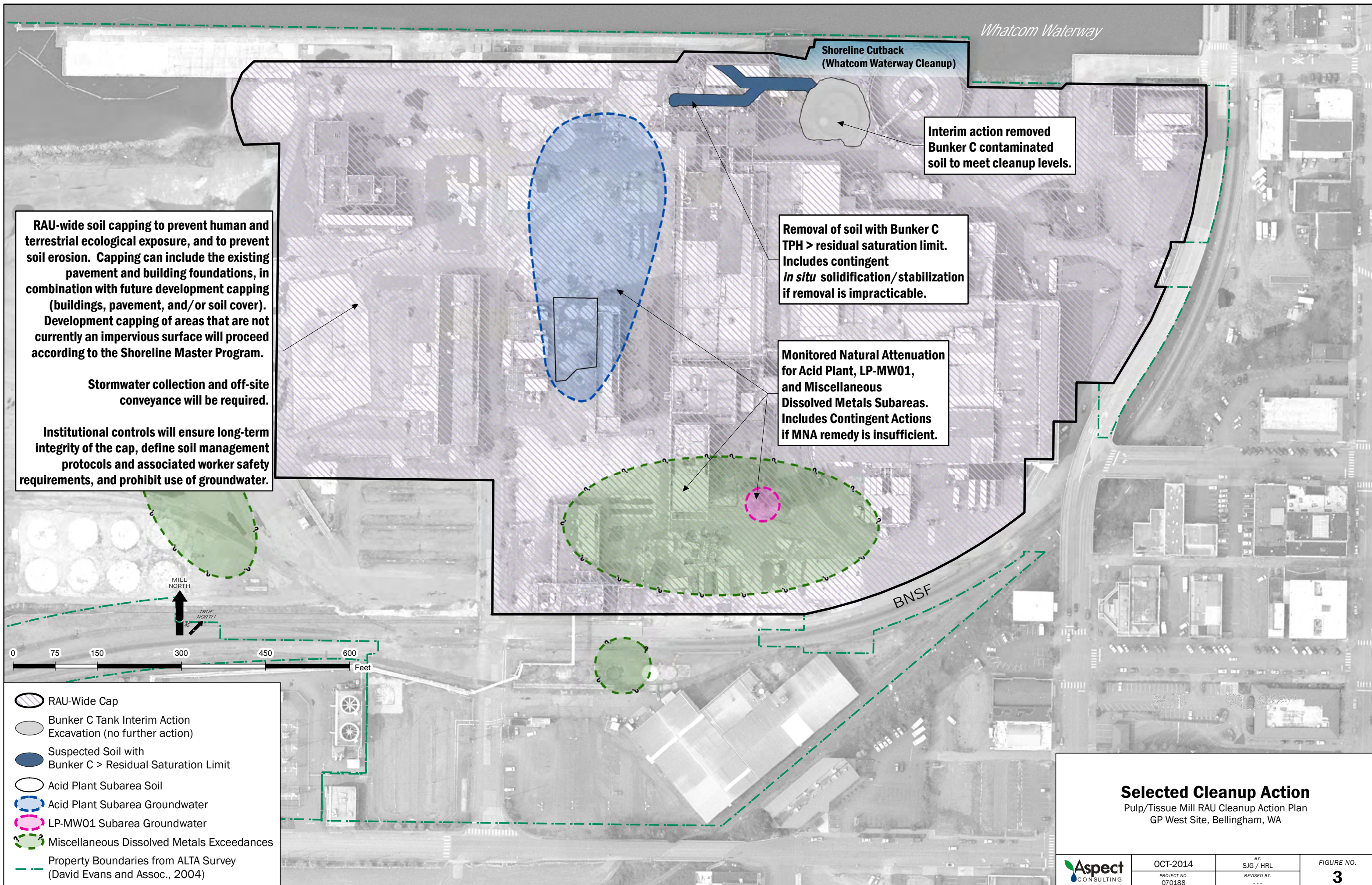
BNSF



- Property Boundaries from ALTA Survey (David Evans and Assoc., 2004)
- Bunker C Tank Interim Action Excavation (completed 2011; meets cleanup levels)
- Bunker C Subarea
- Soil Dioxin/Furans > Unrestricted Cleanup Level
- Soil Bunker C > Unrestricted Cleanup Level
- Soil Bunker C > 10,000 mg/kg
- Soil Acidic pH and Total Metals > Unrestricted Cleanup Levels
- Groundwater Miscellaneous Dissolved Metals Exceedances
- Groundwater Acidic pH and Dissolved Metals Exceedances
- Groundwater PCE/Vinyl Chloride Exceedance
- Soil Miscellaneous Contaminants > Unrestricted Cleanup Levels

Areas Exceeding Cleanup Levels		
Pulp/Tissue Mill RAU Cleanup Action Plan GP West Site, Bellingham, WA		
	OCT-2014 PROJECT NO. 070188	BY: SJG / HRL REVISIONS BY: DAH / HRL / RAA
		FIGURE NO. 2

Path: T:\projects_8\Port_of_Bellingham\Working\RAU Feas Study\Port_Tissue Mill April 2014 CAP\2 Areas Exceeding Cleanup Levels.mxd



RAU-wide soil capping to prevent human and terrestrial ecological exposure, and to prevent soil erosion. Capping can include the existing pavement and building foundations, in combination with future development capping (buildings, pavement, and/or soil cover). Development capping of areas that are not currently an impervious surface will proceed according to the Shoreline Master Program.

Stormwater collection and off-site conveyance will be required.

Institutional controls will ensure long-term integrity of the cap, define soil management protocols and associated worker safety requirements, and prohibit use of groundwater.

Shoreline Cutback (Whatcom Waterway Cleanup)

Interim action removed Bunker C contaminated soil to meet cleanup levels.

Removal of soil with Bunker C TPH > residual saturation limit. Includes contingent *in situ* solidification/stabilization if removal is impracticable.

Monitored Natural Attenuation for Acid Plant, LP-MW01, and Miscellaneous Dissolved Metals Subareas. Includes Contingent Actions if MNA remedy is insufficient.



- RAU-Wide Cap
- Bunker C Tank Interim Action Excavation (no further action)
- Suspected Soil with Bunker C > Residual Saturation Limit
- Acid Plant Subarea Soil
- Acid Plant Subarea Groundwater
- LP-MW01 Subarea Groundwater
- Miscellaneous Dissolved Metals Exceedances
- Property Boundaries from ALTA Survey (David Evans and Assoc., 2004)

Selected Cleanup Action
 Pulp/Tissue Mill RAU Cleanup Action Plan
 GP West Site, Bellingham, WA

	OCT-2014	BY: SJG / HRL	FIGURE NO. 3
	PROJECT NO. 070188	REVISED BY:	