DEPARTMENT OF ECOLOGY
State of Washington

Watchtower Heights Property: Preliminary Habitat Assessment

January 9, 2025

This memorandum represents a Department of Ecology recommendation specific to the Watchtower Heights Property – Proposed Residential Development, located at 5920 Browns Point Boulevard, Tacoma, Pierce County, WA.

Determination:

The proposed non-developed area can be designated as especially valuable habitat (EVH) with the possibility of non-remediation of the elevated arsenic (As) levels. If the property owner does decide to propose non-remediation in those areas of elevated contamination, a Net Environmental Benefit Analysis (NEBA) is recommended.

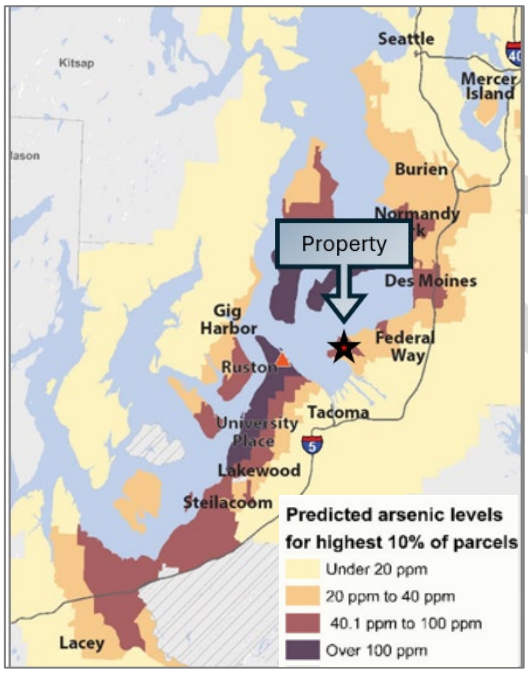

Figure 1. Vicinity Map

This memorandum specifically pertains to Ecological Risk Assessment and the Terrestrial Ecological Evaluation (TEE) under the Tacoma Smelter Plume Model Remedy (Ecology, 2019), and MTCA (WAC 173-340-7490 through 7494) (Ecology, 2024). An initial site visit was made January 2, 2025.

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Background

The Watchtower Heights Property is the site of a proposed future residential home development in Pierce County, WA. It is approximate 18.19 acres and is currently undeveloped. Figure 1 shows the location of the Property within the Tacoma Smelter Plume (TSP). In August and September 2021, Terra sampled 64 locations in the upper 12 inches of soil. Based on the 2021 sampling, it appears there are elevated arsenic (As) levels on the property (Table 1). The average As for the 0-6" depth is 16.01 mg/kg. However, two of the samples exceeded 40 mg/kg, with a maximum result of 55

mg/kg for As at this depth interval. The elevated As concentrations in the soil are likely from the air emissions from an old Asarco smelter in north Tacoma. The area-wide contamination as a result of this pollution is known as the TSP. After property development plans changed, Terra completed additional sampling in October 2024 to collect deeper samples in the area designated as DU B. (Table 1). While cleanup is expected in DU A as part of its development, it has been proposed to evaluate the effects of the contamination on the receptors and habitat in DU B, planned to be retained as a natural area (Figure 2).

Table 1. Summary of 2021 and 2024 Characterization Sampling on the Property, by Decision Unit

Matrix	DU	Depth (inches)	Arsenic Minimum (mg/kg)	Arsenic Maximum (mg/kg)	Arsenic Average (mg/kg)	Lead Minimum (mg/kg)	Lead Maximum (mg/kg)	Lead Average (mg/kg)
Soil	DU A	0-6	2.2	**55**	16.01	3.2	110	25.72
		6-12	2.7	**21**	10.81	3.3	74	21.1
	DU B	0-6	5.2	**42**	13.49	5.8	80	26.06
		6-12	2.0	19	10.55	5.7	17	10.63
		12-24	1.6	**37**	15.00	--	--	--
		24-36	4	**45**	**20.68**	--	--	--
Duff	DU A/ DU B	subsurface	1.5	11	4.61	5.0	23	10.43
MTCA Cleanup Level				40	20		500	250

Bold values represent concentrations above the MTCA Method A Cleanup level; **bold red** values represent concentrations twice the MTCA Method A cleanup level for unrestricted land use.

Based on the amount of proposed undeveloped area, Ecology conducted a site visit to make a preliminary determination regarding the quality of the habitat. As a result of the visit, it was determined that the proposed undeveloped area does have potentially valuable habitat, and that further evaluation is recommended prior to making a decision regarding whether or not the habitat would be suitable for upland ecological receptors despite the elevated concentrations of As.

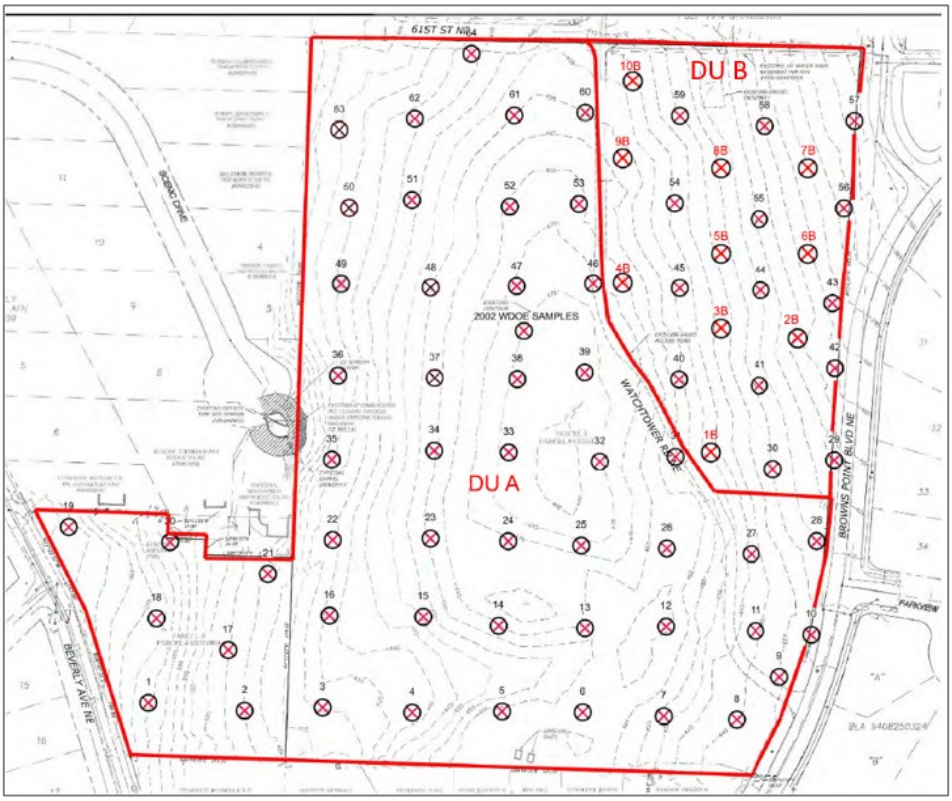

Figure 2. Watchtower Heights Property - Approximate Locations of Characterization Sampling (Terra, 2024)

Preliminary Assessment of Habitat in Proposed Undeveloped Area

On January 2, 2025, Ecology conducted a field visit at the site. The site was accessed by Watchtower Road NE.

The first location visited was at sampling location 59B (Figure 3). As concentration at this location was 42 mg/kg at 0-6" depth. This area appears to be dominated almost entirely by native species (red alder, salal, ferns, etc.).

Figure 3. Area in the Vicinity of Sample Location 59B

The second location visited was near sampling location 10B (Figure 4). As concentration at this location was 45 mg/kg at 24-36” depth. This area appears to be dominated almost entirely by native species (red alder, salal, ferns, etc.)

Figure 4. Area in the Vicinity of Sample Location 10B

Net Environmental Benefit Analysis

Net environmental benefits are the ecological gains as a result of remediation or ecological restoration, minus the environmental injuries caused by those actions (Efroymson et al., 2003). Ecosystems and natural resources (including wild animal and plant populations) can be thought of as environmental assets which provide people with a range of "services" which directly or indirectly contribute to our well-being. Decisions where there may be ecological tradeoffs, for example, clearing a vegetated site to access contaminated soil, needs to be balanced with the potential damage caused to the habitat, or "ecosystem" and the wider services that it provides (Deacon et al., 2010). Therefore, a Net Environmental Benefit Analysis (NEBA) would be the procedure of weighing the advantages of active cleanup (remediation) versus the impact that cleanup might have on potentially valuable ecological receptor habitat. Terrestrial ecological evaluation procedures should not create an incentive to cause harm through the destruction of habitat. As a result, WAC 173-340-7490 (5): "Additional measures. The department may require additional measures to evaluate potential threats to terrestrial ecological receptors notwithstanding the provisions in this and the following sections (when based upon a site – specific review), the department determines that such measures are necessary to protect the environment." (Ecology, 2024).

Limitations: As stated in WAC 173-340-7490 (1) (c): "These procedures [Terrestrial Ecological Evaluation] are not intended to be used to evaluate potential threats to ecological receptors in sediments, surface water, or wetlands. Procedures for sediment evaluations are described in WAC 173-340-760, and for surface water evaluations in WAC 173-340-730. Procedures for wetland evaluations shall be determined by the department on a case-by-case basis." In addition, WAC 173-340 also defines terrestrial ecological receptors as "plants and animals that live primarily or entirely on land." (Ecology, 2024). As a result, the intent of this NEBA section is to clarify procedures that would further protect especially valuable habitat that supports terrestrial ecological receptors that would otherwise require remediation to attain cleanup levels. It is not the intent of this NEBA section to delineate between upland, surface water, sediment, and wetland environments.

Procedures

Step 1: This is the Responsibility of Ecology:

Initial Determination

The proposed non – remediated area needs to be designated as Especially Valuable Habitat (EVH). EVH can be designated by one of the below proposed methods (Method 1 or Method 2):

Method 1: Site can be designated "especially valuable habitat" if:

- The site is used by a threatened or endangered species protected under the Federal Endangered Species Act, or;

- The site is used by a "priority species" or "species of concern" designated under Title 77 RCW, or;
- The site is used by a plant species classified as "endangered," "threatened," or "sensitive" under Title 79 RCW, or;
- Wetlands and Fish and Wildlife habitat conservation areas designated as critical areas under Chapter 36.70A.170 RCW. Other critical areas that might be found on the property, such as recharge areas, frequently flooded areas, geologically hazardous areas, steep slopes, and aquatic areas, are not immediately designated as "especially valuable habitat" unless they meet one of the previous criteria. These other types of critical areas must follow the Method 2 process.

Note: For animals, "used" means that individuals of a species have been observed to live, feed or breed at the site. For plants, "used" means that a plant species grows at the site or has been found growing at the site (Ecology, 2024).

Method 2: Site can be designated "especially valuable habitat" if:

- An experienced field biologist must visit the site and document that:
  - The site can be potentially used by a threatened or endangered species protected under the Federal Endangered Species Act, or;
  - The site can be potentially used by a "priority species" or "species of concern" designated under Title 77 RCW, or;
  - The site can be potentially used by a plant species classified as "endangered," "threatened," or "sensitive" under Title 79 RCW

Discussion and Recommendation for Preliminary Habitat Assessment:

Ecology has completed Step 1. The results of the field visit/evaluation indicate that the proposed undeveloped area appears healthy, is well established, and dominated by native species. It could be designated as "especially valuable habitat" under Method 2:

- The area can be potentially used by a threatened or endangered species protected under the Federal Endangered Species Act, or;

- The area can be potentially used by a "priority species" or "species of concern" designated under Title 77 RCW, or;

- The area can be potentially used by a plant species classified as "endangered," "threatened," or "sensitive" under Title 79 RCW.

Step 2: This is the Responsibility of the Property Owner

Biological Survey and Depth – Weighted Exposure Adjustment

If the property owner proposes non-remediation in the areas of elevated contamination, they must hire an experienced field biologist (or other department-approved individual) to document types of flora and fauna and signs of excessive uptake of the specific contaminants (see Table 1 – for an example). The biological survey should provide empirical (site-specific) information and is focused in those areas of concern with elevated contaminant levels. This will help establish habitat sustainability and whether or not native species are present.

- Document the species of plant (as per: *Natural Vegetation of Oregon and Washington* – Franklin and Dyrness, 1988), soil biota, and wildlife found at the specific site
  - Differentiate between those that are native and those that are invasive
- Document if native plant life is well-established (i.e., primary or secondary growth)
- Document if plant life shows signs of contaminant uptake including (but not limited to) signs of:
  - Wilting
  - Chlorosis (pale, yellow or white plant tissue)
  - Browning
  - Excess mortality
  - Reduced growth, photosynthesis, mitosis, or water absorption (dehydration)
- Document any signs of contaminant uptake in soil biota including (but not limited to):
  - Limited numbers
  - Species diversity
- Document any signs of contaminant uptake in wildlife including (but not limited to):
  - Muscular incoordination
  - Debility
  - Slowness
  - Jerkiness
  - Falling
  - Hyperactivity
  - Fluffed feathers
  - Drooped eyelids
  - Seizures

Table 1: Example - Documented plant species that have been observed in the proposed undeveloped area (note: the same tables should be provided for soil biota and wildlife).

Common Name	Scientific Name	Native (Y/N)?	Well Established (Y/N)?	Signs of Contaminant Uptake (Y/N)?
Douglas Fir	*Pseudotsuga menziesii*	Y	Y	N
Pacific Madrone	*Arbutus menziesii*	Y	Y	N
Salal	*Gaultheria shallon*	Y	Y	N
Oregon Grape	*Berberis aquilfolium*	Y	Y	N
Red Alder	*Alnus rubra*	Y	Y	N
Big Leaf Maple	*Acer macrophyllum*	Y	Y	N
Salmonberry	*Rubus spectabilis*	Y	Y	N
Sword Fern	*Polystichum munitum*	Y	Y	N
Himalayan Blackberry	*Rubus discolor*	N	Y	N
Trailing Blackberry	*Rubus ursinus*	Y	Y	N
Indian Plum	*Osmaronia cerasiformis*	Y	Y	N
Red Huckleberry	*Vaccinium parvifolium*	Y	Y	N

Depth – Weighted Exposure Adjustment:

In addition to the biological survey, it is the responsibility of the property owner to provide some additional sampling information. Sampling and depth – weighted receptor adjustment calculations at sampling points 59B, 10B, and 54B (Figure 2) are also required at this site. This additional information should allow for a better understanding of upland ecological receptor exposure to contamination. Depths recommended at each sampling point are:

- 0 – 6” bgs
- 6 – 12” bgs
- 12 – 24” bgs
- 24 – 36” bgs

Depth – Weighted Receptor Adjustment Equation:

$$C_{ea} = (C_{c\,(1)} \times P_{r\,(1)}) + (C_{c\,(2)} \times P_{r\,(2)}) + (C_{c\,(i)} \times P_{r\,(i)})$$

Where:

C_{ea} = Exposure adjusted contaminant concentration
$C_{c\,(1)}$ = Soil contaminant concentration at sample depth 1 (i.e., 0 – 6”)
$C_{c\,(i)}$ = Soil contaminant concentration at sample depth (i)
$P_{r\,(1)}$ = Proportion of Receptor found at sample depth 1 (i.e., 0 – 6”)
$P_{r\,(i)}$ = Proportion of Receptor found at sample depth (i)

The following is an example of a Depth – Weighted Receptor Exposure Adjustment:

For sample XXXX (As):

1. The soil contaminant concentration at sample depth (0 – 6”) is 113 mg/kg
2. The depth – weighted receptor adjustment is 0.3
3. The adjusted As level at sample depth (0 – 6”) is 33.9 mg/kg
4. Repeat steps for sample depth (6 – 12”, 12 – 24”, and 24 – 36”)
5. Add the four adjusted sample depth concentrations for a Depth – Weighted Receptor Exposure Adjustment total of 34.8 mg/kg (As)

The resulting Depth – Weighted Exposure Adjustment Concentration for (As) is 34.8 mg/kg.

Justification for Exposure Adjustments

- Adjustment of 0.55 for sample depth 6 to 12”

Soil development is rarely uniform and processes such as erosion and deposition can influence the vertical distribution of biological activity across landscapes. Sampling strategies where a constant depth is collected may not accurately reflect site-specific exposures of environmental contamination to the soil biota. A horizon may not accurately represent contaminant exposure to soil biota, resulting in inaccurate risk estimates. If constant depths are utilized, [our] results suggest that samples should be collected to a depth of approximately 25 – 30 cm as opposed to shallower depths (USEPA, 2015). Result: the majority of receptor exposure to contamination is expected to be at sample depth of 6 to 12” (0.55 or 55%).

- Adjustment of 0.3 for sample depth 0 to 6”

The organic matter which provides the food base for the earthworm community is vitally important in determining their distribution and abundance, and soil organic matter content can sometimes be a good predictor of earthworm abundance. For example, Hendrix et al. (1992) reported a highly significant correlation between earthworm density and soil organic carbon content over a range of sites in Georgia, U.S.A., including a wide variety of soil and vegetation types and management histories (Curry, 1998). Result: it is assumed that the increased organic matter found at shallower depths (0 to 6”) would be the second most abundant vertical horizon for soil biota (0.3 or 33%).

- Adjustment of 0.1 for 12 to 24” and 0.05 for 24 to 36”

The main source or the organic matter on which earthworms feed is litter from above-ground plant parts in most ecosystems, although dead roots and rhizodeposition can also be important

sources (Curry, 1998). Result: As depth increases, receptor exposure should decrease, so at 12 to 24" (0.1 or 10%) and at 24 to 36" (0.05 or 5%).

Important Note: If non-remediation is chosen as a cleanup action for "especially valuable habitat," then:

- Institutional controls are required that would:
  - Demonstrably limit or prohibit activities that may interfere with an interim action or cleanup action or result in exposure to hazardous substances at the site. The purpose of institutional controls would be to reduce the risks of current human and/or future land use, and;
  - Demonstrably reduce the risk of present or future releases or migration of the hazardous substance located at the site.

Summary: The intent of the institutional controls would be to preserve the "especially valuable habitat" by restricting future development and human activities in those designated areas. If those institutional controls are proposed to be lifted, then the original cleanup levels assigned to the site would apply.

Step 3: This is the Responsibility of Ecology

Final Determination

After the field biologist visit and depth – weighted exposure adjustments have been completed and submitted to Ecology, the Ecology Site Manager (or designee) will then make a final determination as to whether or not the proposed non – remediated area appears to be established, sustainable, and native habitat. In granting the request of non – remediation, the Ecology Site Manager (or designee) should consider the following factors prior to making a final decision:

- The rarity of the habitat for the geographic area in which the site is located.
- The size of the habitat.
- Whether the habitat functions as a wildlife corridor.
- Whether the habitat functions as a refuge or feeding area for migratory species.
- The structural diversity of the habitat.
- Surrounding habitat and land uses.
- Whether the habitat is manmade or natural.
- Whether the cleanup would significantly disturb the ecological functions of the habitat.
- The level of human activity in the area.
- The length of time for recovery of the habitat after cleanup.

References:

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