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May 14, 2020

Warren Snyder, P.E.
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Re: Goose Lake Public Review Draft Feasibility Study Comments – Agreed Order No. DE 99TC-S260

- **Site Name:** Goose Lake
- **Site Address:** NW of SR 101, Shelton, Mason County, WA 98584
- **Facility/Site No.:** 1185
- **Cleanup Site No.:** 2537

Dear Warren Snyder:

Thank you for submitting the Public Review Draft (PRD) Feasibility Study (FS), Goose Lake Site, Shelton, Washington, dated June 11, 2019. The Department of Ecology (Ecology) has the following comments:

Specific Comments

Section 3.2.2 Groundwater Point of Compliance:

- This general description of standard and conditional groundwater points of compliance should include a description of the conditions necessary for approval of a conditional point of compliance as outlined in WAC 173-340-720(8).
- This section should also include specifics about where these points of compliance apply at this site. Explain that this feasibility study will evaluate both alternatives using the standard groundwater point of compliance and alternatives using a conditional groundwater point of compliance in the landfill area. For clarity, please include a statement that when applying a conditional groundwater point of compliance in the landfill area, a standard groundwater point of compliance still applies throughout the rest of the site.

Section 3.3.1 Preliminary Sediment Cleanup Levels:

- The polychlorinated biphenyl (PCB) congener TEQ and carcinogenic polycyclic aromatic hydrocarbon (cPAH) TEQ sediment screening levels from the January 12, 2018, Remedial Investigation Report should be included in Table 3, as sediment preliminary cleanup levels.

Section 3.3.2.1:

- This section acknowledges the 45-centimeter sediment point of compliance for beach play exposure in nearshore areas of Goose Lake, but this report does not provide a process for confirming the nearshore areas meet this point of compliance. Please include in the FS a process for doing this during engineering design, sediment remediation or during confirmational sampling.

Section 4.3 Remediation Technology Screening:

- The last sentence of the first paragraph states that a screening evaluation of groundwater remediation technologies was not completed. Revise this statement since the evaluation is included.

Sections 4.3.1, 4.3.2, and 4.3.3:

- Strengthen these sections by including a brief list of the technologies evaluated in the text. Ecology expects to receive public comments requesting use of alternate technologies. Highlighting the other technologies evaluated in the text will better inform the reader to the additional information in Tables 6 and 7.
- The groundwater technology screening is difficult to locate beginning on page 5 of Table 6. Place this screening in a separate table to increase visibility and ability of the reader to locate this information.

Section 6, General comment:

- Cap integrity monitoring and maintenance will be required as long as contamination exists below the cap. Use 50 years when estimating the timeframe for cap monitoring and maintenance for both sediment caps and landfill caps in cost estimates. After post construction monitoring and caps are determined to be stable, monitoring once every five years is appropriate. Some alternatives estimate only 5 years of monitoring and others estimate only 20 years.
- Include estimates of sheet pile and barrier wall maintenance and replacement costs. Both sheet pile walls and slurry walls will need periodic maintenance or replacement over time. Sheet pile walls may have a lifespan of only 30 years, based on Ecology's experience at other sites (Wyckoff). Include a conservative life expectation for the sheet pile and slurry walls and include maintenance and replacement costs expected over 50 years to provide a realistic comparison of costs for the disproportionate cost analysis (DCA).

Section 6.1.1 Landfill Alternative L1:

- Without isolation of the landfill soil and groundwater from the lake surface water and sediment, this alternative does not appear protective and does not meets the MTCA threshold requirements for a remedy. Ecology requests removal of this option.

Section 6.1.2, 6.1.3 and 6.1.6:

- For each remedy that includes a conditional point of compliance include a statement that contingency actions will be needed if the downgradient groundwater monitoring wells do not meet cleanup levels after remedy construction or do not show a trend toward meeting cleanup levels within a reasonable restoration timeframe.

Section 6.1.2 Landfill Alternative L2:

- This section and the associated cost estimate include a 25' sheet pile barrier. At least 5' of this would need to remain above the current ground surface to accommodate the dredged fill, drainage, and cap layers, leaving only 20' below the ground surface. The cross-section D-D' on Figure 7 from the Public Review Draft Remedial Investigation Report (Landau, 2018) shows more than 30' of landfill materials below ground surface. The sheet pile wall should also key into an aquitard. A 25' vertical sheet pile barrier is inadequate to isolate the landfill. The estimate of sheet pile length should be a minimum of 35 feet to account for the depth of the former landfill and the 5' to remain above the current ground surface. Include additional characterization costs, like those included in alternative L5, to determine the depth to aquitard.

Section 6.1.3 Landfill Alternative L3:

- The cross-section D-D' on Figure 7 from the *Public Review Draft Remedial Investigation Report* (Landau, 2018) shows more than 30' of landfill materials below ground surface. The slurry wall should also key into an aquitard. A 25' slurry wall is inadequate to isolate the landfill groundwater from the lake. A 35' deep slurry wall is included in the cost estimate for in the new Alternative L5 along with additional characterization costs to determine the depth to an aquitard. Update Alternative L3 to include the additional characterization and the deeper slurry wall estimate also.

Section 6.1.4 Landfill Alternative L4

- Decrease the cost estimate for L4 significantly by incorporating several options from Alternatives L4.1 through L4.3.
    - Alternatives L4.1 through L4.3 assume additional soil characterization would allow approximately 1/6 of the landfill material to remain in place. If the conceptual site model supports this assumption, it should also be included in Alternative L4 to reduce the cost of off-site removal of all contaminated landfill materials. Spending the estimated $150,000 estimated to characterize the landfill material could justify

reducing the excavation, transport and disposal cost of L4 by about $6.5 million.

- Reduce the full excavation alternative costs by placement of an attenuation layer and expanding the footprint of Goose Lake rather than adding fill and topsoil. This would save another $7.6 million.

Section 6.1.5 Landfill Alternatives L4.1 through L4.3:

- The assumptions in these alternatives are so different from the assumptions in alternative L4 that they undermine confidence in any of the four alternatives. Based on the sampling data and the heterogeneous nature of the landfill materials, alternatives L4.1 through L4.3 are not realistic. The data does not support an assumption that 75-90% of the former landfill soil is clean soil suitable for reuse on site. Ecology requests removal of these alternatives from the report.

Section 6.4.1 Sediment Alternative S1, Section 6.4.2 Sediment alternative S2, and Section 6.4.3 Section Alternative S2.1:

- It is not clear whether the one post-construction performance monitoring event to confirm removal of sediment contamination is before or after placement of the 6 inches of clean fill/habitat substrate layer. If the post-construction performance monitoring confirms the sediment cleanup levels are met before placement of the 6-inch cover layer, then the cover layer's purpose is to provide management of dredging residuals and substrate for aquatic plant growth. If contamination remains after dredging, then the 6-inch layer's purpose is better described as an enhanced monitored natural recovery (EMNR) layer. EMNR needs a period of long-term monitoring to ensure cleanup levels are met over time as the layer mixes with the underlying surface sediment. Clarify the purpose of the 6-inch layer and the timing of post-construction sampling. Remove the language referring to the 6-inch layer as a physical barrier to prevent direct contact. A 6-inch layer is not adequate to serve as a physical isolation barrier or cap.

Section 6.4.3 Alternative S2.1:

- Institutional controls will be required to protect the landfill waste isolation cap. Please add institutional controls to this option.

Section 6.4.3 Sediment Alternative S2.1, Section 6.4.4 Section Alternative S3 and Section 6.4.5 Sediment Alternative S4:

- Each of these remedies include capping in part of or all of Goose Lake. Capping will result in a loss of aquatic habitat and may trigger a need for mitigation in accordance with Chapter 220-660 Hydraulic Code Rules. Recognition of the need for mitigation and the estimated costs should be included in the alternative descriptions and cost estimates.

Section 6.4.4 Sediment Alternative S3:

- This alternative mentions institutional controls to prevent exposure to contaminated sediment beneath the attenuation layer. An attenuation layer is intended to allow some mixing with sediment below and is not an isolation cap. Institutional controls are likely not needed for the attenuation layer; however, institutional controls are needed for the landfill waste isolation cap. Correct the description of institutional controls to prevent exposure to contaminated sediment beneath the landfill waste isolation cap.

Section 6.5.3.6 Consideration of Public Concerns:

- The DCA should attempt to estimate public concerns rather than leaving this for Ecology to do following the public comment period. There has been considerable public interest in this site in previous years. It is clear the public is interested in seeing this site cleaned up using the most protective and permanent method possible before construction of the large development nearby. Full removal should rank 5 (the highest). Full containment should rank 4 (the second highest) with capping and partial barrier walls ranking lower.

Tables 9 and 10 Evaluation of Landfill Cleanup Action Alternatives: Ecology disagrees with several scores in the landfill DCA. The following table provides an overview of Ecology's scores. Ecology is willing to meet to discuss these changes in more detail, as needed**.** According to Ecology's review, scoring and updated cost estimates, Alternative L5 should be the recommended alternative.

Evaluation of Landfill Cleanup Alternatives							
	Weighting Factor	L1	L2	L3	L4	L4.1-L4.3	L5
Protectiveness	0.3	1	3	3	5	4	4
Permanence	0.2	1	3	2	5	4	4
Long-Term Effectiveness	0.2	1	3	2	5	4	4
Short-term risks	0.1	5	5	4	3	3	4
Tech and admin impl.	0.1	5	4	2	2	1	1
Public Concerns	0.1	1	2	2	5	4	4
Total Benefits		1.8	3.2	2.5	4.5	3.6	3.7
Total Benefits X 10		18	32	25	45	36	37
Estimated cost		$2,073,000	$4,447,000	$3,464,000	$58,666,546	$15,577,000	$4,194,403
Ratio benefit/cost		26	22	22	2	7	26
Ratio cost/benefit		$1,151,667	$1,389,688	$1,385,600	$13,037,010	$4,326,944	$1,133,622
Disproportionate?		No	No	No	Yes	Yes	No
Yellow highlight indicates modified value.							

Tables 12 and 13 Evaluation of Sediment Cleanup Action Alternatives: **Ecology disagrees with several scores in the sediment DCA. The following table provides an overview of Ecology's scores. Ecology is willing to meet to discuss these changes in more detail. According to Ecology's review, scoring and updated cost estimates, Alternative S2 should be the recommended alternative.**

Evaluation of Sediment Cleanup Action Alternatives						
	Weighting Factor	S1	S2	S2.1	S3	S4
		Dredge/off-site disposal	Dredge with on-site containment	Dredging with on-site containment and landfill waste cap	EMNR and landfill waste cap	Isolation cap
Protectiveness	0.3	5	4	4	1	3
Permanence	0.2	5	4	3	2	3
Long-Term Effectiveness	0.2	5	4	4	2	4
Short-term risks	0.1	2	3	3	4	4
Tech and admin impl.	0.1	2	4	3	4	3
Public Concerns	0.1	5	4	3	1	2
Total Benefits		4.4	3.9	3.5	2	3.2
Total Benefits X 10		44	39	35	20	32
Estimated cost		$9,611,000	$5,237,000	$5,264,000	$2,583,000	$7,970,000
Ratio benefit/cost		1.4	2.2	2.0	2.3	1.2
Ratio cost/benefit		$2,184,318	$1,342,821	$1,504,000	$1,291,500	$2,490,625
Disproportionate?		Yes	No	No	No	Yes
Yellow highlight indicates modified value.						

Appendix B Cost Estimates:

- **Tables B-1, B-2, B-3 and B-5:** Establishing adequate conditional point of compliance monitoring wells immediately downgradient of the capped landfill along with ensuring an adequate monitoring well network throughout the site will require a robust network of monitoring wells. Installation of six new wells are estimated in Tables B-1, B-2, B-3 and three wells are estimated in Table B-5. The actual monitoring well network developed during remedial design may require more than six new wells. An estimate of six wells is adequate for cost estimation purposes in the feasibility study; however, the description in the cost estimate describes their locations as near the shoreline. The conditional point of compliance wells should be located on the downgradient edges of the landfill. Correct the description of the location of the additional wells as downgradient of the landfill for the landfill conditional point of compliance or as needed for the site monitoring well network. Also, correct the corresponding footnotes to these tables that only mention installation of three wells.

- **Tables B-2 and B-3:** Like Table B-5, Line 5 of Tables B-2 and B-3 should include an increase in characterization costs to cover the cost of additional characterization included for evaluation of depth to glacial till to determine the optimum depth for slurry and sheet pile walls. Update these tables to include the deeper sheet pile wall and slurry wall needed as outlined in the comments above.

- **Tables B-4 and B-6**: The Transport and Disposal Subtitle C Landfill cost in Table B-4 is $65/Ton and in Table B-6 is $45/Ton. Please be consistent or explain why these costs are different.

- **B-4.1(Line 11), B-4.2(Line 10), and B-4.3(Line 12)**: The estimated quantity appears to be in Tons instead of CY as indicated. After this correction, make sure the cost per unit reflects the correct units. The source/assumptions column currently references a per-CY cost.

- **Table B-5:** Line 12 includes an estimate of 87,500 SF for the slurry wall. The source/assumptions shows 2,300 linear feet of wall and a depth of 35 feet which equals 80,500 SF. Please check these calculations and correct the estimated cost.
- **Table B-5**: This estimate should include 5-year groundwater monitoring events similar to Table B-2 and B-3 Lines 22a.
- **Table B-7.1**: This alternative, S2-1, includes an isolation cap like Alternative S3 and should include the $15,000 additional costs for NPDES/water quality permitting as in Line 2 of Table B-8. It should also include the maintenance fill estimate included in Alternative S3 and S4

Editorial Comments

Section 6.4.3, first sentence: The first sentence should refer to S2.1 instead of S2.

Section 6.5.4, paragraph 2: The DCA is discussed in Section 6.5.3 instead of 6.5.2 and the results of the DCA are summarized in Section 6.5.3.8 instead of 6.5.2.8.

Table 3: The Preliminary Cleanup Level for Goose Lake and the Inactive Landfill for copper should be 36 instead of 38 based on Table 7 in the RI and the soil background value for copper.

Appendix A Figures A-2 through A-4: Specify dioxin/furan TEQ in the figure title. The type of TEQ is not clear from the figures alone.

Appendix B Table B-7.1: Correct the title alternative number to S2-1 and the title description text to distinguish S2-1 from S2.

Revised Public Review Draft Feasibility Report

Ecology would like to have a meeting or conference call to discuss these comments to ensure mutual understanding of the comments and expected changes prior to revisions. Please revise and submit the revised PRD FS to Ecology for review and approval within 60 days. If you have questions regarding these comments, please contact me at (360) 407-6254 or connie.groven@ecy.wa.gov .

Sincerely,

Connie Groven

Connie G. Groven, PE
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Ecology Site File