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Memorandum

To: Jeff Condit

Date: June 12, 2025

From: John M. Hower, Geo-Logic Associates, Inc.
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Subject: Response to comments on CUP Application for the expansion of the Coffin Butte Landfill

The following are responses to public comments received following submittal of the Conditional Use Permit (CUP) application for the Coffin Butte Landfill.

Response to Comments concerning the effect of blasting on adjacent properties

Commenters noted that blasting used to break up and loosen rock for excavation can potentially interfere with uses on adjacent properties due to noise and the potential for seismic disturbance (rattling of windows), and interruption of groundwater flow.

Seismic Disturbances

Blasting has been used sparingly at the CBL, and only when the rock is too hard for removal by traditional earth moving equipment like excavators. At VLI, a blasting engineer develops a focused program to account for the area and quantity of material to be excavated and the geologic conditions, including rock fracture spacing and orientations to ensure that community disruptions are minimized. An appropriate monitoring program using seismographs is also implemented. VLI notes that in 2024 during excavation of Cell 5E, only two blasting events or shots occurred. Knife River, working in the quarry area that was developed as Cell 6, detonated 55 shots between early 2023 and the end of 2024.

Research by the U.S. Bureau of Mines (Duvall and Fogelson, 1962) and cited by the Oregon Department of Transportation website found that fracturing rock around a typical blast hole is limited to a distance of approximately 20-to-40-hole diameters away from the drill holes in which the explosives are packed. Thus, this is a standard of practice employed by blast engineers for this type of mass excavation. As an example, during excavation of the Cell 5 area, 4.5-inch diameter holes were drilled to depths of approximately 48 feet on 10-foot centers to loosen the rock. This resulted in a rock break distance of between 7.5 feet and 15 feet from each hole, using the rationale above. These findings suggest that the disturbance of rock resulting from blasting would likely be on the same order as disturbance of rock using conventional earth moving equipment.

Even with the short distance of rock fragmentation from the blasting hole, as a precaution, the contractor deployed seismographs to monitor ground vibration caused by the blasting at several locations along Military and Wiles roads on the north side of Coffin Butte near existing homes, at distances of approximately 1,100 to 2,300 feet from the excavation. The seismic wave velocities at those distances were all far below the criteria used for assessing ground vibration associated with building damage.

During the development of the future expansion area, VLI and/or its subcontractor will continue to will provide nearby residents with notification of future blasting events, and a seismic monitoring plan will be implemented for future blasting required for the development area.

Wilbur I. Duvall and Fogelson, D E. "Review of criteria for estimating damage to residences from blasting vibrations.", United States Department of the Interior, Bureau of Mines Report of Investigations 5968, Jan. 1962.

State of Oregon Department of Transportation pamphlet – Rock Blasting and the Community (https://www.oregon.gov/odot/geoenvironmental)

Interruption of groundwater flow associated with the proposed development.

VLI recognizes residents' concerns over the future water supply. As shown in annual groundwater monitoring reports and in Figure 1 (below), we note that the proposed development is located where groundwater flow from Coffin Butte and groundwater flow from Tampico Ridge converge. As a result, the local community south, southwest, and southeast of the proposed development is located upgradient of the proposed development. Groundwater monitoring during development of Cells 1 through 5 has not resulted in a significant change in the groundwater equipotential surface upgradient of these areas of the site as shown in the hydrographs and equipotential surface contour maps that accompany the annual water quality monitoring reports. Recognizing that the geologic conditions beneath the proposed expansion area and Tampico Ridge are similar to those under the existing landfill, modeling results support a conclusion that the proposed expansion is unlikely to result in change in the water resource that is different than the change that occurs seasonally during wet and dry seasons.

The ways in which a landfill development could interrupt groundwater flow include blasting (rock removal) and changes to recharge zones. This section evaluates those interruptions.

To better estimate the potential impact to residents, VLI prepared an analytical solution to characterize the change in water levels associated with the landfill development through blasting, rock removal, and placement of the composite liner system. All of the proposed development activities are located in areas downgradient of the local community, and as result, those activities should not affect recharge to wells or springs.

The potential changes in water levels at the Berkland and Holdorf wells resulting from the proposed landfill operation were evaluated. The two Berkland wells are closest to the proposed development area. The Holdorf well is farther to the south.

The analysis concluded possible decreases similar to the changes in water levels associated with seasonal precipitation patterns observed in site monitoring wells.

The analytical calculation included an area of several thousand feet beyond the southern edge of the proposed development area in order to evaluate conditions beyond the location of residential water supply wells that were modeled. These evaluations suggest that the change in head beyond about 3000 feet from the proposed development area would be far smaller, and would likely have no effect on well or spring water supply.

VLI recognizes that our neighbors rely on well water, and that springs are part of the appealing natural landscape. We will work closely with the community to monitor and address changes in local water supply wells and springs that may be affected by our operations. A methodological, stepwise approach to monitoring and evaluation will be conducted as follows.

- As part of the proposed expansion project, a network of four monitoring wells will be constructed along the southern side of the development. Water levels in these four wells will be regularly monitored as part of the CBL routine monitoring program. These wells will effectively act as “sentinel” wells to provide an added level of monitoring.
- Should these four new wells show four successive decreases demonstrating a 10 percent decrease in the potentiometric surface, or a dramatic change across two events (not associated with local climactic conditions or residential water use), VLI will request the ability to evaluate yield and water levels at residential wells. Furthermore, as part of this, VLI may install additional sentinel wells to the south of the four new monitoring wells.

- Additionally, if those sentinel wells show a decrease that is affecting neighbors, and that is unrelated to local climate conditions or changes in residential water consumption, VLI will reach out to those neighbors to evaluate and implement mutually-agreeable solutions at VLI's expense. VLI underscores that its evaluation and analysis does not support that there will be any material impact to neighboring residential well.
- VLI will remain open to discussion with interested residents about their wells and water levels.

Response to Comments concerning the presence of arsenic in groundwater

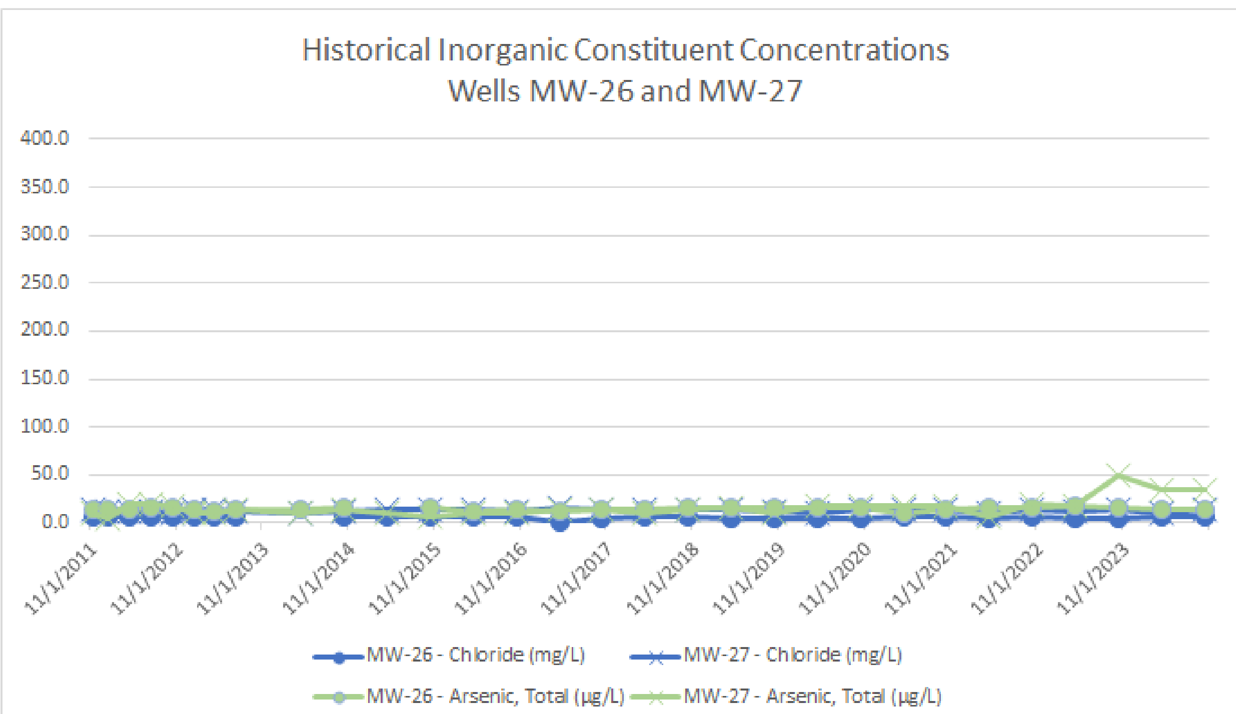
VLI has been monitoring groundwater chemistry at the CBL for more than 30 years in accordance with the requirements outlined by the State of Oregon Department of Environmental Quality (ODEQ). VLI acknowledges that since arsenic was first detected at well MW-9S, elevated arsenic concentrations have been detected in wells that monitor the east side of the facility; namely, wells MW-26, MW-27, and MW-9S; however, no monitoring results indicate that these arsenic concentrations are attributed to a leachate discharge. This section will:

- describe the ways leachate impacts to groundwater can be determined, and present historical groundwater chemistry results for the subject wells,
- present public information regarding the basin-wide geochemistry with respect to arsenic and its natural occurrence in the area,
- describe the impacts of low dissolved oxygen content associated with local the natural environmental conditions along the eastern portion of the site, and its effect on arsenic concentrations in this area of the site
- propose actions should a release to groundwater be identified and verified.

Determination of Leachate Impacts to Groundwater

Typical for a MSW landfill, the monitoring program at CBL monitors both leachate and groundwater quality. The leachate at CBL is monitored annually at primary and secondary leachate sampling locations. Historical data show that leachate at the CBL is composed of elevated concentrations of inorganic constituents (for example: total dissolved solids, chloride, sodium) and some metals including arsenic as well as volatile organic compounds. Chloride in particular is a useful tool for determining leachate influence on groundwater; whereas arsenic is not. Chloride is a conservative indicator of a release because the ion will move at the same rate as groundwater and will not attenuate due to chemical reactions and interactions. A release from a landfill is determined by observing changes in a suite of geochemical parameter concentrations in detection monitoring wells. This monitoring is conducted in accordance with the ODEQ-issued permit and data submitted to that agency.

Evaluation of groundwater data trends for key inorganic indicator parameters is a reliable method used to determine if groundwater has been affected by leachate. Considering that concentrations of inorganic constituents in leachate are significantly higher than in groundwater, if a leachate discharge were to occur, concentrations of many inorganic monitoring parameters - particularly chloride - would increase over time. Time-series charts depicting chloride and arsenic concentrations measured over time in samples from wells MW-9S, MW-26, and MW-27 are provided below. These charts illustrate that concentrations of these monitoring parameters have been relatively static over time. The absence of increasing concentrations supports the conclusion that groundwater at these wells is not affected by a leachate release.



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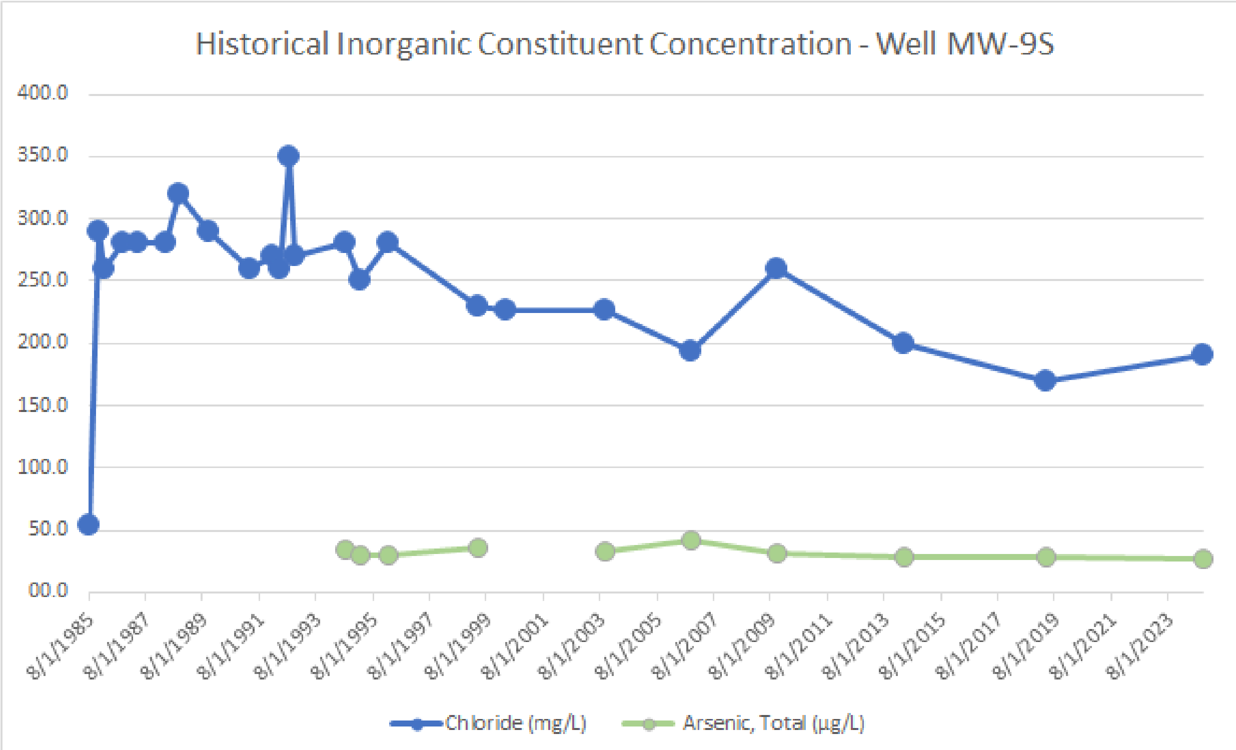

In addition to inorganic constituents, the leachate at CBL contains measurable concentrations of chlorinated aliphatic compounds (including, tetrachloroethene, cis-1,2-dichloroethene, methylene chloride, and several others) and chlorinated aromatic compounds (benzene, 1,4-dichlorobenzene, chlorobenzene, toluene, xylenes, and ethylbenzene). These VOCs have been repeatedly detected in leachate samples collected over the last 30 years. Conversely, no VOC has been detected and verified in groundwater samples collected from wells MW-26, MW-27, or MW-9S. Taken together, the stable inorganic constituent concentrations and the absence of VOCs in samples from these wells indicate that the arsenic concentrations in this area of the site are naturally occurring. Fluctuations in arsenic concentrations are discussed below.

Regional Occurrence of Arsenic in Groundwater

The occurrence of arsenic in the region is documented in a technical publication by the U.S. Geological Survey (Hinkle and Polette, 1999), which identified naturally occurring arsenic minerals occurring in volcanic rock including the same types of geologic materials underlying the CBL. That publication focused on areas in the Willamette Basin using publicly available data from water wells in Lane and Linn Counties and in the Tualatin Basin where arsenic has been found in groundwater. That document cautions, however, that "*... it cannot be assumed that these areas are the only areas in the (Willamette) basin that contain ground water with high concentrations of arsenic. Little or no data exist for many parts of the basin.*" The important takeaway from that document is that arsenic is present in the Willamette Basin, and that it can be present in areas outside the data set that the authors used.

The USGS study also evaluated temporal changes in arsenic concentrations over the course of the year. The study found that at some wells, arsenic concentrations changed by up to 50 percent of the original sample concentration from one sampling event to the other. The changes in arsenic concentration were independent of seasonal influences, and the study concluded without a working hypothesis to explain those variations. Arsenic concentrations in samples from wells MW-26, MW-27, and MW-9S also exhibit variations between sampling events and appear to be related to the level of dissolved oxygen in groundwater at the time of sampling, as described below.

Effect of Dissolved Oxygen on Arsenic Concentrations

The mechanism that releases the naturally-occurring arsenic from the native iron oxides locally at Coffin Butte is contact with groundwater that has a low dissolved oxygen content. This low dissolved oxygen is related to the former depositional environment on the eastern side of the landfill, which was a marsh or wetland with organic rich clays. These conditions are clearly noted in the boring logs for well MW-27, and were geologically mapped in the vicinity of wells MW-26 and MW-27 during excavation of Cell 4. When low dissolved oxygen groundwater comes in contact with soils, it dissolves the iron oxides and releases both the iron oxide and associated arsenic into the groundwater where it is measured and as seen in monitoring wells MW-26 and MW-27. As groundwater migrates beyond areas of low dissolved oxygen, the iron oxide and arsenic precipitate back to the soil, reducing the concentrations in groundwater. Natural variability over time within the same well can result in fluctuations in arsenic concentrations such as at MW-27 and as presented in the 1999 USGS study. Understanding the geologic conditions at the site in relation to the arsenic concentrations, ODEQ has found this rationale sound in approving the detection monitoring program for the east side of the landfill.

Response Actions to Community Concerns

As demonstrated above, more than 30 years of groundwater monitoring results support the conclusion that the arsenic concentrations measured in samples collected from wells MW-9S, MW-26, and MW-27 are associated with a naturally-occurring condition that exists on the eastern side of the landfill property. Furthermore, none of the data collected from these wells show indications of leachate impact over the last 30 years. Solid Waste Permit 306 requires VLI to continue to monitor water quality throughout the active life and post-closure period of the landfill, and take appropriate remedial measures in the event that a release to groundwater occurs. VLI is committed to complying with our site-specific, State of Oregon, and federal landfill operations and monitoring requirements. ODEQ has accepted VLI's explanation for the presence of arsenic in groundwater near the eastern property boundary, and through this understanding, the agency has not mandated further evaluation, implementation of a formal assessment monitoring program, or corrective actions.

VLI acknowledges the community's concern regarding local arsenic concentrations and potential water quality changes associated with the proposed development. As a measure to help foster better understanding of the issue, and respond should the issues arise, VLI proposes a methodical, stepwise approach, including:

- The installation of a network of four groundwater monitoring wells around the perimeter of the proposed facility. The new monitoring wells would be installed prior to placement of waste in the new cell in order to obtain background water quality data as it relates to the new cell.
- In addition, VLI, with property-owner approval, proposes to sample domestic water wells immediately south of the landfill (i.e., along Blaze Drive and Ploughshares Road) for arsenic and chloride once a year to track levels moving forward. This sampling program will begin before landfill construction to establish a baseline for arsenic and chloride concentrations in those wells.
- If changes in concentrations above baseline levels are measured and can be attributed to landfill operations, VLI will work with property owners to remedy the condition.

Response to Comments concerning stormwater and surface water management in the current development area.

Surface water and stormwater at the CBL is divided into three drainage areas:

- Area 1, which drains the Knife River quarry, and is permitted under the Oregon 1200-A permit through Knife River
- Area 2, which incorporates the western area of the CBL and discharges at Outfall 001, and is permitted under the Oregon 1200-Z permit
- Area 3, which incorporates the eastern area of the CBL and discharges at Outfall 002), and falls under the same permit at Area 2.

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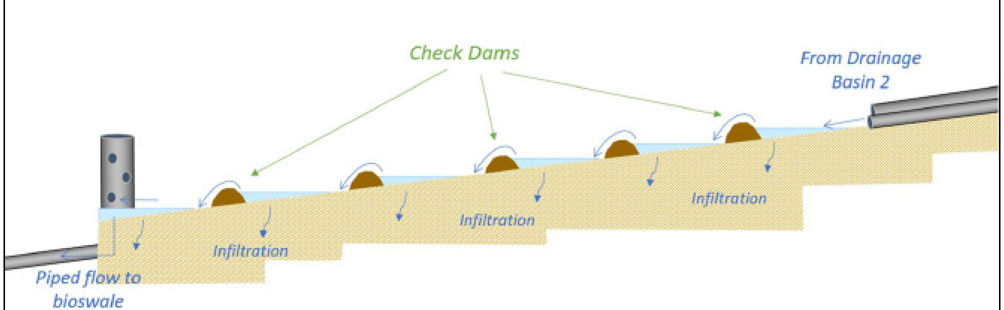
Drainage Area 1 is operated under a separate permit, and is not included in the CUP application. Drainage Area 2 and 3 each discharge to a different outfall (Outfalls 001 and 002 respectively). Drainage Area 2, located on the west side of the Site, is a 43-acre area that drains to the west towards Soap Creek, which is more than 500 feet from the Basin 2 outfall point. The stormwater infrastructure in this area of the site consists of pipes and a large end-of-pipe sedimentation basin (Pond 3) followed by a large bioswale. In 2021, Pond 3 was modified with six impermeable check dams, or berms, to increase the hydraulic retention time of the basin, thereby enhancing gravitational settling of particulate solids, and increasing mass reduction by infiltration. The berms bisect the basin across its longitudinal axis, extending across the width of the basin between the two side embankments. Gravel-filled trenches were placed in front of the first two berms to promote infiltration. Each berm has a weir that water flows over when the depth behind the berm rises above the weir crest and discharges to the next lower step pool. The inverts of the weir crests are approximately 4 inches lower than the top of the berms. The last step-pool discharges to a large area at the downstream end of the basin where water ponds and additional infiltration occurs before discharging through an outlet structure. A schematic of this system is shown below.

The addition of check dams has spread out the flow across the large surface area of the pond, promoting larger, shallow ponding areas. The check dams result in a step-pool like structure which has greatly increased the retention time and infiltration of runoff.



Schematic of Drainage Area 2 Infrastructure. Source, Geosyntec Consultants.

Drainage Area 3 consists of the active landfill and primary Facility operations located on the east side of the Site, including the proposed expansion area facilities. Most of the area is or will be covered with landfill wastes, and most of the landfill, and each cell of the landfill in this drainage area is equipped with a composite liner system, rendering the area impervious. Other areas of impervious surfaces include truck scales, loading bays, building roofs, and Coffin Butte Road. Overall, Drainage Area 3 contains about 26.6 acres of impervious surface and is therefore approximately 21.5 percent (%) impervious. Stormwater runoff from the active landfill north of Coffin Butte Road is generated both from active cells and covered, inactive cells. The area south of Coffin Butte Road includes the area surrounding the existing leachate treatment facility, leachate holding ponds, and landfill gas power generation facility. Stormwater from Drainage Area 3 is routed through a series of existing treatment controls (i.e., BMPs) prior to discharging to Toketie Marsh over a flow spreader weir, where it is sampled. Toketie Marsh discharges to an unnamed tributary of Soap Creek. Soap Creek discharges to the Luckiamute River, and then to the Willamette River.

Existing end-of-pipe BMPs in Drainage Area 3 include two large sedimentation basins, located to the northeast and southeast of the active landfill area, a large bioswale that receives water from both sedimentation ponds, and a subsurface wetland (installed in 2021) that receives effluent from the bioswale. The more northern sedimentation basin (Pond 2) is approximately 32,000 square feet and receives runoff from the areas north of the active landfill through a 30-inch storm pipe. The more southern sedimentation basin (Pond 1) is approximately 26,000 square feet and receives runoff from the active and inactive landfill cells, which generally drain to the east, through a 36-inch storm pipe. Both ponds drain towards the centerline of the landfill area where they combine into a 48-inch storm pipe that drains to the large bioswale, which takes up approximately 45,000 square feet.

In 2021, a portion of the existing east bioswale was converted to a sub-surface flow wetland (SSFW). A conceptual overview of the constructed SSFW is depicted below and includes an impermeable berm bisecting the swale at its northern end that forces water down through a sand/biochar media filter and into a subsurface gravel layer. After passing through the treatment media, water flows horizontally through the gravel layer beneath the impervious berm and re-emerges on the surface on the downstream side. Bioretention media planted with native wetland plants was placed above the gravel layer on the downstream side of the berm. Treated surface water flows over a flow spreader weir at the northern end of the subsurface wetland, where it is sampled, prior to being discharged to Toketie Marsh.

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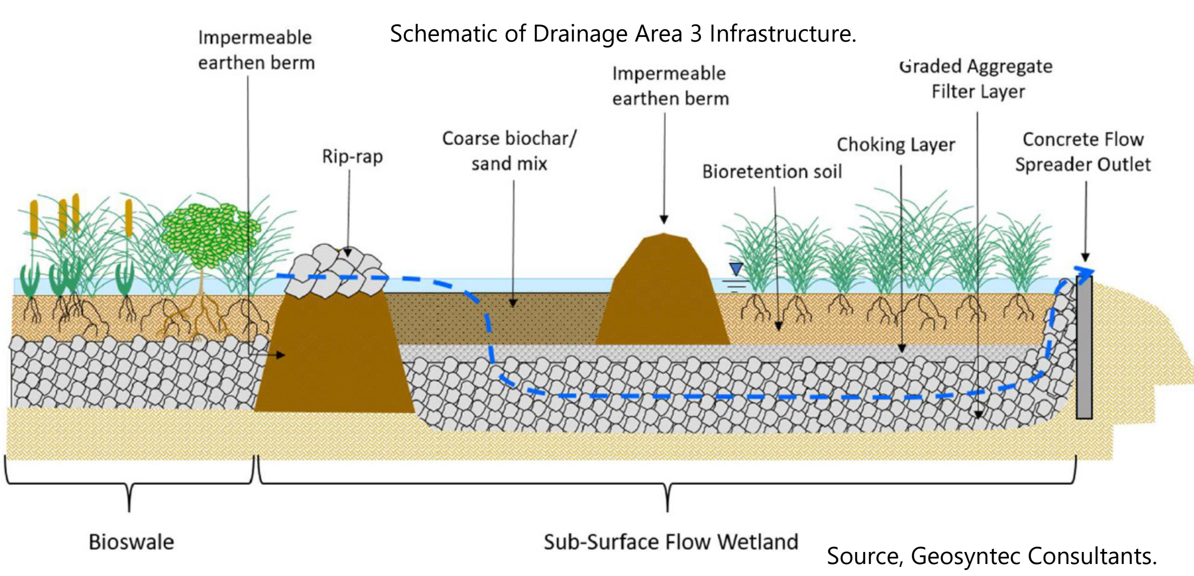

Outside of the operations areas, precipitation that falls on the northeastern slopes of Tampico Ridge drains north to a ditch along the south side of Coffin Butte Road, which conveys the intercepted stormwater eastward toward Highway 99. Stormwater then flows through a culvert beneath Coffin Butte Road, continuing northward in the drainage ditch along the west side of Highway 99 to a culvert that conveys water from a wetland and this ditch to a creek on the east side of Highway 99.

Response to Comments concerning Stormwater and Surface Water Management in the Proposed Development Area

Stormwater from the proposed landfill development area will ultimately be directed toward the east and use existing stormwater controls described in the discussion of stormwater controls for the existing landfill (see preceding response). As presented in the CUP application supporting documentation, the proposed stormwater design captures stormwater using graded swales and conveys the water to catch basins. The catch basins direct stormwater flows to a combined detention and wet pond facility located to the east of the landfill footprint. The purpose of this facility is to slow down the flow rate to allow sediment to settle out of the flow stream before water is discharged. The outflow of onsite stormwater from the wet pond will be conveyed through a graded swale to a 12-inch culvert crossing to the north side of Coffin Butte Road and ultimately discharge to the existing detention facility and bioswale that include a sub-surface flow wetland where stormwater will undergo additional treatment before discharge off site.

The combined detention and wet pond were designed for the project site according to the current City of Corvallis Stormwater Design Standards. Surface water will be monitored in accordance with the current ODEQ-issued NPDES Stormwater permit, which requires stormwater monitoring on the east side (for the current landfill) as well as monitoring stormwater west of the proposed development area. Stormwater that discharges to the west originates on the existing landfill north of Coffin Butte Road, generally on the western part of the landfill. After treatment, discharge from the western part of the landfill flows into Soap Creek.

As the project design progresses, VLI will develop comprehensive designs for drainage structures. These designs will be supported by hydraulic calculations to demonstrate that each component of the stormwater management system for the proposed development area is sized to accommodate the design storm event for the facility. This procedure is typical of development projects of all types and will be conducted in accordance with the appropriate engineering standards and pertinent regulations. The final drainage system design will be reviewed and approved by ODEQ prior to finalizing the bid documents for construction.

Response to comments concerning current stormwater runoff flowing into Knife River Quarry

A comment reported an observation that stormwater runoff from the existing landfill entered the Knife River quarry pond. Current topography, grading and engineered drainage controls prevent stormwater runoff from the existing landfill from flowing into the Knife River quarry pond. The current stormwater protection plan for the landfill identifies stormwater flow basins based on topography. Site drainage and grading direct stormwater runoff away from the quarry operations. VLI notes that stormwater in the western part of the landfill, primarily the closed parts of Cell 1 and closed Cell 1A, flows within what is referred to as Drainage Area 2 and discharges to Outfall 001. Although this drainage area shares a common boundary (based on topography) with the Knife River drainage area; existing grades and engineered controls are designed to prevent stormwater runoff from landfill areas comingling with runoff from the quarry area, as shown in Figure 2.

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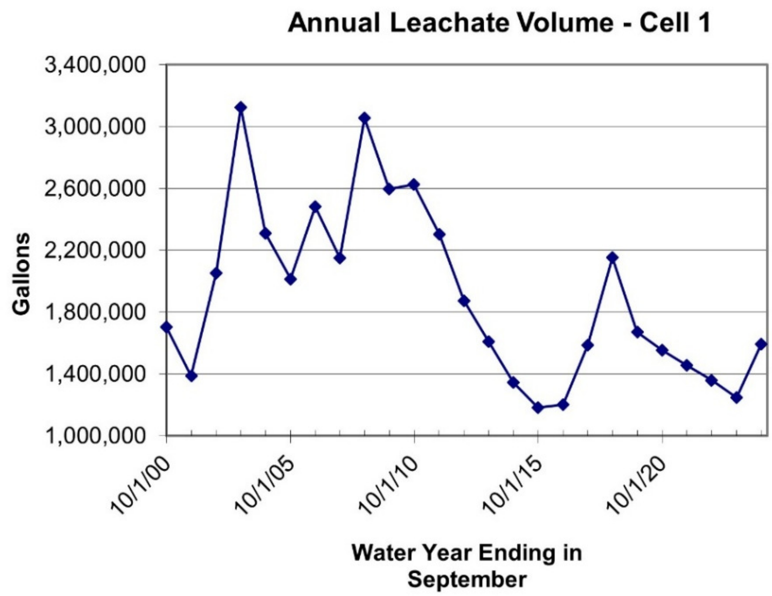
Response to Comments concerning the volume of leachate produced in Cells 1 and 1A.

VLI monitors leachate production rates for each cell on a daily basis. The volume of leachate generated in each cell is transmitted to a pipeline equipped with a calibrated flow meter, and the meter is read and recorded daily, allowing operations staff to observe changes in leachate production. Annual leachate production volumes from Cell 1 between 2000 and 2024 are presented in the graph below and are based on the "water year" beginning on the first of October of one year and extending through the end of September of the following year. For the 2025 water year to date, the Cell 1 leachate production is 880,390 gallons, which should project to a water year total of approximately 1.2 million gallons. As shown on the graph, leachate generation volumes have generally decreased over time, though transient increases in generation occur following periods of higher-than-normal precipitation. During the last five years, the annual leachate production from Cell 1 has been less than 1.7 million gallons.



With placement of flexible membrane final cover systems, which act to prevent infiltration and, thus, leachate generation, over Cell 1A and most of Cell 1, leachate generation rates will continue to decline.

Response to Comments concerning concentrations of metals and PFAS in leachate

As required by Solid Waste Permit 306, annual leachate samples are analyzed for 15 metals and reported in the Annual Environmental Monitoring Report (AEMR). Data published by the USEPA in 2002 (Kjeldsen, et. al, 2002 – Present and Long-Term Composition of MSW Landfill Leachate: A Review), show that concentrations of metals in leachate samples collected at the CBL are comparable to the leachate chemistries at other municipal solid waste landfills. As shown below, the arsenic concentrations in leachate at the CBL are near the bottom of the range of arsenic values reported by the USEPA. VLI notes that, because they are targeted to drinking water quality, USEPA primary drinking water standard Maximum Contaminant Levels (MCLs) referenced in various comments are not applicable to leachate.

Comparison of EPA Cited Ranges for Metals Concentrations in Leachate with Average Leachate Values at Coffin Butte Landfill

Constituent	EPA cited ranges		Coffin Butte Leachate
	Minimum Value	Maximum Value	Average Value
Arsenic	100	1,000	111
Cadmium	1	400	2.61
Calcium	10,000	7,200,000	129,000
Chromium	20	1,500	160
Cobalt	5	1,500	50
Copper	5	10,000	15.8
Magnesium	30,000	15,000,000	145,000
Lead	1	5,000	5.5
Iron	3,000	55,000,000	6,040
Manganese	30	1,400,000	984
Mercury	0.1	160	0.70
Nickel	15	13,000	161
Zinc	30	1,000,000	419

All values are reported in micrograms per liter (µg/L)

Source: Peter Kjeldsen, Morton A. Barlaz, Alix P. Rooker, Anders Baun, Anna Ledin, and Thomas H. Chistensen, 2002, "Present and Long-Term Composition of MSW Landfill Leachate: A Review" *in* Critical Reviews in Environmental Science and Technology, V32(4), p297-336.

Per- and Polyfluoroalkyl substances (PFAS) are emerging contaminants recently recognized by the USEPA to be present in environmental media as a result of industrial discharges, use in commercially-available household products, and in fire-fighting foams. In fact, the use of PFAS is widespread, and these chemicals are present in products such as lip balms, lotions, makeup, sunscreen, food packaging, fire retardant, clothing, and cookware. Through their use in many household products, these chemicals have been found in samples of municipal solid waste leachate at many landfills. Landfills are a receiver of many wastes containing PFAS and sequester these chemicals in a highly-engineered, closely monitored setting.

As an emerging contaminant, neither the current solid waste permit nor federal 40CFR258 regulations require testing for PFAS. However, leachate samples were collected in 2022 and 2024 at the request of the City of Corvallis. These samples were analyzed for PFAS in order to gain an understanding of their presence and concentrations in landfill leachate that was transported to its wastewater treatment facility. Twenty-seven PFAS compounds were detected during these two monitoring events at concentrations ranging from 7 to 36,000 nanograms per liter (ng/L or parts per trillion). For comparison, in 2022, the USEPA (Chen, et. al, 2022) published the results of a study of PFAS concentrations in landfill leachate. This study analyzed 26 PFAS compounds and found total concentrations of PFAS as high as 58,260 ng/L in leachate samples. In addition, between 2018 and 2020, the State of California Water Resources Control Board conducted a pilot study to evaluate PFAS concentrations in leachate at active municipal solid waste landfill throughout the State. Review of data from 12 California landfills that are equipped with leachate collection and removal systems shows cumulative PFAS results as high as 103,000 ng/L. Results from USEPA and the State of California suggest that the leachate PFAS data from the CBL is similar to PFAS concentrations in leachate at other municipal solid waste landfills.

As federal and state agencies gain an understanding of the presence of PFAS in the environment, permit requirements may change as far as routine monitoring or pilot testing. VLI will continue to comply with current and future permit requirements for this site.

Chen, Y., H. Zhang, Y. Liu, J. Bowden, T. Tolaymat, T. Townsend, and H. Solo-Gabriele. Concentrations of perfluoroalkyl and polyfluoroalkyl substances before and after full-scale landfill leachate treatment. WASTE MANAGEMENT. Elsevier Science Ltd, New York, NY, USA, 153: 110-120, (2022)

Response to Comments concerning leachate seeps

Past landfill operations experienced leachate seeps emanating from active faces of the landfill. Current operations utilize ethylene propylene diene monomer (EPDM) as an alternative interim cover material and linear low-density polyethylene (LLDPE) final cover systems as portions of the landfill reach design capacity. Combined with improved grading and drainage practices, the use of EPDM interim cover material and LLDPE final cover systems significantly limits the amount of precipitation that infiltrates landfill wastes. In addition, more robust leachate collection and recovery as well as landfill gas collection systems that remove significant volumes of water vapor from the landfill that would otherwise promote leachate formation, and these environmental controls significantly reduce the likelihood of leachate accumulation and the formation of seeps. As a matter of practice, site operations personnel inspect the landfill during and immediately after significant or prolonged storm events to make sure that environmental controls are functioning correctly and to repair any storm-related damage as quickly as possible.

Response to Comments concerning the absence of clay below the liner system.

Cells 1A and 1 were first used for waste disposal in 1975. Both cells were developed prior to the adoption of regulations and practices requiring construction of landfill liner systems, and historical records indicate that minimal excavation was conducted in these areas of the site prior to initiating waste disposal operations. Historical records indicate that Cell 1A was developed on exposed bedrock. The southern portion of the Cell 1 area was originally underlain by native alluvium, and that material was removed prior to waste placement and used to construct an approximately two-foot-thick clay liner over portions of the Cell 1 subgrade and an engineered fill toe berm. In addition, Cell 1 is equipped with a leachate collection system. Leachate is extracted from Cell 1, and is managed in accordance with the terms of the current solid waste permit. Portions of Cell 1 and all of Cell 1A have been formally closed in accordance with Oregon Administrative Rules, Chapter 340, Division 94 (OAR 340) and Federal Subtitle D regulations found in the Code of Federal Regulation, Part 258 (40CFR258).

Acknowledging the absence of modern landfill liner systems that were available at the time these cells were constructed, VLI installed the leachate collection system and numerous groundwater monitoring wells downgradient of these cells. As a result, the leachate collection and monitoring system now meets or exceeds current regulatory standards. These efforts are to remove leachate for proper disposal, and to allow evaluation and appropriate response should changes in groundwater chemistry be detected in this area of the landfill.

Proposed Expansion Area Liner System

With respect to the project proposed in the CUP application, the composite liner system proposed for the landfill expansion is designed to meet or exceed OAR 340 and 40CFR258 design standards for municipal solid waste landfill liner systems. The composite liner system design planned for the expansion area extends below the entire landfill footprint. The excavation will result in slope areas and a floor area. Slope areas will descend from a high point

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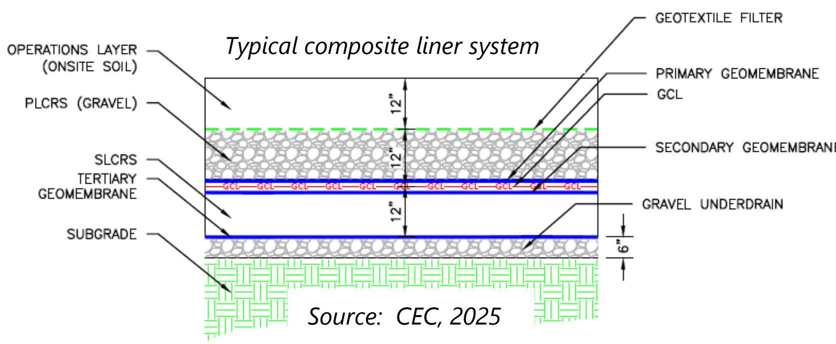
of approximately 370 feet above mean sea level near the southwestern portion of the development area to an elevation of approximately 250 feet above mean sea level near the northeastern portion of the development area. Slope areas will be developed at a gradient of 2 (horizontal) to 1 vertical, and the floor area of the development will be graded to drain to the northeast at a gradient of 2 percent. The multiple-layer composite system contains the following key components, from bottom to top:

- An underdrain layer of sand or gravel (or other possible geosynthetic component) that keeps the groundwater from impinging on the liner.
- A tertiary geomembrane, referred to as a flexible membrane liner (FML), of high-density polyethylene (HDPE) that separates the groundwater from lower layers of the liner system.
- A second layer of sand or gravel (or other possible geosynthetic component) that provides for detection and secondary containment of possible leaks. This layer is monitored for volume and water quality as part of the detection monitoring program.
- Two more FML layers (primary and secondary geomembranes separated by a geosynthetic clay liner) to provide containment of leachate and fluids produced within the landfill. •



Source: CEC, 2025

- A 12-inch-thick leachate collection and removal system (LCRS) designed to collect and remove leachate generated in the landfill and convey the liquid to a pond for treatment; this prevents the accumulation of leachate along the base of the landfill and removes the downward hydraulic pressure that could drive leachate from this layer into the underlying secondary layer and to groundwater.
- A 12-inch-thick operations layer comprising on-site soils that reduces the likelihood of waste materials damaging the composite liner system components

As currently proposed, the composite liner system design far exceeds the OAR 340 and 40CFR258 standards. The final design and installation will be approved by the DEQ and construction will be closely monitored, tested and certified by a professional engineer, consistent with a DEQ-approved quality assurance and quality control plan.

Geo-Logic ASSOCIATES

Respectfully submitted,

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REGISTERED PROFESSIONAL
OREGON
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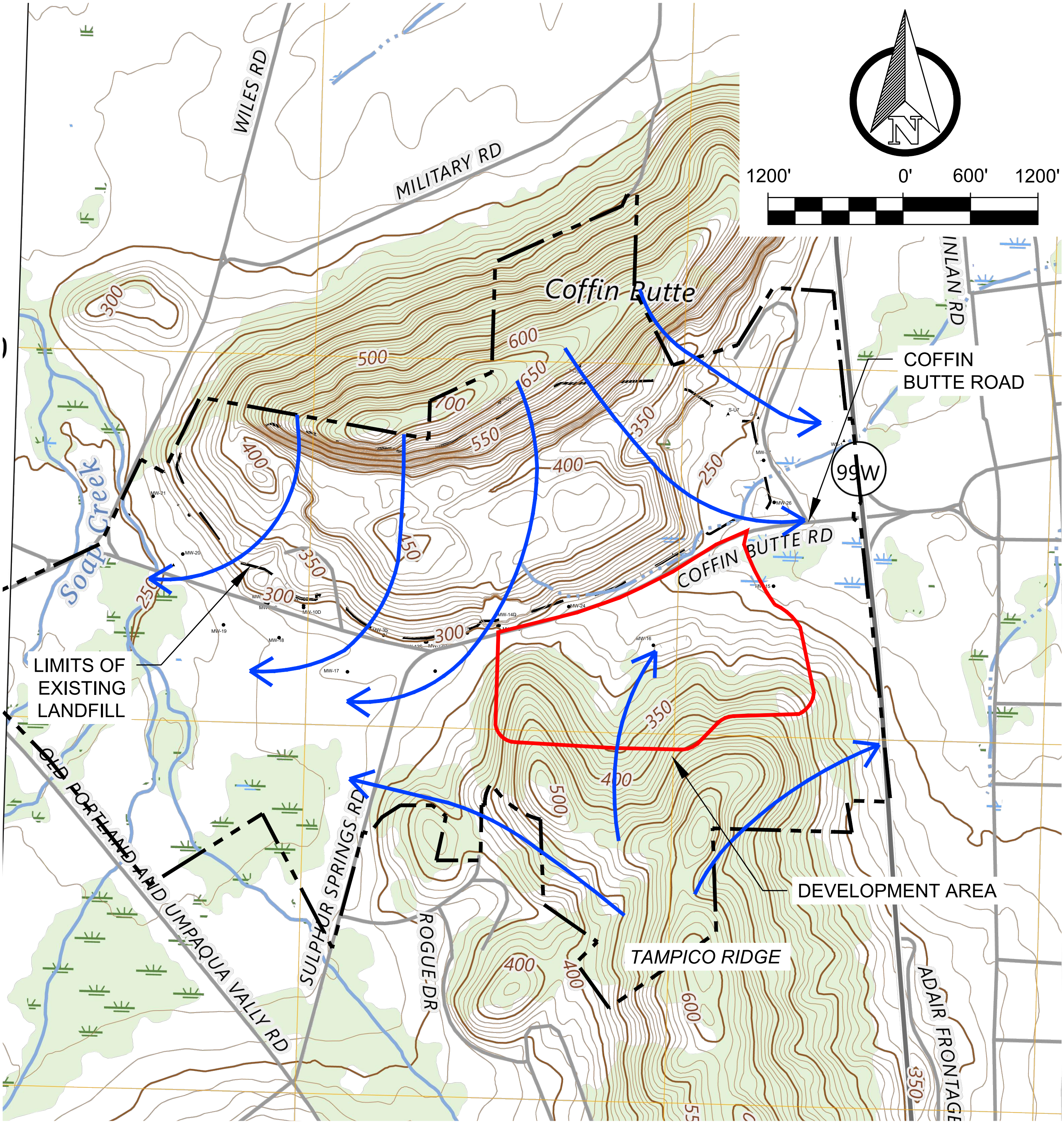
Exp 12/1/2025



LEGEND

(red line)	DEVELOPMENT AREA
(dashed black line)	PROPERTY BOUNDARY
(blue arrow)	GROUNDWATER FLOW DIRECTION

NOTES

1. MAP OVERLAY FROM USGS 2024 LEWISBURG QUADRANGLE OREGON 7.5- MINUTE SERIES NAD83 WGS84.

COFFIN BUTTE LANDFILL
RESPONSE TO COMMENTS - CUP APPLICATION
BENTON COUNTY, OREGON

GROUNDWATER FLOW CONDITIONS

FIGURE NO. 1

PROJECT NO. AU24.1090.00

DATE OF ISSUE: 06/11/2025 DRAWN BY: SMD APPROVED BY: JH

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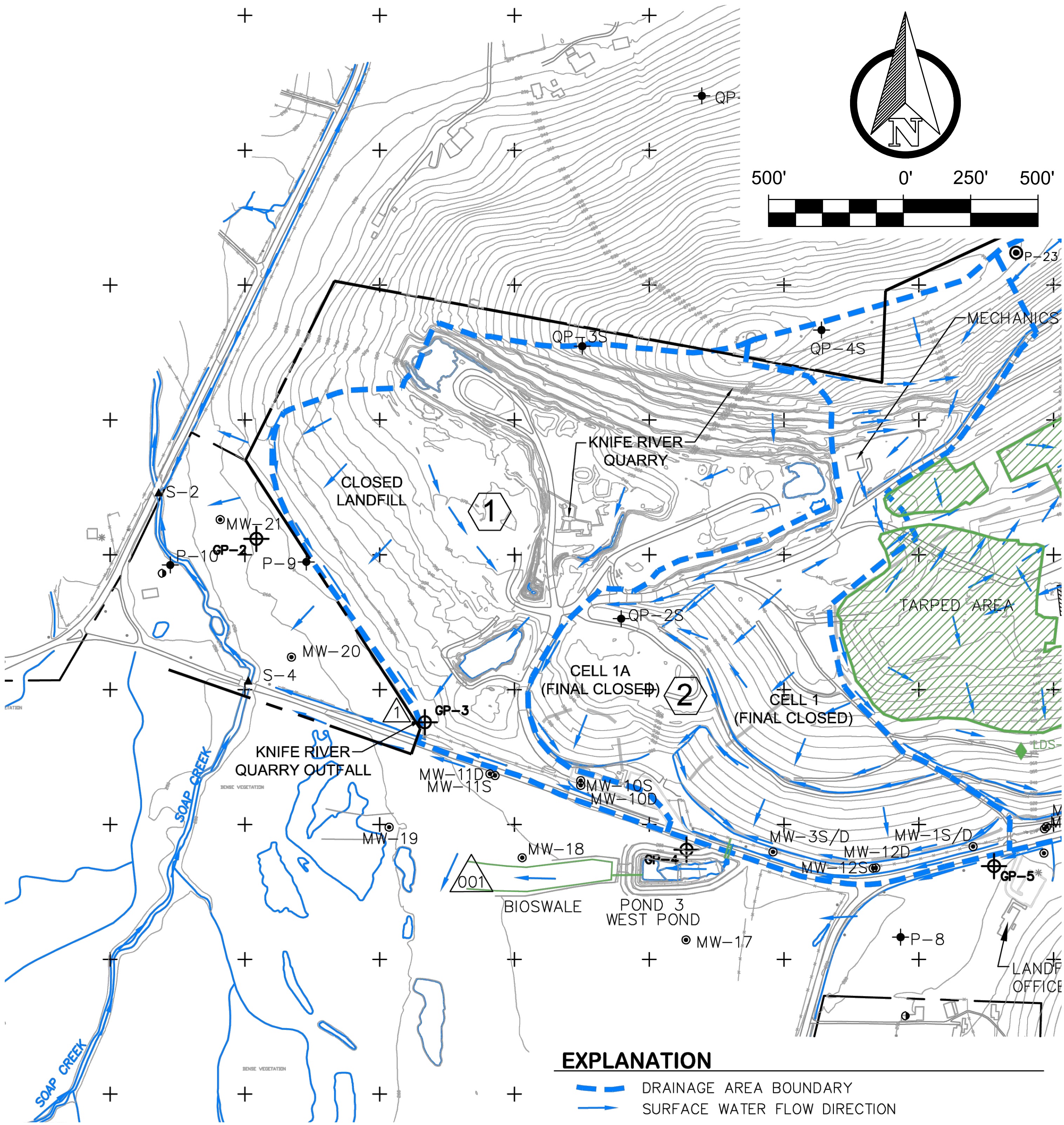

COFFIN BUTTE LANDFILL

RESPONSE TO COMMENTS - CUP APPLICATION

BENTON COUNTY, OREGON

DRAINAGE MAP

FIGURE NO. 2

PROJECT NO. AU24.1090.00

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