Edgewood Legacy Landfill Closure Plan

Prepared for:

Regional District of Central Kootenay

ISSUED FOR USE

Prepared by:

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PRJ25043

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1. Background

The Regional District of Central Kootenay (RDCK) has ownership and control of several Legacy Landfills which have historically received municipal solid waste with various levels of closure. As these sites are no longer receiving waste the RDCK is looking to abandon the permits for these sites and as such has been instructed to complete Closure Plans for each site. This report seeks to satisfy the requirements set out by the Ministry of Environment and Park's (ENV) for final closure of the Edgewood Landfill site and abandonment of the permit.

To develop the Closure Plan, Sperling Hansen Associates (SHA) has relied on background information provided by the RDCK, gained from a Request for Information made to the ENV. These documents include:

- Correspondence from ENV (1973-2000, 223 pages)
    - This includes the original permit, inspection reports, etc.
- 1992 Amended Permit PR-04366
- 2003 Draft Operational Certificate to Replace Permit PR-4366
- 2012 ENV Inspection Report and Photos

SHA conducted a site visit on May 24, 2025 to gather further information and ensure that the landfill can be closed according to above guidance and to the satisfaction of the Ministry of Environment prior to permit abandonment.

2. Introduction and Site History

The Edgewood Landfill site is located approximately 2.5km northwest of Needles, BC, along Highway 6. The permit application lists the property for the landfill as Block 6 and 7 of Plan 1214, DL 7892, Central Kootenay District, and the site is currently held by the RDCK under a Licence of Occupation for operation of the transfer station. The property slopes towards the Whatshan River, just to the east of the site, which is otherwise bordered by Highway 6 to the west and a Ministry of Transportation gravel pit to the south (Figures 1 and 2).

Figure 1: Edgewood Landfill Location

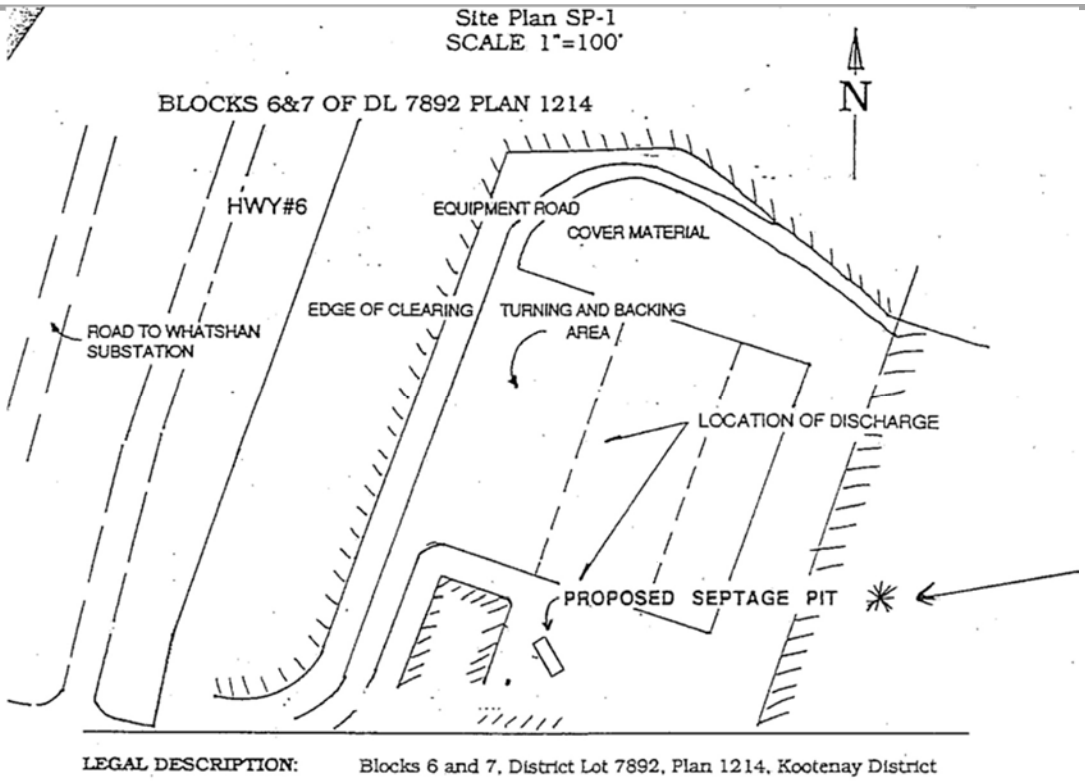

Figure 2: Site Plan From 1992 Amended Permit PR-04366

The landfill was originally commissioned in 1976 with Permit PR-04366 to replace unpermitted refuse sites located at Edgewood and Fauquier, which were 'operated' by BC Hydro at the time. The site was engineered by SIGMA Engineering as a combination of over-the-edge landfilling and trench and cover operations. Waste was to be dumped over the edge, then routinely pushed down, compacted, and covered in a trench at the base of the slope.

The landfill was replaced by a transfer station in 1999, but in examination of historical pictures it seems that landfilling appears to have continued past this date into 2000. This is consistent with inspection reports for the site, which indicate continued struggles with proper maintenance of the site and lack of cover material. The site continues to operate as a transfer station today, and accepts solid waste, recyclables, and yard & garden waste.

An undated Municipal Solid Waste Landfill Survey likely completed in 1994 or early 1995 estimated the total quantity of disposed waste to be 1,500m^3 and an expected intake for 1995 of 1,000m^3. These estimates don't line up, and instead SHA used the following information to determine the waste in place:

- Site operated for 24 years (1976-2000)
- Maximum discharge specified in Permit PR-04366 was 1.8 m^3/day
- Estimated that average discharge was 75% of maximum allowed
- Waste density of 0.6 tonnes/m^3

These assumptions provide for an estimated tonnage of in place waste to be 7,100 tonnes, up to a maximum of 9,500 tonnes if the maximum discharge limit was reached each day of operation.

3. Final Cover

There are no records for the final cover that might have been placed on the landfill site, but SHA's site investigation revealed that there is between 150mm to 300mm of sandy soil and vegetative

layer covering 50% of the landfill surface, with the other 50% being exposed waste or consists of minimal cover (Photos 1 and 2). While on site, SHA used a hand auger to investigate 5 locations (dwg. PRJ25043-EDGEWOOD-2) to gain an understanding of the cover soil, the results of which are presented in Table 1.


Photos 1 and 2: Exposed Waste on Landfill Area and Typical Cover Soil Found on Site

Table 1: Hand Auger Results

#	Location	Depth	Results
1	Transfer Station Area	0.35m	0 to 0.1m – Wood waste 0.1 to 0.35 m – Native sand
2	Closed Landfill Slope	0.4m	0 to 0.1m – Vegetative cover 0.1 to 0.3m – Sandy soil 0.3m – Waste encountered
3	Transfer Station Area	0.15m	0 to 0.15m – Gravel
4	Closed Landfill Surface	0.3m	0 to 0.1m – Vegetative Cover 0.1 to 0.25m – Sandy soil 0.3m – Waste encountered
5	Old Site Access Road		Native soils/sand

The Landfill Criteria lists several objectives of the final cover design for any landfill in Section 5.8: Final Cover Design. These are listed below, and the following sections explain how the current cover system either meets these objectives or how more work will be required:

- Prevent exposure of humans and/or wildlife to MSW
- Control infiltration of precipitation
- Minimize the uncontrolled release of methane to the atmosphere
- Limit erosion and release of sediment to surrounding surface waters
- Control release of odours
- Minimize oxygen infiltration and fire risk

Portions of the historical landfill site that are not currently utilized for the Transfer Station do not have sufficient cover, and in some areas have inert waste exposed. These areas should be covered with 0.5m of material to prevent exposure of humans or wildlife to MSW. As there is no readily available cover material on site, SHA recommends that cover material be sourced from the adjacent gravel pit, or the RDCK could use the excess of woodchips at their other solid waste sites, to cover the area. While this material will not prevent the infiltration of surface water, it is SHA's professional opinion that the waste placed at the site is sufficiently old enough that leachate generation is not a concern at this time.

As explained further in Section 7 – Landfill Gas Management, the amount of LFG being produced at the site is not sufficient enough to require the use of a low-permeable material. Furthermore, the porous nature of the soils near the site and the unlined nature of the landfill will simply force any small amounts of gas to migrate outside of the waste mass instead of vertical venting – the release of methane will not be reduced through use of a low-permeability soil. The minimal amounts of gas that will be produced over the next years will also severely limit the production and release of any odours on site, and SHA did not note any evidence of LFG while on site.

Further to what has been explained thus far, the age of the waste means that the landfill is likely biologically inactive, and thus the risk of fire is minimal at this time.

4. Surface Water Management

SHA's site investigation revealed no water on site or near the waste mass, and there was no evidence observed of erosion or surface water channels. As recorded in the historical documents and observed by SHA on site, the local geology consists of sandy, well draining soils and the transfer station area is surrounded by an area that allows for water to infiltrate, preventing run-on to the transfer station and historical landfill area.

The Whatshan River is located approximately 270m to the East of the site, but SHA believes that the age of the waste, the small nature of the landfill footprint, and the semi-arid nature of the region mean that the site will have minimal if any impact on the water quality within the river.

Climate data for the site was available from a nearby Fauquier monitoring station located approximately 4.7km from the Edgewood site. The most recent climate normal were available for the period from 1981-2010 which is presented in the following table:

Table 1: 1981-2010 Fauquier Climate Normals Data

	Daily Average (°C)	Rainfall (mm)	Snowfall (cm)	Precipitation (mm)
Jan	-1.7	24.9	48.9	73.8
Feb	-0.6	24.7	19.6	44.3
Mar	3.4	48.5	8.4	56.9
Apr	7.8	61.3	0.3	61.6
May	12.2	76.1	0	76.1
Jun	15.8	90.1	0	90.1
Jul	18.7	66.6	0	66.6
Aug	18.2	47.4	0	47.4
Sep	13.1	56.3	0	56.3
Oct	7.2	63.5	0.4	63.8
Nov	2	61.7	19.4	81.1
Dec	-1.7	26.2	47.2	73.4
Year	7.9	647.2	144.1	791.3

5. Site Maintenance

While on site, SHA observed that there is litter scattered throughout the site boundary. While the site currently consists of a transfer station and this may contribute to the litter, these areas should be cleaned up and litter removed. Some exposed waste will be covered through the application of cover material, but larger pieces of waste such as the 'camping setup' and parts of auto hulks shown in the photos below will need to be removed.

Photos 3 and 4: Litter and Pieces of Exposed Waste Observed by SHA While on Site

In addition to the litter and larger pieces of waste present surrounding the landfill, the metal and tire piles at the transfer station do not seem to be well consolidated, leading to the potential for confusion or mixing with the historical waste at the site. The tires semi-buried in the slope adjacent to the transfer station should be removed (Photo 5), and the metal and wood piles should be delineated in a fashion that waste is not pushed over the edge and is stored in a tidy fashion. SHA believes that this can be achieved with a simple lock-block wall or lock-blocks placed along the edge of the slope.

Photo 5: Tires and Metal Waste Scattered in Northwest Area of Site

6. Leachate Management

No evidence of leachate was observed at the site during SHA's site visit, and it was assumed that groundwater from the site would flow towards the Whatshan River, East of the site. According to SHA's experience and database of leachate generation potentials aligned with the precipitation received at the sites, the Edgewood site as a moderate leachate generation potential (Figure 3). The absence of leachate breakouts on the slope, combined with the distance to the Whatshan River and the semi-arid nature of the site leads SHA to believe that there is minimal generation of leachate that would impact the river.

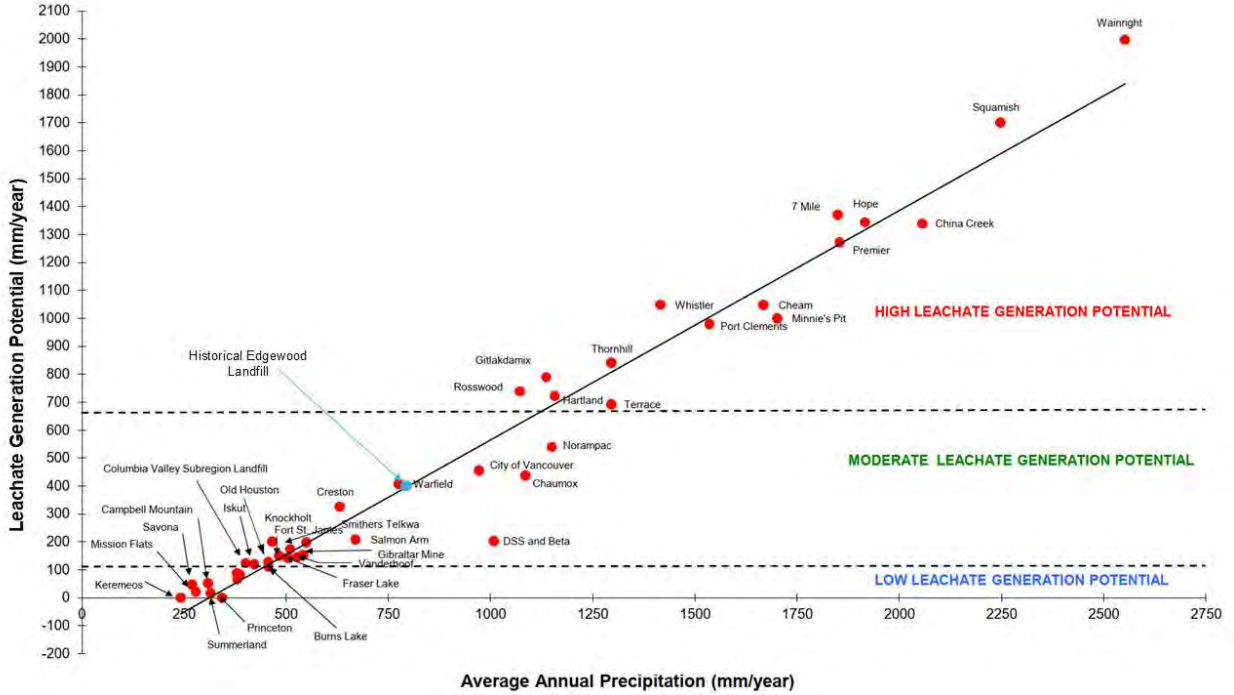

Figure 3: Leachate Generation Potential of Landfills in BC

7. Landfill Gas Management

Landfill Gas (LFG) is a by-product of natural decomposition of organic material in landfills. The two main components of landfill gas are methane (CH4) and carbon dioxide (CO2), which vary in concentration through several parameters, including waste composition, age of the waste, and the level of atmospheric air intrusion into the landfill. [1]

After waste is placed, it takes 1 to 3 years for the landfill to produce amounts of gas large enough to be noticed. Following this, peak production of landfill gas occurs 5 to 7 years after placement, after which the amount of gas produced is significantly reduced. After 20 years, almost all gas will have been produced from waste, but small amounts of gas may be produced for up to 50 years after waste is placed in the landfill. [1] Given that the waste in the Edgewood Landfill was last placed around 25 years ago, it is unlikely that the landfill is currently producing any significant amount of landfill gas and no management infrastructure is required.

8. Contaminating Lifespan and Environmental Monitoring

The amount of waste in place at the historical Edgewood Landfill is estimated to be minimal (around 7,100 tonnes), for which the BC MSW Landfill Criteria recommends a standard contaminating lifespan of 50 years. However, considering the minimal risk of leachate as explained in Sections 3 and 6 and the minimal amounts of LFG being produced at the site, SHA believes that the contaminating lifespan is much shorter. Understanding that the absolute minimum contaminating lifespan is 30 years, SHA believes that this should be used for the Edgewood landfill given that there is a very small amount of waste in place, and that any efforts to cover the waste will remove the current primary concern at this site.

Upon review of the provincial water well registry, there is currently only one groundwater well within a 1km radius of the landfill footprint, and no wells within the projected western downgradient of the site. There are wells several kilometres to the North and South of the site, and closer to Upper Arrow Lake, however these are on the other side of the Whatshan River so these wells will not be impacted by the site. Given this information and that there are no downgradient receptors between the site and the river, SHA believes that no environmental monitoring is required for the remaining 5 years of the contaminating lifespan.

9. ENV Closure Plan Requirements

When the RDCK submitted an Application for Permit Abandonment to the ENV, the ENV indicated that this closure plan should address several specific sections of the Landfill Criteria. This section details how these sections are followed within this closure plan or provides justification for exemption from these criteria.

9.1 Section 5.8 – Final Cover Design

Final cover design for the historical Edgewood Landfill site is discussed in Section 3: Final Cover. As discussed there, additional cover is required on the landfill slopes. As no leachate staining was observed on site, SHA believes that this material could be either gravel sourced from the adjacent gravel pit or woodchips sourced from other RDCK solid waste management facilities.

9.2 Section 5.9 – Final Contours

The list below outlines the final contour requirements as outlined in the BC Landfill Criteria:

- Final contours shall be constructed at grades not steeper than 3H:1V.
- Recommended plateau area is slope not less than 10H:1V. Can be reduced up to 25H:1V for geomembrane systems.

- Surface water control benches shall be provided on the landfill final contours every 15 vertical metres or less.

Based on SHA's assessment of the Edgewood Landfill and as discussed in Section 3, the existing contours meet the requirements for closure, except for the northern area as indicated on dwg. PRJ25043-EDGEWOOD-1. This steep slope area should be covered with material well suited for quick vegetation growth so that vegetative cover can be quickly established and prevent erosion.

9.3 Section 7.0 – Closure and Post-Closure Criteria

This document presents the Closure Plan for the Edgewood Landfill site and seeks to update the Closure according to the 2016 BC Landfill Criteria for MSW. Post-closure operation has been undertaken since the site was converted to a Transfer Station in 1999-2000. The contaminating lifespan and post-closure monitoring requirements are discussed in Section 8: Contaminating Lifespan and Environmental Monitoring.

9.4 Section 10.3 – Design, Operations, and Closure Plan

According to the Landfill Criteria, each landfill is required to have current and up to date a Design, Operations, and Closure Plan (DOCP) prepared by a qualified professional. This plan is to demonstrate that the landfill will be 'planned, designed, constructed, operated, monitored, and closed in accordance with the "Criteria"'. SHA believes that as this landfill is no longer receiving waste, the preparation of a DOCP is an exercise that will have no benefit to the site, the Ministry, or the RDCK in closure of the site. Rather, SHA believes that as the only aspects of the DOCP left to be addressed are the monitoring and final closure, this closure plan will be sufficient to satisfy the requirements of the DOCP according to the Criteria.

This Closure Plan, which is required in the DOCP, documents how the facilities environmental controls will be maintained following closure to meet all performance criteria.

9.5 Section 10.3.2 – Surface (Storm) Water Management Plan

The surface water management has been addressed in Section 4: Surface Water Management.

9.6 Section 10.3.4 – Closure Plan

Each landfill is required to have a closure plan, and Sections 1 through 8 of this report seek to satisfy the requirements set forth in the Criteria for Closure Plans. These include:

- Final cover design to meet requirements and objectives
- Surface water management
- General site maintenance
- Leachate management
- Landfill Gas Management
- Environmental monitoring during the contaminating lifespan
- Practical and implementable contingency measures

Due to the older nature of the site, there are no contingency measures identified at this time.

10. Recommendations

Based on SHA's review of the available documents, the site visit, and our experience with landfill closure, we have the following recommendations for the site prior to the permit being abandoned.

1. Clean up litter on site and in surrounding areas and dispose of accordingly.
    a. This includes clean up of the rubber tires, metal scatter and debris in the Northwest area of the site.

2. Implement measures such as lock-block delineation of edge of slope to prevent metal waste from being pushed over edge and potentially impacting the closure system.
3. Place a minimum of 500mm of cover material over the landfill slope to prevent human or wildlife exposure to waste.
    a. Material does not need to be low permeability material, as there are no concerns about leachate at the site.
4. The area with steep slopes should have a minimum of 500mm of cover material placed over top, with material well-suited for vegetation growth to prevent erosion and improve slope stability.
    a. This area should be seeded following cover placement

The table below provides a recommended timeline for the implementation of these closure measures. It should be noted that these timelines are subject to change, pending the approval of this closure plan by the ENV.

Table 2: Implementation Timelines

Task	Initiation	Duration	Completion
Litter clean up	2025	1 Week	2025
Delineation of slope	2025	1 Week	2025
Place cover material	2026	1 Month	2026
Place cover material over steep slopes	2026	1 Month	2026
Seed cover material	2026	1 Week	2026

11. Statement of Limitations

Sperling Hansen Associates (SHA) have prepared this report on behalf of the Regional District of Central Kootenay (RDCK) in accordance with generally accepted engineering practices, to a level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions in British Columbia.

The report is based on site visits, project experience, and analysis of data compiled during the preparation of this report from several sources, done by SHA staff. Except where specifically stated to the contrary, the information on which this study is based has been obtained from external sources. This external information has not been independently verified or otherwise examined by SHA to determine its accuracy and completeness. SHA has relied in good faith on this information and does not accept responsibility of any deficiency, misstatements or inaccuracies contained in the reports as a result of omissions, misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation.

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The findings and conclusions of this report are valid only as of the date of this report. The interpretations presented in this report and the conclusions and recommendations that are drawn

are based on information that was made available to SHA during the course of this project. Should additional new data become available in the future, SHA should be requested to re-evaluate the findings of this report and modify the conclusions and recommendations drawn, as required.

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August 28th, 2025

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President and Chief Engineer

12. References

[1] Agency for Toxic Substances and Disease Registry, "Landfill Gas Primer - An Overview for Environmental Health Professionals," ATSDR, November 2001. [Online]. Available: https://www.atsdr.cdc.gov/hac/landfill/html/ch2.html. [Accessed 10 June 2025].

SPERLING HANSEN ASSOCIATES

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No.	DATE yr/m/day	REVISIONS	DRAWN	CHK'D	APP'D

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REGIONAL DISTRICT CENTRAL KOOTENAY

DESIGN BY: -

DRAWN BY: M. DOORNBOS

DATE CREATED: 2025/08/13

SHA PROJECT #: PRJ25043

RDCK LEGACY LANDFILL CLOSURE PLANS

EDGEWOOD LANDFILL

DRAWING NO.	REV	SHEET
PRJ25043-EDGEWOOD-1	1	1

N

Auger 5

Auger 4

Auger 2

Auger 3

Auger 1

625

630

630

Landfill Slope Profile

Landfill

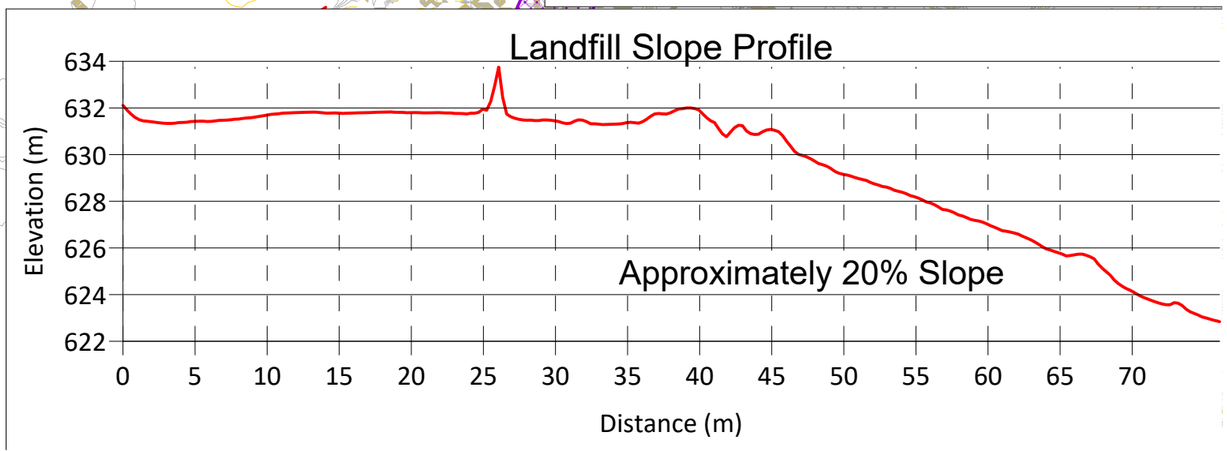
0m 10m 20m 30m 40m 50m

Historical Perimeter Access Road

Steep Slopes in Landfill Area

Auger Location

Estimated Waste Footprint



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CELEBRATING 30 YEARS OF ENGINEERING EXCELLENCE

No.	DATE yr/m/day	REVISIONS	DRAWN	CHK'D	APP'D

REGIONAL DISTRICT CENTRAL KOOTENAY

DESIGN BY: -

DRAWN BY: M. DOORNBOS

DATE CREATED: 2025/08/13

SHA PROJECT #: PRJ25043

RDCK LEGACY LANDFILL CLOSURE PLANS

EDGEWOOD LANDFILL

DRAWING NO.	REV	SHEET
PRJ25043-EDGEWOOD-2	1	1

APPENDIX A
Site Photolog

Photo 1: Overview of Edgewood Site. Highway 6 visible at top of photo.

Photo 2: Site Entrance with attendant shack and reuse shed visible on left.

Photo 3: North side of site including metal pile and recycling sheds.

Photo 4: Wood pile location

Photo 5: North edge of landfill slope area. Note exposed waste in treeline.

Photo 6: Taken from North side of landfill slope area, looking South.

Photo 7: Exposed waste on landfill slope area.

Photo 8: Metal waste and tires embedded in upslope area.

Photo 9: Site entrance gate.

Photo 10: Site entrance with attendant shack on right.

Photo 11: Attendant's shack.

Photo 12: Reuse shed.

Photo 13: Recycling area with metal pile on right, and tire/propane tank storage on left.

Photo 14: Wood storage pile.

Photo 15: Metal pile placed just upslope of exposed waste on landfill surface.

Photo 16: Metal recycling pile.

Photo 17: Metal and tires embedded on upslope side of site.

Photo 18: Litter on site just North of recycling area.

Photo 19: Metal waste on surface North of recycling area.

Photo 20: Steep slopes with exposed waste on North side of site.

Photo 21: Steep slopes and exposed waste on North side of site, viewed from above.

Photo 22: Steep slopes and exposed waste on North side of site, viewed from below.

Photo 22: Litter scattered in treeline adjacent to site.

Photo 23: Bottom toe of landfill slope, viewed from historical perimeter road.

Photo 24: Typical cover material on landfill slope.

Photo 25: Typical cover material on landfill slope.