2024 ANNUAL REPORT FOR THE VANCOUVER LANDFILL

Prepared for:

BC MINISTRY OF ENVIRONMENT AND PARKS

Prepared by:

CITY OF VANCOUVER
Engineering Services
Transfer and Landfill Engineering and Environment
320 – 507 West Broadway
Vancouver, BC
V5Z 0B4

March 28, 2025
Version: Final

This Page is Intentionally Blank

EXECUTIVE SUMMARY

The purpose of this report is to fulfill the annual reporting requirements defined in the Landfill's Operational Certificate (OC) MR-01611 (BC Ministry of Environment and Parks, formerly known as BC Ministry of Environment and Climate Change Strategy, hereafter ENV, 2001) and the BC *Landfill Criteria for Municipal Solid Waste, Second Edition* (ENV, 2016). The report covers the period of January 1 to December 31, 2024. The ENV Annual Compliance Status Form is also included.

Background

The Vancouver Landfill opened in 1966 and is owned and operated by the City of Vancouver. It is located at 5400 72 Street in Delta, in the southwest corner of Burns Bog, and is only accessible via Highway 99 Southbound. Further details on the site background and regulatory structure are included in the report.

The Landfill plays an integral role in the management of municipal solid waste (MSW) from commercial and residential sources within Metro Vancouver as part of Metro Vancouver's *Integrated Solid Waste and Resource Management Plan* (Metro Vancouver, 2010). The waste received at the Landfill is either direct-hauled or transferred through the Vancouver South Transfer Station (VSTS), also owned and operated by the City of Vancouver, or one of Metro Vancouver's Recycling and Waste Centres.

Authorized waste discharge

The Landfill is authorized to accept up to 750,000 tonnes of MSW for disposal each year. Materials used beneficially, such as for cover, road building and closure, are not counted towards this annual discharge limit. In 2024, 733,196 tonnes of waste were disposed at the Vancouver Landfill.

Leachate and stormwater management

In 2024, approximately 2.1 million cubic metres (cu. m) of leachate and surface runoff were delivered to Annacis Island Wastewater Treatment Plant for treatment at a cost of approximately $3.99 million.

A total of 51 leachate, surface water and groundwater monitoring stations are sampled quarterly as part of the Landfill's Water Quality Monitoring Program. In 2024, an additional 12 monitoring stations were sampled during the winter (January to March) and fall (October to December) to assess stormwater quality in closed areas of the Landfill and potential receiving water bodies.

As an ongoing operational practice, clean stormwater is periodically released from storage ponds to the Dredge Pond, diverting flow from the leachate collection and containment system and subsequently reducing leachate treatment and conveyance costs. In 2024, approximately 1.36 million cu. m of the total precipitation fell on closed areas with diversion infrastructure and was ultimately diverted through controlled release to the Dredge Pond and evapotranspiration from the cover system and stormwater ponds.

Landfill gas control

In 2024, new horizontal gas collectors were installed on Lift 6 of Phase 5 South and 58 vertical gas extraction wells were installed throughout Phases 1, 3, 4, and 5. By the end of 2024, there were a total of 306 vertical gas extraction wells, 144 horizontal gas collectors, 13 DRAINTUBE (DT) gas collectors and 10 side slope gas collectors for a total of 473 gas collection points.

Commissioning of two renewable natural gas (RNG) facilities occurred in 2024, specifically Delta RNG in January and FortisBC RNG in December. As a result, approximately 70 percent of landfill gas (LFG) collected was flared through the year, while the remainder was utilized by the RNG facilities. Approximately 76.3 million cu. m of LFG (normalized to 50 percent methane) was collected and destroyed in 2024.

Closure capacity

To date, a total of 126.8 hectares (ha) have been progressively closed, representing 56 percent of the 225 ha Landfill footprint.

Recycling

Through the Zero Waste Centre, 1,709 tonnes of materials were recycled in 2024. A breakdown of the types and quantities of recycled materials is included in this report. Pilot projects for the collection of upholstered furniture and durable plastics continued in 2024.

Compost

The City operates a Composting Facility to process yard trimmings dropped off at the VSTS and Landfill into finished compost for sale and donation. In 2024, approximately 19,400 tonnes of yard trimmings were composted and approximately 6,022 tonnes of finished compost were distributed.

Table of Contents

List of Tables

List of Figures

List of Appendices

1. Introduction

This report covers the period from January 1 to December 31, 2024. It has been prepared to fulfill the requirements of the Landfill's Operational Certificate MR-01611. This report is available online at vancouver.ca/landfill-annual-report, along with reports from previous years.

This report addresses the reporting requirements described in Section 3.5.2 of the OC with Table 1 summarizing where the required information can be found.

Table 1: Operational Certificate Reporting Requirements

OC Reporting Requirement	2024 Annual Report Section(s)
Updates to the design and operating plan	2. Design and operating plans
Revised closure/post closure costs	3. Closure and post closure costs
Planned improvements	4. Planned improvements
Records for waste, recyclable material and compost quantities	Table 6: Inbound Material Quantities for 2023 and 2024 Table 8: 2023 and 2024 Recycling Quantities 7.4 Yard trimmings collection and composting Appendix 2: Annual waste quantities
An evaluation of recycling and composting programs, including waste diversion projections	7. Waste reduction and recycling initiatives
A review of receiving environmental monitoring data with interpretation, including leachate flow data and leachate/drainage ditch levels suitably tabulated	8.3 Water quality monitoring program and annual review Appendix 6: 2024 Water quality monitoring program review executive summary Appendix 7: 2024 Weekly leachate and drainage ditch water elevations
An evaluation of leachate generation control measures	8.1 Leachate, surface runoff and stormwater management system 8.2 Leachate generation
An evaluation of the efficiency of the landfill gas management systems, including an estimation of the landfill gas generation rate, percent recovery and the actual rates/volumes of gas collected, utilized and flared	8.5 Landfill gas collection efficiency
A list of operating problems and corrective actions taken	9.3 Operating problems and corrective actions
A summary of the public complaint and resolution log	9.5 Public complaint and resolution log

This report also meets the reporting requirements as per Section 10.6 of the BC *Landfill Criteria for Municipal Solid Waste, Second Edition* (ENV, 2016) with Table 2 summarizing where the information can be found.

Table 2: Additional Reporting Requirements as per the Landfill Criteria

Landfill Criteria Reporting Requirement	2024 Annual Report Section(s)
Total volume of waste discharged into the landfill for the year	Table 6: Inbound Material Quantities for 2023 and 2024 Appendix 2: Annual waste quantities
Operational plan for the next 12 months	2. Design and operating plans
Remaining site life and capacity	2.3 Remaining capacity
Closure works completed	2.1 Site plan and progressive closure status Appendix 1: Progressive closure status
Results of regular inspection for cover integrity, health of vegetation, undesirable plant species, burrowing animals, erosion, settlement, etc.	9.2 Site inspections
Any changes from approved reports, plans and specifications	2. Design and operating plans
Compaction, waste to cover ratio, waste to road ratio and airspace utilization factor	2.2 Operational efficiency
Operational and maintenance expenditures	9.4 Operational and maintenance expenditures

As of January 1, 2016, annual reports for high priority authorizations must include the ENV Annual Compliance Status Form. The form for the Vancouver Landfill lists all OC conditions, all of which were met in 2024, and is included at the back of this document in Appendix 9.

2. Design and Operating Plans

Golder Associates Ltd. (Golder) completed the *Design Plan, Vancouver Landfill, Delta, BC* (Design Plan, Golder, 2019a) and *Operating Plan, Vancouver Landfill, Delta, BC* (Golder, 2019b) in early 2019. The Design Plan is a reference for landfill design and progressive closure, while the Operating Plan is a guide for day-to-day operation of the Landfill.

Table 4 shows the updates made to the 2019 Design and Operating Plans to the end of 2024.

Table 3: Design and Operating Plan Updates

Year	Update	Documented	Annual Report Reference
2020	Figures referencing final contours and filling sequence of Phase 4 (Operating Plan)	Phase 4 Closure Report (SHA, 2024a)	2024
2021	Figures referencing final contours and filling sequence of Phase 5 (Operating Plan)	Phase 5 South and North Filling Plan – DOPC Updates (SHA, 2021)	2021
2024	Filling sequence changed to start filling in south of Phase 5, moving northward and divided Phase 5 into three areas instead of two, creating Phase 5 Centre and adjusting closure boundaries (Design Plan) Filling plan amended to recover airspace on the south/west banks of Phase 5 South, deferring Phase 5 South Closure to 2025 (Design Plan)	Phase 5 South Closure and Gas System Upgrades (SHA, 2024b)	2024

In August 2022, the City retained Sperling Hansen Associates Inc. (SHA) to complete a fully updated Design, Operations and Progressive Closure Plan for the Landfill which is expected to be completed in 2025.

2.1. Site plan and progressive closure status

The Landfill property is 320 ha in size, which contains the operational area (within the perimeter ditches) of 225 ha, a 16.7 ha pond historically used for dredging cover material, and perimeter buffer zone. In 2009, a 200 ha area of undeveloped land known as Parcel 2 that was part of the original Landfill property was transferred to the City of Delta, the Greater Vancouver Sewerage and Drainage District (GVS&DD) and Metro Vancouver (formerly Greater Vancouver Regional District). In 2013, an additional 100 ha area known as Lot 9 was transferred to the City of Delta. The transferred areas are shown in Figure 1 and the site plan for the Landfill property is shown in Figure 2.

Progressive closure phases and a profile view of the engineered fill plan are shown in Figure 3.

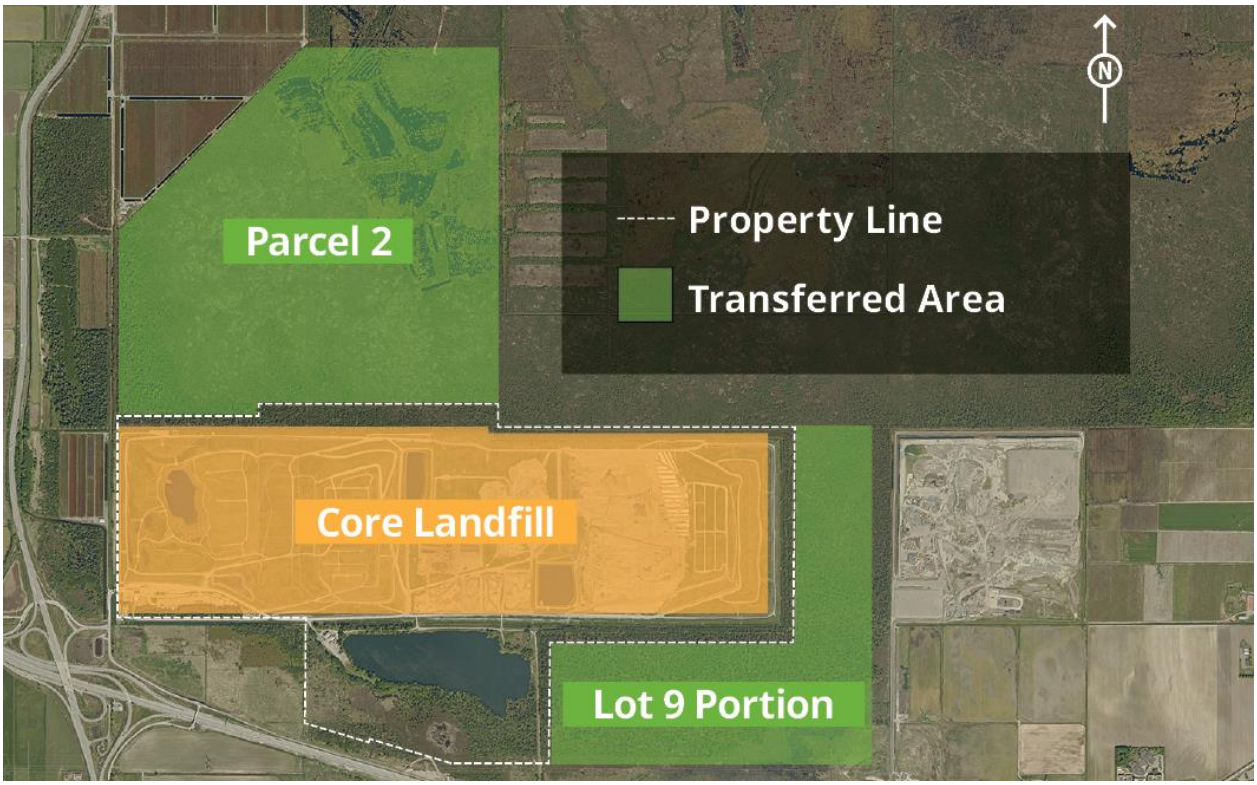


Figure 1: Vancouver Landfill Property and Footprint

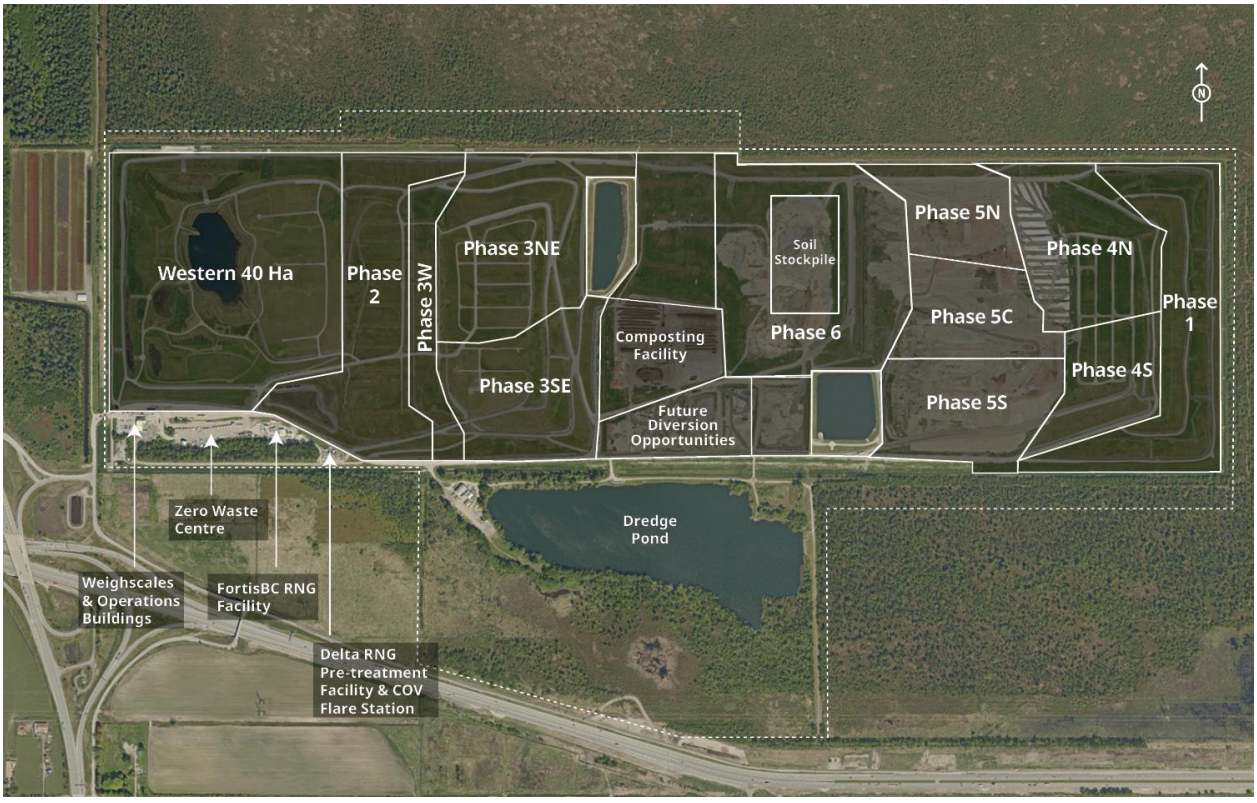


Figure 2: 2024 Vancouver Landfill Site Plan

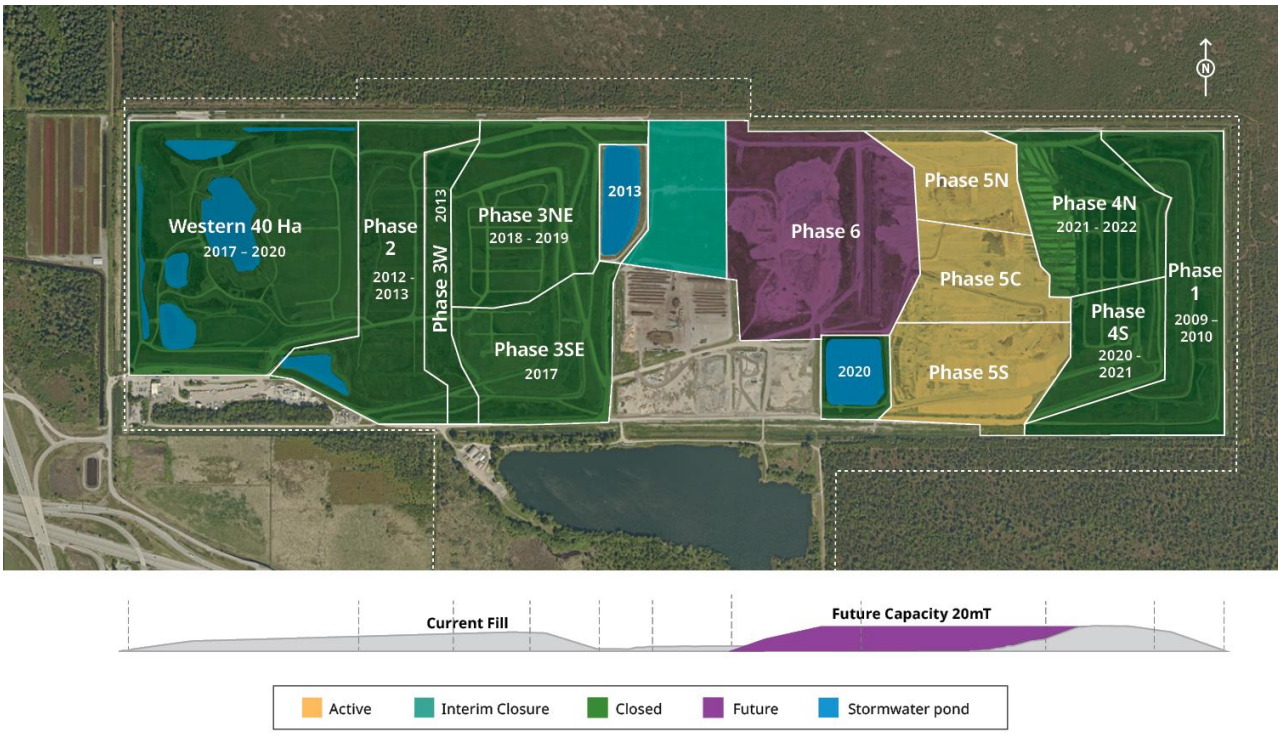


Figure 3: 2024 Landfill Fill and Progressive Closure Plan

In 2024, MSW filling and asbestos disposal occurred in Phase 5 North, Phase 5 Centre and Phase 5 South with the active face moving as needed to facilitate construction of horizontal gas collectors. In general, Phase 5 South was filled in the first half of 2024, and the others filled in the second half. At the end of the year, filling also occurred on the banks of Phase 5 South in preparation for progressive closure in summer 2025.

The operational plan over the next 12 months includes completion of filling in Phase 5 South in preparation for closure in 2025, and filling focussed mainly in Phase 5 Centre with some additional filling in Phase 5 North to advance gas works to meet CleanBC funding award commitments. Litter fencing will continue to be added on every lift, and the gas collection infrastructure in Phase 5 will continue to be expanded.

As of the end of 2024, several phases have been progressively closed with engineered cover systems, including the Western 40 Hectares and Phases 1, 2, 3 and 4. No closure work occurred in 2024, as planned. A more detailed breakdown of the progressive closure status, up to and including 2024, is available in Appendix 1.

2.2. Operational efficiency

Aerial mapping and analysis has been completed at the Landfill annually since 2000. The flight to generate contour data occurs around the beginning of April when weather permits, and the data are typically available within three months. SHA was retained by the City to complete the annual data analysis from 2022 to 2024.

The purpose of this project is to utilize the contour data from the previous and current years coupled with the tonnages of materials disposed and beneficially used to assess the following parameters:

- Landfill settlement
- Compaction density
- Air space consumption
- Waste to cover ratio and waste to road[1] materials ratio
- Remaining capacity
- Lifespan analysis

As per SHA's *Vancouver Landfill 2023 to 2024 Aerial Mapping Report* (SHA, 2025), the following operational efficiencies were achieved from March 30, 2023 to May 3, 2024, for the Phase 5 active area:

- Compaction density of 0.77 tonnes per cu. m for MSW in Phase 5. This value is back-calculated using assumed densities from various geotechnical sources and survey volumes after accounting for settlement.
- Airspace utilization factor of 1.38 cu. m per tonne in Phase 5.
- Waste to cover ratio by volume of 2.02:1 was achieved in Phase 5. This is dependent on multiple factors, including estimated settlement and the large amount of cover material coming to the site.
- Waste to road materials ratio by volume of 5.42:1 was achieved in Phase 5. Waste to road materials ratio represents the volume of waste divided by the volume of all materials used for construction of roads, including recycled crushed rock, wood waste and demo hog.

2.3. Remaining capacity

Per the 1999 agreement between the City of Vancouver and City of Delta (City of Vancouver and the Corporation of Delta, 1999), the current waste capacity of the Landfill is defined as 20 million tonnes of MSW as of October 1, 1997. The remaining capacity as of December 31, 2024 is 4,228,582 tonnes, which at the current fill rate will be reached in 2030. The overall airspace remaining based on taking the difference between final design contours and the 2024 flight contours is an estimated 5.73 million cubic metres.

[1]Road materials include beneficial use materials such as clean wood waste, demo hog and crushed concrete/rubble.

3. Closure and post closure costs

The OC requires the City to maintain a dedicated reserve fund sufficient to finance closure, post-closure and environmental contingencies related to the Landfill. The Solid Waste Capital Reserve (SWCR) was established to address these costs. In 2001, Council set the minimum balance of the SWCR at $30 million and directed that the requirements for the SWCR be reviewed every five years. At the end of 2024, the closing balance of the SWCR was approximately $89 million. This reflects a net increase of $9.3 million from 2023, which is due to the transfer of surplus tipping fees exceeding operating and pay-as-you-go capital costs through the year.

Every year, closure and post-closure costs are reviewed and updated with current available information. For the 2024 Landfill liability calculation, the Design Plan with staff updates was used as the primary resource. The net present value for closure and post-closure costs is $148 million, up from $142 million in 2023 as a result of aligning the closure date (2030 based on current fill rates) with the 1999 agreement.

According to the 1989 Tripartite Agreement (GVS&DD, City of Vancouver and City of Delta, 1989), Metro Vancouver is responsible for closure and post-closure costs based on the proportion of regional waste in place at the Landfill. The City of Vancouver is responsible to pay for closure and post-closure costs for Vancouver and Delta waste. These percentages are reviewed and adjusted annually. At the end of 2024, 39 percent of the total waste in place at the Landfill was regional waste, with the remaining 61 percent originating from Vancouver and Delta. This represents an increase of 1.2% in the proportion of Metro Vancouver regional waste since 2023.

4. Planned improvements

4.1. Leachate, surface water runoff and stormwater management

In October 2022, the City awarded the 2022-2027 Water Quality Consulting and Stormwater Management Planning Project to AECOM Canada Ltd. (AECOM). Key tasks initiated under this contract in 2024 include:

- 2024 Annual Water Quality Monitoring Review (completed Q1 2025)
- Perimeter Stormwater Management Strategy (initiated in 2024 – in progress)

In 2025, the City will focus on completing the Perimeter Stormwater Management Strategy and subsequent Conceptual Design. In addition, certain aspects of the *City of Vancouver Landfill Stormwater Management Plan* (AECOM, 2020) will be advanced, namely developing conceptual designs for engineered discharge and conveyance structures. The City is also planning to develop a design for stormwater flow measurement instrumentation to be installed in select conveyance pipes that discharge to the Dredge Pond. In addition, the City has expanded upon Phase 1 of the *Landfill Leachate Pump Station Assessment* (AECOM, 2022) by initiating the second phase of the study. The Phase 2 study is expected to be completed in 2025 and will include inflow and capacity analysis, a system risk assessment and the development of an upgrade strategy.

4.2. Landfill gas collection

Modifications and upgrades to the LFG collection system undertaken in 2024 are summarized in Table 4.

Table 4: Implemented Modifications and System Upgrades in 2024

Landfill Sub Area	Activity	Description
Phases 1,3,4	Installation	15 vertical gas extraction wells (re-drills)
Phase 5 South	Installation	Lift 6 horizontal gas collectors
	Installation	13 vertical gas extraction wells
	Installation	17 pre-closure vertical gas extraction wells
Phase 5 North	Installation	9 vertical gas extraction wells (finished banks)
	Installation	4 vertical gas extraction wells

In 2024, the City was awarded $8.8M through the CleanBC Industry Fund with planned construction between 2025-2029 for works over and above business-as-usual. CleanBC funding opportunities support the City's continued endeavours to increase the LFG Collection Efficiency (CE) with the associated reduction in fugitive GHG emissions. Planned modifications and upgrades to the LFG collection system scheduled for 2025 are summarized in Table 5.

Table 5: Planned Modifications and Upgrades in 2025

Landfill Sub Area	Activity	Description
Phases 1,3, 4	Installation	5 vertical gas extraction wells for densification
Phase 5 North	Installation	Lift 2 horizontal gas collectors
	Installation	Lift 3 leachate collector
	Installation	Lift 4 horizontal gas collectors
	Installation	9 vertical gas extraction wells (finished banks)
	Installation	4 vertical gas extraction wells

4.3. Progressive landfill closure

The contract for design and construction supervision of Phase 5 Closure was awarded to SHA in March 2023. Design of Phase 5 South Closure was completed in December 2024. The construction contract is expected to be awarded in Q1 2025 with construction planned between April and October 2025.

4.4. Landfill facilities

The following projects continued or were completed in 2024:

- Sign Fabrication and Installation Project
- Landfill Road Paving

The following works are planned for construction in 2025:

- Landfill Civil Works Project
- Landfill Electrical Upgrades
- Diesel Pump Replacement and Pond Water Supply
- Prefab Storage and Workshop Units

Details on these completed and planned works are found below.

4.4.1 Sign fabrication and installation project

In 2023, Pacific Sign Group Inc. DBA Knight Signs (Knight Signs) was retained to fabricate and install the new signs, as well as decommission and recycle/dispose of existing site signs. Fabrication and installation took place in 2024, with some additional work planned in 2025 to address deficiencies and install additional signs requested in 2024.

4.4.2 *Landfill paving*

The City of Vancouver Streets Operations Branch completed asphalt paving in multiple areas of the Landfill in 2024. A total area of over 7,000 m^2 was paved, including repairs made to the Landfill entrance and roads, and paving of a new pad and extension of an existing paved road.

4.4.3 *Landfill Civil Works project*

In 2023, RAM Engineering Ltd. completed the detailed design for site improvements in the Zero Waste Centre (ZWC) as part of the Landfill Civil Works Project. In 2024, Scott Construction Group was awarded the construction contract to install a cover over the household hazardous waste storage area, two bin canopies for the drop-off bays to support new diversion opportunities, and an additional covered storage area for operations. An intercom located at the Landfill scales by-pass lane will also be installed. Construction is scheduled to be completed in Q2 2025.

4.4.4 *Landfill electrical upgrades*

Stantec Engineering Ltd. (Stantec) was retained in 2022 to provide an assessment of the state of Landfill electrical infrastructure and determine what (if any) upgrades are required for future infrastructure. A Capacity Review Report was received in 2023 containing Stantec's recommendations for electrical upgrades (Stantec, 2023).

In 2024, Stantec coordinated with BC Hydro to upgrade their power lines as Stage I of the project. The City also initiated Stage II by retaining PBX Engineering Ltd. to provide design and construction supervision for on-site equipment upgrades, generator replacement as well as a capacity assessment of the existing buildings on site. The design will be finalized in early 2025 and construction is planned to begin in late 2025.

4.4.5 *Diesel pump replacement and pond water supply*

A contractor-owned and operated diesel pump is typically used to supply collected rainwater in the Phase 3 stormwater pond for on-site dust control throughout the dry summer months. In this project, the City identified the opportunity to purchase an electric pump to reduce rental costs and emissions.

Water Street Engineering Ltd. was retained in 2023 to provide professional services, including detailed design and construction supervision and the new pump will be commissioned in 2025.

4.4.6 *Prefab storage and workshop units*

Conceptual and detailed design work to address the need for updated and expanded office, storage and indoor workshop areas was advanced in 2024 by McGinn Engineering and Preservation Ltd. Construction is expected to begin in late 2025.

5. Waste disposal and beneficial use materials

The Landfill is authorized to accept up to 750,000 tonnes of waste each year. The annual totals for 2023 and 2024 for municipal solid waste, demolition material, soil, road construction and capital and closure materials are provided in Table 6. Historical quantities are shown in Figure A1.

Table 6: Inbound Material Quantities for 2023 and 2024

Material	**2024 Quantity** (tonnes)	**2023 Quantity** (tonnes)
Waste Discharge		
Municipal Solid Waste	672,779	684,499
Bottom Ash	39,347	38,177
Demolition Material	21,069	20,932
Soil including Cover	603,018	455,900
Road Construction and Other Beneficial Use Materials		
Demo hog	89,727	90,791
Wood waste	3,455	3,432
Crushed concrete	40,293	67,787
Purchased concrete and rock	49,199	32,073
Sand	0	775
Capital and Closure Materials		
Aggregate	1,915	21,567
Sand and Soil	248	11,827
Total*	1,521,050	1,427,760

Note:
* Totals may vary due to rounding errors.

5.1. Municipal solid waste disposal

Waste disposed at the Landfill is either direct-hauled or transferred through the VSTS or one of Metro Vancouver's Recycling and Waste Centres.

In 2024, a total of 733,196 tonnes of waste (MSW, bottom ash, and demolition material) were disposed of at the Landfill, reflecting a decrease of approximately 1.4% from 2023. Of this, 140,013 tonnes were transferred through the VSTS, and 405,722 tonnes were transferred through Metro Vancouver Recycling and Waste Centers.

Table A1 in Appendix 2 provides a breakdown of material type, origin and disposal location for 2024. Table A2 provides the 2023 breakdown for comparison. Table A3 shows the breakdown by month of material types for 2024. Details on some of these materials are included in the following sections.

5.1.1 Asbestos waste

The Landfill receives asbestos waste from commercial and residential sources. The definition of asbestos waste used in the Landfill's Asbestos Policy (City of Vancouver, 2019) follows the *Occupational Health & Safety Regulation* (BC Ministry of Labour, 1998).

Commercial asbestos waste is received for direct burial, while residential asbestos waste is received in a dedicated bin at the Zero Waste Centre. Commercial loads of asbestos waste must meet the *Transportation of Dangerous Goods Regulation* (Transport Canada, 1985).

Burials occur a minimum of 20 metres away from all active areas and include the placement of a minimum of 0.5 m of material on the waste. An exposure control plan is in place that includes periodic exposure monitoring to confirm the risk of asbestos exposure is low.

A total of 6,341 tonnes of asbestos waste was disposed of in 2024, down from 9,447 tonnes in 2023.

A total of 509 tonnes of used residential drywall (suspect asbestos containing material) was received at the Landfill in 2024, down from 536 tonnes in 2023. Used drywall from commercial customers is not accepted due to the availability of alternative disposal options within the commercial sector.

In December 2022, the City submitted an application for an ENV authorization amendment to increase the Landfill's authorized capacity for asbestos to correct an administrative error in the previous authorization. The City received a letter from the ENV in May 2024 amending the Landfill's authorization as requested. (ENV, 2024)

5.1.2 Demolition material

Demolition material is mainly wood waste with small amounts of soft construction material, which must meet the minimum criteria for wood content of 80 percent. In 2024, a total of 21,069 tonnes of demolition material was received at the Landfill, compared to 20,932 tonnes received in 2023. Demolition material was used for preparation of roads and drainage layers in Phase 5, and the remainder was landfilled.

5.1.3 Construction and demolition processing residual waste

The Landfill receives construction and demolition processing residual waste from around the region. This waste stream is composed of the materials that remain after construction and demolition waste has been processed to remove recyclable materials. In 2024, a total of 58,526 tonnes of this material was received from licensed transfer stations and material recovery facilities in the region, down from 64,524 tonnes in 2023.

5.1.4 Bottom ash

The Landfill receives bottom ash from the regional Waste-To-Energy Facility. Approximately 95 percent of bottom ash received at the Landfill has undergone a metal-recovery process and is acceptable for disposal without confirmatory sampling or analysis. The remaining bottom ash received is unprocessed and undergoes testing to confirm that it does not meet hazardous waste criteria (ENV, 1988) before it is landfilled, according to Metro Vancouver's Bottom Ash Management Plan (Metro Vancouver, 2020a). A total of 39,347 tonnes of bottom ash was disposed of in 2024, slightly more than 38,177 tonnes in 2023.

5.3 *Soil including Cover*

Soil received at the Landfill is typically excavation material generated by sewer, water and street construction activities in the Metro Vancouver region.

In 2024, the Landfill received a total of 603,018 tonnes of soil. The majority of soil received was sent directly to Phase 5 for cover where needed or disposed. The remaining soil is directed to the soil stockpile area (see Figure 2).

The soil stockpile area is managed by the on-site contractor, Poschner Construction 88 Ltd. (Poschner), who must maintain a minimum of 30,000 cu. m of soil in the area at all times. Articulated ('Yuke') dump trucks are used to deliver soil to the active face on an as needed basis. Soil usage data by location is considered for Annual Aerial Mapping.

5.4 *Road construction and other beneficial use materials*

Road construction materials for temporary access roads on the active areas at the Landfill include purchased and recycled concrete, demolition (demo) hog and wood waste.

The City regularly retains a contractor for processing clean concrete and asphalt received at the Landfill. Crushed material is used for Landfill operations and in closure works when they occur. In 2024, one crushing event took place in September and October. Approximately 40,300 tonnes of recycled concrete and asphalt for crushing and 49,200 tonnes of purchased aggregate were received for road construction in 2024.

Demo hog is ground construction wood waste received at a reduced fee from local processors for use as top dressing on tipping pads. Demo hog is classified as a beneficial use material and not counted towards the annual authorized discharge as approved by ENV in February 2008 (ENV, 2008). Approximately 89,730 tonnes of demo hog were received in 2024, down from 90,791 tonnes in 2023.

Since January 1, 2011, residential quantities of wood waste have been accepted at the Landfill at a reduced fee to encourage diversion. Wood waste is ground onsite and then used as road base. At the Landfill, 3,454 tonnes of wood waste were received and reused in 2024, up from 3,432 tonnes in 2023.

5.5 *Capital and closure materials*

Materials used for the construction of engineered cover systems, roads and other improvements in completed areas of the Landfill are periodically sourced and brought to the Landfill. In 2024, contractors sourced approximately 1,915 tonnes of aggregate and 248 tonnes of sand and soil for capital works such as emergency berm repairs (see Section 8.3) and improvements to the landfill gas and stormwater collection systems.

5.6 *Other authorized waste*

Other ongoing waste disposal authorized by ENV are for Non-Recyclable Wastewater Treatment Plant (WWTP) Residuals and Non-Recyclable Drinking Water Treatment Plant (WTP) Residuals, both generated by regional facilities.

5.6.1 Non-Recyclable Wastewater Treatment Plant Residuals

The Landfill has a consolidated authorization from ENV to dispose of non-recyclable WWTP residuals from any of the five regional WWTPs (ENV, 2012). The following residuals were received in 2024:

- Grit from Annacis Island, Lion's Gate, Lulu Island and Iona WWTPs. Grit is primarily composed of materials that are denser than water and may include sand, pebbles, cinders, coffee grounds, seeds, cigarette filters and organic matter.
- Sludge and scum screenings from Annacis Island WWTP. Sludge screenings are solids composed of hair, plastic debris, paper fibers and other finer materials. Scum screenings are floating materials such as toilet paper, waste paper products, plastics and other buoyant materials, which are generally combined with fat and grease.

As part of ENV's authorization to accept WWTP residuals, the City and Metro Vancouver were required to develop a sampling and reporting program. Metro Vancouver completes a Landfill Waste Assessment Form annually to confirm WWTP residuals are not Hazardous Waste. Further, Metro Vancouver completes characterization sampling and reporting on a biennial basis.

The most recent *Grit and Screenings Characterization Study Sub-Report* was completed for Metro Vancouver in December 2024 (WSP, 2024). This report summarizes the 2024 sampling program results of the non-recyclable WWTP residuals disposed of at the Landfill. In 2024, all samples from WWTPs disposing residuals at the Landfill met the applicable guidelines. The next report is expected in 2026.

In 2024, 2,525 tonnes of grit were buried as nuisance waste in Phase 5. The tonnage of WWTP residuals received is reported as a separate line item (Sewage Treatment Plant Residuals) in Table A1 in Appendix 2.

5.6.2 Non-Recyclable Drinking Water Treatment Plant Residuals

The Landfill receives WTP residuals from the Seymour Capilano Filtration Plant under authorization by ENV for disposal as MSW (ENV, 2011). The residuals consist of silt and sediment from the raw water reservoir and the coagulants added to bind the sediment together. In 2024, 4,063 tonnes of WTP residuals were accepted at the Landfill.

5.7 Nuisance Waste

Nuisance waste is defined as material that requires special consideration, documentation, handling or disposal (such as direct burial). These materials typically originate from small businesses or light industry and are not classified as Hazardous Waste. The waste generator completes a Landfill Waste Assessment Form and submits it for review and approval by City staff.

Nuisance waste also includes materials such as invasive species or food that has been ordered for destruction or burial by the Canadian Food Inspection Agency (CFIA). Deep burial is required to meet CFIA requirements and is often witnessed by a CFIA Officer. The Canadian

Border Services Agency also periodically orders destruction of specific materials entering Canada.

Table 7 lists the types of nuisance wastes and quantities received at the Landfill in 2024. The tonnage of nuisance waste burials in 2024 was 1,389 tonnes or 13 percent less than in 2023.

Table 7: 2024 Nuisance Waste Quantities

Material	2024 Quantity (tonnes)
Invasive and Toxic Species (CFIA)	8662.9
Non-Compostable Food	283.2
Tree Stumps and Root Bulbs	140.4
Fish and Shellfish Waste	128.5
Street Sweepings	106.9
Marine Nets and Ropes	89.0
Non-Recyclable Cardboard and Styrofoam	52.6
Film Plastics	45.8
Ropes and Rubber	25.9
Plastic-Contaminated Green Waste	17.0
Other*	359.9
Total	9,912.1

Note:
* Other includes concrete with rebar, ice paint, nylon web slings, insulation, expired medical equipment, odourous wastes and other miscellaneous wastes requiring special handling.

6. Waste composition

Metro Vancouver publishes waste composition study reports for the region, and the City contributes as a partner by coordinating waste audits at the VSTS. The data is combined with data gathered at other regional facilities.

Metro Vancouver published three waste composition studies in 2024, focusing on different sectors within the region's solid waste system. All three studies were prepared by Dillon Consulting Limited:

1. The 2023 Multi-Family Waste Composition Study (Dillon, 2024a) examines garbage, recycling and organics from multi-family residences throughout the region.
2. The 2023 Commercial and Institutional Waste Composition Study (Dillion, 2024b) examines garbage, recycling and organics from the following sectors:
    - Retail and Wholesale Trade
    - Food and Accommodation
    - Manufacturing
    - Business and Commercial Services (Offices)
    - Education
    - Health and Welfare
3. The 2023 Full-Scale Waste Composition Study (Dillon, 2024c), provides composition breakdowns from the following sources:
    - Single-family Residential
    - Multi-family Residential
    - Commercial/Institutional
    - Small Loads

These studies, as well as those completed in previous years, are available on Metro Vancouver's website: https://metrovancouver.org/services/solid-waste/reports-resources

7. Waste reduction and recycling initiatives

7.1 Zero Waste Centre

The ZWC offers a recycling area for large items not typically included in curbside collection programs (e.g. mattresses, scrap metal, white goods) and a number of Product Stewardship Program materials (i.e. paper and packaging, household batteries, lead acid batteries, smoke alarms, tires, thermostats, used oil, used oil filters).

In 2023, a pilot project was launched to trial the collection of upholstered furniture and bulky, durable plastics for recycling and energy recovery. The purpose of the pilot project is to assess the operational and financial feasibility of collecting and preparing to haul these difficult to recycle items. These materials were successfully managed at the Landfill ZWC throughout 2024, and collection will continue in 2025.

Recycled quantities received are provided in Table 8. The total amount of materials recycled in 2024, including the tonnes associated with materials measured in litres and other units was 1,709 tonnes. This is an 11 percent increase from 1,542 tonnes in 2023.

Table 8: Recycling Quantities for 2023 and 2024

Item	2024	2023	Units
Books	7.0	8.1	tonnes
Clothing	8.6	7.0	tonnes
Containers (Plastic, Metal, Paper)[1]	2.3	2.4	tonnes
Cooking Oil	1.0	1.2	tonnes
Drywall, new scraps only	67	76	tonnes
Durable Plastics	23.6	7.3	tonnes
Electronics and Small Appliances[1]	138	128	tonnes
Fire Extinguishers	1.6	1.5	tonnes
	706	676	units
Furniture (Upholstered)	86	62	tonnes
	1,522	1,128	units
Glass Bottles and Jars[1]	3.6	5.1	tonnes
Household Batteries and Cell Phones[1,2]	1.0	1.1	tonnes
Lead Acid Batteries[1]	25.6	20	tonnes
Light Bulbs[1,3]	2.2	1.3	tonnes
Mattresses	408	266	tonnes
	16,354	10,655	units
Mixed Paper and Cardboard, Residential[1]	166	197	tonnes
Flexible Plastics[1]	7.4	6.4	tonnes
Plastic Foam Packaging[1]	3.8	7.8	tonnes
Product Care Items (Paint, Aerosol, Pesticide, Solvent)[1,3]	49	50	tonnes
Propane Tanks	6,316	4,534	units
	7.8	6.2	tonnes
Refrigerators, Freezers and Air Conditioners[1]	151	156	tonnes
	2,383	2,418	units
Scrap Metal (excluding Refrigerators, Freezers and Air Conditioners)	495	468	tonnes
Smoke Alarms[1]	4	0	boxes
Thermostats[1]	0	73	units
Tires[1]	30	29	tonnes
	2,862	2,746	units
Waste Antifreeze[1]	1.2	2.9	tonnes
	1,210	2,931	litres
Waste Oil[1]	22	31	tonnes
	25,055	34,492	litres
Waste Oil Filters[1]	0.9	1.0	tonnes
Total[3]	**1,709**	**1,542**	**tonnes**

Note:

[1] Product Stewardship Program material

[2] Cell phone weights not tracked by vendor. Included in battery totals.

[3] Includes tonnes calculated for items measured in units, pieces and litres. Conversion factors are provided by Metro Vancouver and Product Stewards.

7.2 Household Hazardous Waste

Household hazardous wastes (HHW), such as paints, used oil, flammable liquids and pesticides, are banned from disposal at the Landfill. The City partners with the Product Care Association of Canada to accept a variety of HHW products regulated under the Product Stewardship Program at the Landfill ZWC. However, residents periodically abandon or discard non-program HHW in loads of refuse. HHW materials are stored in a secure area until they are picked-up and disposed of appropriately by a third party.

In 2024, 2.38 tonnes of non-program hazardous wastes were collected at the HHW facility. The cost of contracted services for the removal and disposal of HHW not covered by stewardship programs was $16,999, up from $11,353 in 2023. Costs incurred in 2024 were approximately 50 percent higher than 2023. As HHW is removed from the Landfill ZWC periodically, a portion of the cost incurred in 2024 may have been related to HHW received in late 2023. Note that City staff time to segregate and pack the materials is not included in the costs above.

7.3 Disposal bans

Since 2008, the City has implemented disposal bans in alignment with Metro Vancouver to reduce the amount of material being landfilled that could instead be recycled and follow BC's *Recycling Regulation* (ENV, 2004) (defines materials to be managed under provincial Extended Producer Responsibility Programs).

Materials banned from disposal as garbage at the Landfill are defined in the appendices of the City's *Solid Waste By-law No. 8417* (City of Vancouver, 2024) and, as much as practical, mirror those which are banned in Metro Vancouver's *Tipping Fee Bylaw* (GVS&DD, 2024).

Disposal bans are enforced by Metro Vancouver's inspection officers that routinely visit the City's disposal facilities. Disposal ban violation notices and surcharges are issued to those customers that dispose of banned materials in excess of the defined thresholds. Appendix 3 contains a complete list of materials that are accepted for recycling at the Landfill and those that are banned from disposal as garbage.

7.4 Yard trimmings collection and composting

In 2024, approximately 19,400 tonnes of yard trimmings were received directly at the Landfill or transferred through VSTS, down from approximately 21,000 tonnes in 2023.

The Composting Facility includes a 4.2 ha paved surface, a dual-shaft shredder, an excavator, two front-end loaders, a star screener and a windrow turner.

The static windrow composting method is used to process yard trimmings into finished compost. The feedstock is ground up and placed in windrows (piles), then turned regularly to maintain optimal oxygen and temperature levels. After a minimum of six months in windrows, the material is screened and stockpiled for curing and subsequent sale or donation.

A total of 6,043 tonnes of finished compost were distributed in 2024, down from 6,954 tonnes in 2023. Compost sales totaled 5,202 tonnes in 2024, and the remaining 841 tonnes were donated to City of Delta and City of Vancouver residents during free compost campaigns.

Compost quality is compared to standards set out in ENV's *Organic Matter Recycling Regulation* (ENV, 2002) based on the feedstock and composting method used. In 2024, the compost met the standards for unrestricted distribution for all parameters listed in the Regulation. A summary of the annual mean compost quality in 2023 and 2024, and the standards for unrestricted use are provided in Table 9.

Table 9: Compost Quality for 2023 and 2024

Parameter	BC Standard mg/kg unless stated	2024 Mean Value mg/kg unless stated	2023 Mean Value mg/kg unless stated
Arsenic	13	3.28	4.00
Cadmium	3	0.38	0.41
Chromium	100	16.4	18.2
Cobalt	34	3.93	4.03
Copper	400	36.2	40.3
Lead	150	18.4	19.7
Mercury	2	0.09	0.09
Molybdenum	5	1.20	1.45
Nickel	62	12.2	13.1
Selenium	2	<0.50	<0.50
Zinc	500	130.8	140
Foreign Matter (%)	1	<0.10	<0.10

7.5 Diversion projections

The *Integrated Solid Waste and Resource Management Plan* (ISWRMP) (Metro Vancouver, 2010) established future diversion targets for the region, and outlined initiatives for achieving these targets.

As per the *2021 ISWRMP Biennial Report* (Metro Vancouver, 2022) produced by Metro Vancouver, 65 percent of the waste generated in the region in 2020 were recycled or diverted from disposal. This diversion rate is slightly higher than the rate determined in the previous period (2018) as reported in the *2019 ISWRMP Biennial Report* (Metro Vancouver, 2020b). The next ISWRMP report is anticipated to be published in 2025.

8. Environmental protection programs

8.1 Leachate, surface runoff and stormwater management system

Water management at the Landfill is described using the following terminology:

- **Leachate** - produced by rainwater percolating through waste.
- **Surface runoff** - rainwater that flows along the surface of areas of the Landfill (subject to the placement of daily or intermediate cover) and may be impacted by leachate.
- **Stormwater** - rainwater that is collected above the engineered cover system installed in closed areas of the Landfill. Stormwater is not impacted by leachate.

The Landfill site is underlain by compressed peat and a continuous layer of relatively impermeable clayey-silt, which is referred to as the natural soil barrier layer. Prior to the placement of waste in each landfill cell, a layer of demolition material was placed on top of the peat to provide a conduit for lateral leachate flow to the perimeter ditch system. The layer of demolition material, natural soil barrier layer and perimeter ditch system are collectively referred to as the leachate collection and containment system, as shown in Figure 4. The inner ditch collects leachate, while the outer ditch, more commonly known as the drainage ditch, collects clean water that runs off adjacent land. The drainage ditch is maintained at a higher level than the inner ditch to contain leachate in the inner ditch as shown in Figure 5. Leachate is conveyed from the pump station located in the southwest corner of the Landfill through force mains to the Annacis Island WWTP under *Waste Discharge Permit SC-100168-FSA* (GVS&DD, 2011), referred to as WDP.

In addition to leachate, surface runoff is routed to the inner ditch. An internal storage pond (linear pond 4) is used to reduce peak discharge to the sewer system and located north of the Phase 4 stormwater retention pond. The Phase 2, Phase 3 and Phase 4 closure areas each have a dedicated pond for stormwater retention, while Phase 1 utilizes a toe ditch. There are six retention ponds for clean stormwater in the Western 40 Hectares. The leachate, surface runoff and stormwater management system is shown in Figure 4.

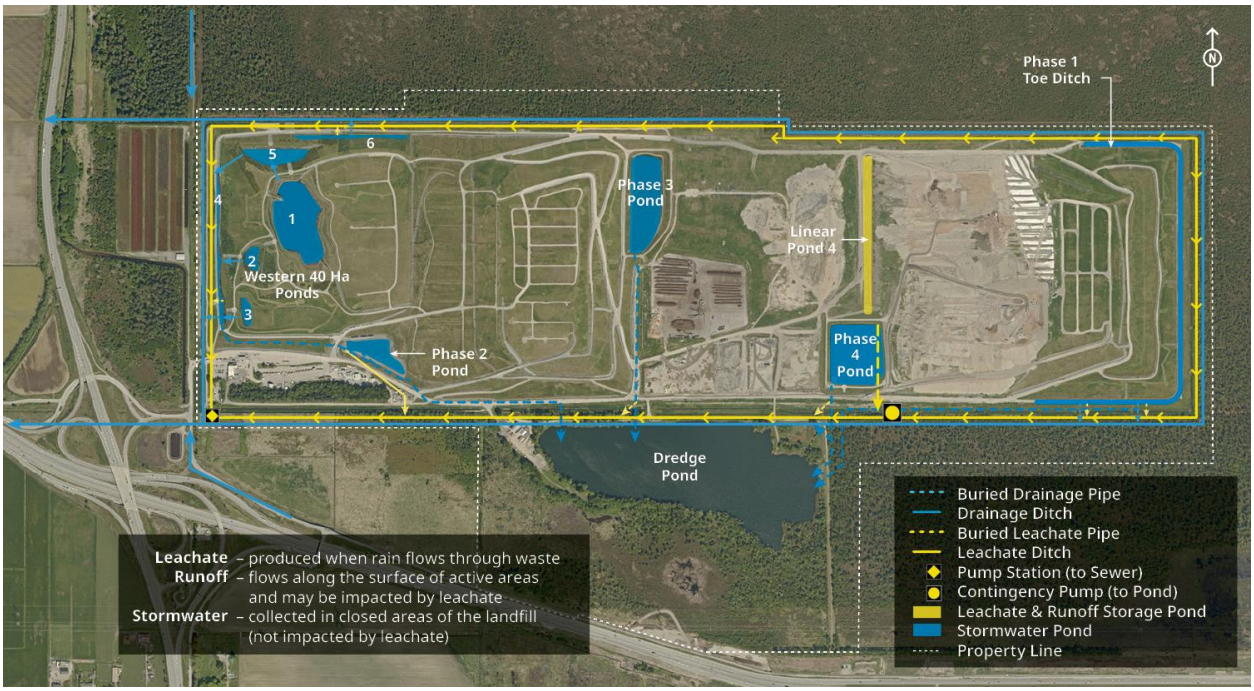


Figure 4: Leachate, Surface Runoff and Stormwater Management

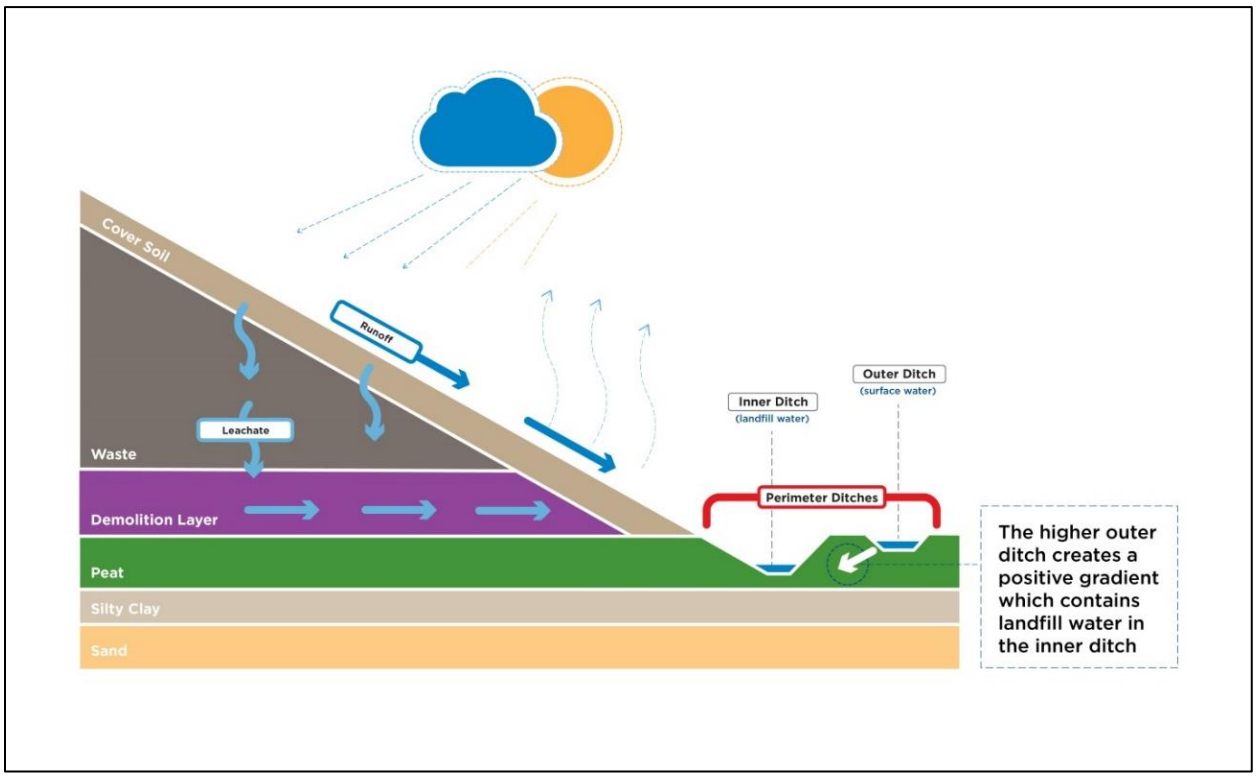


Figure 5: Leachate Collection System Cross-Section

Table 10 shows the pond storage capacity for stormwater or leachate.

Table 10: Pond Storage Capacity

Landfill Area	Storage Type	Current Capacity (m^3)
W40 Ponds 1-6	Stormwater	87,000
Phase 1 Toe Ditch	Stormwater	7,000
Phase 2 Pond	Stormwater	10,500
Phase 3 Pond	Stormwater	54,900
Phase 4 Pond	Stormwater	100,000
Linear Pond 4	Leachate	40,000

8.2. Leachate generation

Leachate generation at the Landfill is controlled through a number of mechanisms, which include the following:

- Progressive closure of completed phases, with an impermeable geomembrane cover system installed to minimize infiltration and leachate generation.
- A dedicated linear pond for leachate and surface runoff to control flows to the leachate pump station as well as stormwater retention ponds to reduce flows from closed areas to the Dredge Pond during significant precipitation events.
- Use of daily and intermediate cover at the active face and keeping the active face as small as possible to minimize infiltration from precipitation.
- Erosion control measures on side slopes, such as swales and downchutes, to convey water to internal ditches.

The annual fees associated with leachate, surface runoff and stormwater management include a conveyance fee paid to Delta for the use of the sewer system, and an industrial discharge fee made up of capacity and usage components for the treatment of the leachate at the WWTP. The capacity and usage charges account for biological oxygen demand, total suspended solids and flow. In 2024, the cost associated with leachate conveyance and treatment totaled $3.99 million. Approximately 77 percent of this cost was associated with conveyance, which represents a 7 percent increase compared to 2023, consistent with the observed increase in precipitation.

Monthly leachate flow and precipitation data for 2024 are provided in Table 11.

Table 11: 2024 Leachate Flow Volumes and Precipitation

Month	Leachate Flow (m^3)	Precipitation[2] (mm)	Precipitation Volume (m^3)	Ratio of Leachate Flow to Precipitation Volume
January	364,105	206	462,825	79%
February[1]	220,208	85	192,165	115%
March[1]	169,252	69	155,550	109%
April	94,986	72	162,060	59%
May	67,258	62	138,930	48%
June	75,164	66	148,133	51%
July	37,672	19	42,300	89%
August	45,616	84	189,225	24%
September	36,848	63	142,868	26%
October	260,997	214	480,608	54%
November	346,175	186	417,990	83%
December	342,834	217	487,710	70%
Total	2,061,115	1,342	3,020,363	68%

Notes:

[1] The high ratio of leachate flow to precipitation volume reported in select months can be due to the release of stored water that occurs when the Landfill becomes saturated, groundwater flow into the leachate ditch, and the controlled release of stormwater from storage ponds.

[2] Recorded at the Landfill Weather Station.

In 2024, the Landfill received approximately 3.02 million cu. m of precipitation. Approximately 1.36 million cu. m of the total precipitation fell on closed areas with diversion infrastructure and was ultimately diverted from the leachate system through controlled release to the dredge pond and evapotranspiration from the cover system and stormwater ponds.

A total of 2,061,115 cu. m of leachate, surface runoff and stormwater were pumped to Annacis Island WWTP in 2024. Leachate from the Vancouver Landfill is considered dilute compared to other MSW landfills because of the high volume of surface runoff and stormwater from the closed areas that cannot be directed by gravity to the stormwater ponds. As closure activities continue to progress, the volume of leachate generated is expected to decrease.

8.3 *Water quality monitoring program and annual review*

The OC requires regular sampling and analysis of leachate, and surface and ground waters in the vicinity of the Landfill, for specific stations and parameters. Leachate flow measurement and leachate/drainage ditch water level measurements are also required. The Landfill's WDP also requires regular sampling and analysis of leachate, in addition to leachate flow measurement. The Landfill Water Quality Monitoring Program (WQM Program) is in place to meet the above requirements and includes stormwater sampling as well. Sampling and data collection is completed by Staff, according to the *Leachate, Groundwater, Surface Water and Stormwater Monitoring and Sampling Manual* (AECOM, 2021).

In 2024, one leachate station, 13 surface water locations, 18 shallow groundwater wells and 20 deep groundwater wells were sampled quarterly. Shallow groundwater wells are screened in the peat aquifer and range in depth between 2.5 – 4 m, while deep groundwater wells are screened in the sand aquifer and range in depth between 6 – 9 m. Well and sampling locations are shown in Appendix 4. Additionally, a 24-hour composite sample representing the leachate pumped to Annacis Island WWTP was taken monthly. Samples were analyzed for the parameters listed in Appendix 5.

Consultants hired by the City have completed annual reviews of the WQM Program each year since 1999. The *City of Vancouver Landfill - 2024 Annual Water Quality Monitoring Report* (AECOM, 2025) confirms that the 2024 Landfill WQM Program meets or exceeds the requirements set out in the OC and WDP with respect to the number, type and locations of stations monitored, sampling frequency, water quality parameters, and detection limits with the exception of five surface water stations (Stations 43, 44, 45, 91 and 96) which were not sampled during dry ditch conditions in the third quarter. This is consistent with past years.

The December 2019 *City of Vancouver – 2018/19 Stormwater and Surface Water Monitoring Report* (AECOM, 2019) recommended that a regular monitoring program for stormwater be implemented and include monthly sample collection from October to March each year. Sampling began in December 2019 and continued in 2024 at 12 stations. Results from the sampling events are included in the 2024 WQM Report.

The executive summary from the 2024 WQM Report, including recommendations, is included in Appendix 6. A tabulation of the leachate/drainage ditch levels is included in Appendix 7.

8.4 *Landfill gas management system*

Figure 6 provides an overview of the Landfill's current LFG collection and beneficial use system. Commissioning of two renewable natural gas (RNG) facilities occurred in 2024, specifically Delta RNG in January and FortisBC in December. The distribution of LFG infrastructure across the Landfill footprint is shown in Figure 7.

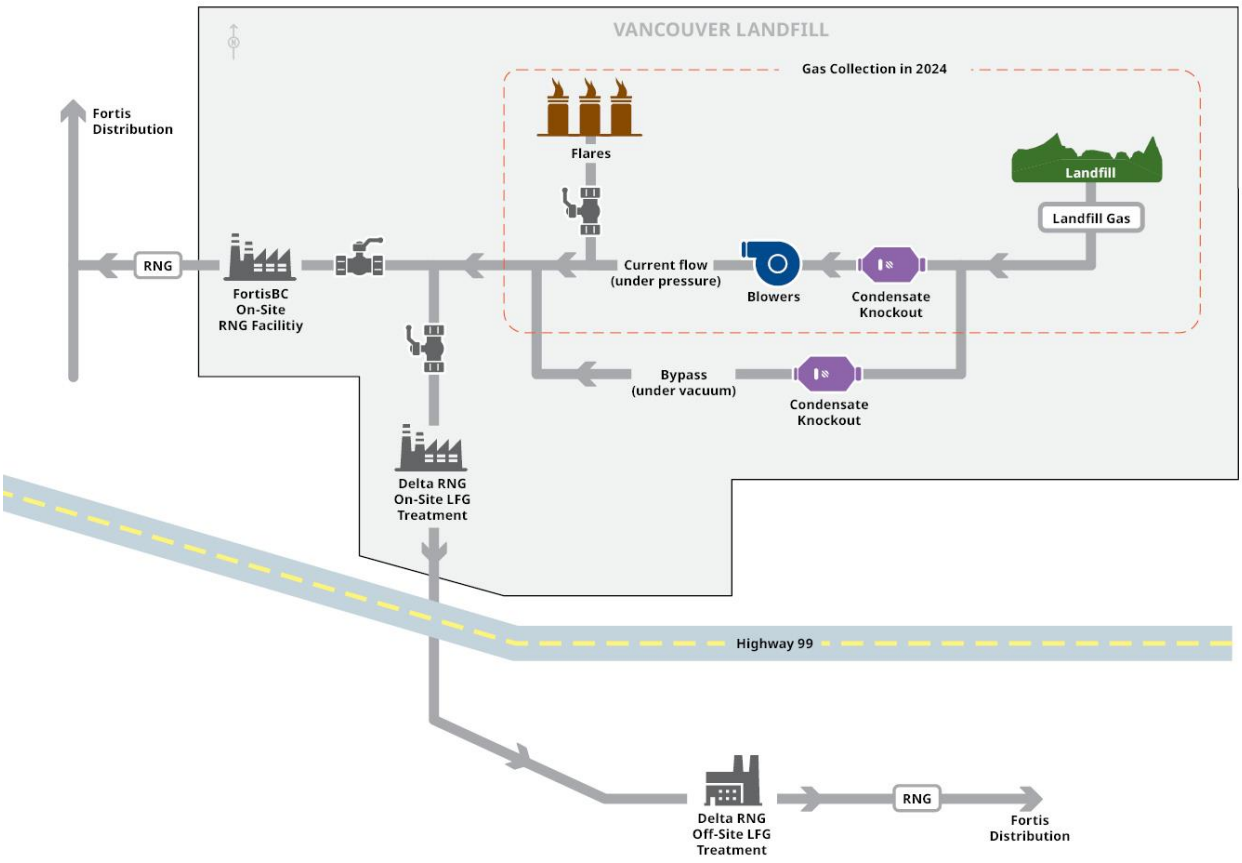


Figure 6: Landfill Gas Collection and Beneficial Use System

Figure 7: 2024 Landfill Gas Collection System

8.5 Landfill gas collection efficiency

The total volume of LFG collected in 2024 is reported in two ways in Table 12:

1. As measured by individual meters; and,
2. On a normalized basis (to 50 percent methane by volume) as per the methodology used by the ENV in Section 3.2 of the 2010 *Landfill Gas Management Facilities Design Guidelines* (Conestoga-Rovers and Associates, 2010).

Table 12: 2024 Landfill Gas Collection and Beneficial Use

2024	Weighted Average Methane Content (% by vol.)	LFG to Utilization Facility (cu. m)	LFG to Flare (cu. m)	LFG Captured for Period (cu .m)
Total (metered)	53.1	21,359,580	50,419,795	71,779,374
Total (normalized to 50 percent methane)	50.0	22,694,067	53,569,885	76,263,953
Daily Average	53.1	53,360	137,759	196,119
Daily Average (normalized)	**50.0**	**62,006**	**146,366**	**208,371**

LFG Collection Efficiency is defined as the normalized average collected flow rate of LFG in the given calendar year divided by the estimated generated LFG flow rate in the given calendar year multiplied by 100 percent. LFG generation is calculated using the following methods:

- A site-specific calibrated model developed by SCS Engineers for the Landfill; and
- ENV LFG Generation Estimate Tool for Annual Reporting.

The 2024 Landfill CE was 85.6 percent, which is a 0.7 percent decrease from 2023. The Landfill's CE exceeds ENV's target of 75 percent.

As shown in Table 5, the City will continue to implement LFG system modifications and upgrades in order to maximize CE. Further details on LFG collection activities in 2024 and the plan to increase future CE can be found in the *2024 Landfill Gas Annual Report for the Vancouver Landfill* (City of Vancouver, 2025).

9. Operational information

9.1. Bird control

Birds, particularly gulls, are a nuisance at landfill sites. In large numbers, they create a negative image of landfills and scatter litter onto surrounding areas. Birds are also a potential aviation hazard. A formal program using birds of prey started at the Landfill in July 2001. The program includes the use of trained raptors near the active face as a primary control method. Trained raptors discourage gulls and other birds from approaching the waste. Secondary control methods are used when trained raptors are not an option, such as when traffic is heavy or during very windy or rainy conditions. These methods include noise deterrents (stock or bull whips, pyrotechnics, whistles), visual deterrents (aerial projectiles, laser pointers, kites), and positioning the bird control vehicle close to the active face. In 2024, a propane cannon was added for use as a noise deterrent.

Pacific Northwest Raptors (PNWR) has been providing bird control services since January 2016. A new contract was awarded in 2024 for PNWR to continue to provide bird control service until 2027.

In early 2018, the City began working the Hancock Wildlife Foundation (HWF) in collaboration with Simon Fraser University for the Bald Eagle Tracking Alliance Project. This project aims to better understand the movements of bald eagles using tracking devices. The City continued to support HWF in 2024 by accommodating periodic visits to the Landfill for the purpose of plotting, baiting and catching bald eagles for banding and GPS tracking.

9.2. Site inspections

Formal site inspection activities beyond those conducted as part of environmental monitoring programs, are summarized in Table 13.

Table 13: 2024 Site Inspection Activities

Type of Inspection	Description	Findings and Action Taken (if applicable)
Site Tour	Conducted weekly by the Landfill Engineer, GPS Technician and Superintendent to assess progress of filling, cover integrity, erosion and settlement in active areas.	Any signs of leachate breakouts or erosion on side slopes are addressed promptly by Operations Staff at the direction of the Superintendent.
Workplace Inspections	Conducted monthly by representatives from the Joint Operational Health and Safety (OH&S) Committee and exempt Staff to verify compliance with the Landfill's Safety Management Program and *OH&S Regulation*.	Any deficiencies identified are logged and addressed as soon as practical with discussion following in the monthly OH&S Committee Meetings.
Construction and	Conducted during construction projects and regular Landfill	Construction contractor to complete recommended action items on observation report as soon as

Type of Inspection	Description	Findings and Action Taken (if applicable)
Operations Site Safety Observations	operations by contracted safety consultants to ensure safety standards are being met and identify potential hazards or safety concerns arising from construction activities.	possible. Observation reports typically reviewed during construction coordination meetings.
Leachate Collection and Stormwater Systems Inspection	Conducted in advance of and during significant precipitation events by the Environmental Technician and/or Operations Staff to ensure ditches and culverts are not obstructed by debris, leachate and stormwater flows are unobstructed, and freeboard exists in the leachate and drainage ditches.	Any accumulation of debris is managed promptly by Operations Staff.
Vegetation Inspection	Regular monthly inspections for invasive plants completed by the landscaping services contractor in established naturescaping areas.	Several different invasive plants are present in large numbers throughout the landfill closed areas. In the naturescaping areas, multiple invasive plants were removed by hand as part of regular monthly maintenance tasks, including: Himalayan Blackberries, Creeping Buttercup, Teasel, Common Mullein, Reed Canary Grass and Common Butterfly Bush.

9.3. *Operating problems and corrective actions*

The operating problems and corrective actions taken in 2024 are detailed in Table 14.

Table 14: 2024 Operating Problems and Corrective Actions

Problem	**Damaged LFG Vertical Extraction Wells During Grass Mowing**
Description	Historically, there have been several instances of LFG extraction wells taking damage from equipment during grass mowing on closed areas of the Landfill. During the spring and summer, grass growth can obstruct visibility of infrastructure near the ground, increasing likelihood of damage caused by the mower.
Corrective Action	City staff, in consultation with Poschner, who is contracted to perform bulk mowing of grass on closed areas of the Landfill, determined that increasing the frequency of mowing to keep the grass shorter would help prevent damage to gas wells. A solution was evaluated in 2024 and in 2025, closed areas will be mowed monthly to keep grass short and prepare to meet new Federal surface emissions monitoring requirements.
Problem	**Remote Water Level Monitoring System Communications Failure**
Description	In July 2024, an alarm was activated from the Remote Water Level Monitoring System, which measures water levels through remote stations located within the Landfill perimeter ditch system and in some stormwater storage ponds. The alarm indicated that a communications failure was present at one of the repeater stations. Further investigation revealed that water level values were not being recorded at four of the remote stations.
Corrective Action	An investigation of the impacted repeater station revealed damage to a cable connecting the remote station to a communication antenna. It was determined that the damage was caused by a previously reported incident where a mower came into contact with the repeater station. City staff coordinated repairs with DEVA Solutions Inc. who completed repairs to the antenna cable in July 2024. Additional system reconfiguration was completed to address communication issues which have since been mitigated.
Problem	**Perimeter Ditch Berm Repairs**
Description	It was discovered during an inspection of the leachate collection system (June 6, 2024) that a 25 metre section (approximate) of the intermediate berm north of the W40 ha closure had separated and shifted towards the inner ditch, partially restricting leachate flow. Cracks formed as a result of the movement allowing water from the outer ditch to flow into and mix with leachate in the inner ditch, thereby increasing the amount of leachate that required disposal.

Corrective Action	The City notified ENV and other stakeholders of the compromised berm. SHA was retained to assess the situation and proposed mitigation measures in consultation with Poschner. In the Fall of 2024 when water levels were at their lowest point of the year, the inner ditch was cleared of slumped berm material while berm material outside of the ditch alignment was stabilized to prevent further movement by placing geotextile fabric and riprap along the banks of the inner ditch. The riprap was shaped to allow leachate to continue to flow along the channel. Cracks in the berm were filled with peat to re-establish the berm's ability to separate flow between the inner and outer ditches. The restoration work was completed in late October 2024 and functioned effectively through the winter of 2024/25.
Problem	**Windstorm Damage**
Description	In late October 2024, multiple storm events accompanied by high winds were experienced at the Landfill, causing multiple trees to up-root and lean or fall over. Several trees located near the south perimeter ditches were impacted and debris from trees was also observed at the FortisBC RNG facility. Additionally, following the storm events it was noticed that multiple recently installed signs throughout the Landfill were ripped from their posts or were warped by the wind.
Corrective Action	Following the storms, BC Plant Health Care Inc. was retained to remove fallen and/or leaning trees near the south perimeter ditches. Additionally, BC Plant Health Care will perform tree risk assessments on the two impacted areas to identify standing trees that are at risk of falling and could impact Landfill operations. The assessments are scheduled to be completed in Q2 2025. Signs that were damaged or removed by wind are to be re-installed in 2025 with an improved anchoring system that is intended to minimize the risk of signs being removed from their posts.
Problem	**Water Line Leaks**
Description	In 2024, reviews of water use invoices from the City of Delta indicated that Landfill water use continued to be abnormally high. Although two water line leaks were identified and repaired in 2023, staff concluded that at least one leak persisted.
Corrective Action	Investigation into the leak began in 2024 but was delayed due to staffing changes and the addition of a temporary water connection to on on-site partner. Further investigation to identify the exact location and work to repair the leak will occur in 2025.

9.4. *Operational and maintenance expenditures*

As detailed in Table 15, the total spent on operations and maintenance at the Landfill in 2024 was $32.9 million, 22.5 percent higher than in 2023. Operational and maintenance expenditures saw an increase in all categories in 2024. The increases can be attributed to a number of causes, including higher prices, an increased demand for rental equipment, more leachate treatment due to high precipitation, and higher soil and recycling quantities received.

Table 15: Operational and Maintenance Expenditures for 2023 and 2024

Item[1]	2024	2023
Salaries, Administration, Wages and Fringe Benefits	$7,674,851	$6,784,585
Vehicle and Equipment Rental	$6,338,131	$5,290,727
Insurance, Taxes, Loan Payments, Utilities, Building Maintenance, Permits and Landscaping	$8,237,887	$6,741,540
Recycling	$512,952	$392,266
Roads and Cover	$2,074,155	$1,906,205
Water Quality, Gas Management, Ditch Maintenance, Bird Control, Household Hazardous Waste Disposal, etc.	$2,233,887	$1,519,587
Consulting Projects (Leachate Upgrades, Gas, etc.)	$460,704	$269,140
Sewer and Soil Deposit Fees	$4,296,732	$3,009,469
Weighscales	$1,037,440	$914,909
Total	$32,866,739	$26,828,428

Note:
[1] Items do not include capital loan repayments and other cost allocations.

9.5. *Public complaint and resolution log*

In 2024, there were 10 complaints logged related to the Landfill, down from 19 received in 2023. The Public Complaint and Resolution Log for 2024 is available in Appendix 8.

More than one complaint was received related to each of the following categories:

- Compost Sales
    - Customers raised concerns about the availability of compost for purchase, as well as the restriction on the amount of compost each customer is permitted to purchase per day. Compost sales and restrictions are based on availability, which varies depending on the amount of yard trimmings received.
- Disposal Volume Limits
    - Customers raised concerns about volume limits for disposal of certain items, including used drywall and recyclable materials managed under Extended Producer Responsibility programs. Limits are imposed to ensure safe disposal of hazardous materials, and some materials are limited to residential volumes only as instructed by collection partners.
- Facility Wait Times
    - Customers raised concerns about potential wait times at the Landfill entrance. Wait times are frequently monitored, and traffic control is used during periods of high traffic. The implementation of live traffic cameras at the Landfill entrance should be completed in 2025.
- Website Clarity
    - Customers raised concerns about clarity regarding instructions for disposing of some items. Specifically, customers reported finding contradicting information on the Landfill Website and Waste Wizard. When this type of complaint is received, Staff review related information and make necessary changes to the website or clarify information with the customer.

9.6. *Landfill tours*

Landfill Staff typically provide tours of the Landfill for a variety of visitors, including school groups (grade 5 to university levels), special interest groups, industry associations and professionals, delegates from other countries and members of the public. Tours provide the opportunity to showcase how waste is responsibly managed to minimize environmental impacts, and how much additional progress is required to reduce the amount of waste sent for disposal.

Formal tours for school classes in grades 5 to 12 resumed in 2024. Teachers interested in signing up their classes for this tour can visit the Metro Vancouver website: https://metrovancouver.org/school-programs/vancouver-landfill

In 2024, the City hosted the Landfill Open House for the first time since 2018. Over two days, 2,400 people visited the Landfill to learn about waste disposal and diversion, get a closer look at the Landfill's environmental protection systems, visit displays from 17 different organizations, and receive a guided bus tour of the site. The next Open House is scheduled for 2026.

References

AECOM Canada Ltd, (AECOM, 2019). *City of Vancouver – 2018/19 Stormwater and Surface Water Monitoring Report.* Report prepared for City of Vancouver, December 31, 2019.

AECOM Canada Ltd, (AECOM, 2020). *City of Vancouver Landfill Stormwater Management Plan.* Report prepared for the City of Vancouver, July 17, 2020.

AECOM Canada Ltd, (AECOM, 2021). *City of Vancouver Landfill –Leachate, Groundwater, Surface Water and Stormwater Monitoring and Sampling Manual*. Report prepared for the City of Vancouver, August 6, 2021.

AECOM Canada Ltd, (AECOM, 2022). *Landfill Leachate Pump Station Assessment.* Report prepared for City of Vancouver, November 22, 2022

AECOM Canada Ltd, (AECOM, 2025). *City of Vancouver Landfill – 2024 Annual Water Quality Monitoring Report.* Report prepared for City of Vancouver, March 19, 2025.

BC Ministry of Environment, Lands and Parks, (ENV, 2001). *Operational Certificate MR-01611.* Issued October 31, 1973, Amended March 8, 2001. https://j200.gov.bc.ca/pub/ams/download.aspx?PosseObjectId=59566144

BC Ministry of Environment, (ENV, 1988). *Hazardous Waste Regulation B.C. Reg. 63/88*. February 18, 1988. https://www.bclaws.gov.bc.ca/civix/document/id/crbc/crbc/63_88_multi

BC Ministry of Environment, (ENV, 2002). *Organic Matter Recycling Regulation B.C. Reg 18/2002.* February 5, 2002. https://www.bclaws.gov.bc.ca/civix/document/id/crbc/crbc/18_2002

BC Ministry of Environment, (ENV, 2004). *Recycling Regulation B.C. Reg. 449/2004*. October 7, 2004. https://www.bclaws.gov.bc.ca/civix/document/id/crbc/crbc/449_2004

BC Ministry of Environment, (ENV, 2008). *Request for Consideration of Materials for Beneficial Use at the Vancouver Landfill – Demo Hog.* Letter prepared for the City of Vancouver, February 28, 2008.

BC Ministry of Environment, (ENV, 2011). *Disposal of Water Treatment Plant Residuals from the Seymour-Capilano Filtration Plant at the Vancouver Landfill.* Letter prepared for the City of Vancouver, November 3, 2011.

BC Ministry of Environment, (ENV, 2012). *Disposal of Non-Recyclable Wastewater Treatment Plant Residuals from the Five Metro Vancouver Owned and Operated Wastewater Treatment Plants at the Vancouver Landfill.* Letter prepared for the City of Vancouver, June 29, 2012.

BC Ministry of Environment and Climate Change Strategy, (ENV, 2016). *Landfill Criteria for Municipal Solid Waste, Second Edition, British Columbia.* June, 2016. https://www2.gov.bc.ca/gov/content/environment/waste-management/garbage/landfills

BC Ministry of Environment and Climate Change Strategy, (ENV, 2024). *Re: Hazardous Waste Regulation Registration for disposal of asbestos at Vancouver Landfill*. Letter prepared for the City of Vancouver, May 24, 2024.

BC Ministry of Labour, (1998). *Occupational Health and Safety Regulation B.C. Reg. 296/97*. September 8, 1997.
https://www.bclaws.gov.bc.ca/civix/document/id/crbc/crbc/296_97_multi

City of Vancouver, (2019). *Transfer & Landfill Operations Asbestos Waste Disposal Policy.* November 8, 2019.
https://vancouver.ca/files/cov/asbestos-policy-revised-july-2016.pdf

City of Vancouver, (2022). *2021 Annual Landfill Report for the Vancouver Landfill*. Report prepared for Ministry of Environment. March 31, 2022.

City of Vancouver, (2024). *Solid Waste By-Law No. 8417.* December 12, 2023.
https://bylaws.vancouver.ca/8417c.pdf

City of Vancouver, (2025). *2024 Annual Landfill Gas Report for the Vancouver Landfill*. Report prepared for Ministry of Environment. March, 2025.

City of Vancouver and The Corporation of Delta, (1999). *Vancouver-Delta Agreement 1999.* September 21, 1999.

Conestoga-Rovers & Associates, (2010). *Landfill Gas Management Facilities Design Guidelines,* prepared for BC Ministry of Environment. March, 2010.
https://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/designguidelinesfinal.pdf

Dillon Consulting Ltd., (Dillon, 2024a). *2023 Multi-Family Waste Composition Study Report.* Prepared for Metro Vancouver. May 4, 2022.
2023 Multi-Family Waste Composition Study

Dillon Consulting Ltd., (Dillon, 2024b). *2023 Commercial & Institutional Waste Composition Study Report.* Prepared for Metro Vancouver. May 5, 2022.
2023 Commercial/Institutional Waste Composition Study

Dillon Consulting Ltd., (Dillon, 2024c). *2023 Full-Scale Waste Composition Study Report.* Prepared for Metro Vancouver. October 5, 2023.
2023 Full-Scale Waste Composition Study Report

Golder Associates Ltd., (Golder, 2019a). *Design Plan, Vancouver Landfill, Delta BC.* Report prepared for City of Vancouver, March 14, 2019.

Golder Associates Ltd., (Golder, 2019b). Operating *Plan, Vancouver Landfill, Delta BC.* Report prepared for City of Vancouver, April 12, 2019.

Greater Vancouver Sewerage and Drainage District (GVS&DD, 2011) *Waste Discharge Permit SC-100168-FSA.* November 8, 2011.

Greater Vancouver Sewerage and Drainage District (GVS&DD, 2024). *Greater Vancouver Sewerage and Drainage District Tipping Fee and Solid Waste Disposal Regulation Bylaw No. 379, 2024*. Adopted June 28, 2024.
https://metrovancouver.org/boards/Bylaws/GVSDD_Bylaw_379_Consolidated.pdf

Greater Vancouver Sewerage and Drainage District, City of Vancouver and The Corporation of Delta, (1989). *Agreement between Greater Vancouver Sewerage and Drainage District and City*

*of Vancouver and The Corporation of Delta (*also known as *Burns Bog Landfill Tripartite Agreement).* March 21, 1989.

Metro Vancouver Regional District, (Metro Vancouver, 2010). *Integrated Solid Waste and Resource Management Plan.* Plan prepared for the Ministry of Environment, July, 2010. http://www.metrovancouver.org/services/solid-waste/about/planning/Pages/default.aspx

Metro Vancouver Regional District, (Metro Vanocuver, 2020a). *Bottom Ash Management Plan Metro Vancouver Waste-to-Energy Facility*. November 6, 2020.

Metro Vancouver Regional District, (Metro Vancouver, 2020b). *2019 Biennial Report, Integrated Solid Waste and Resource Management Plan.* January, 2020. http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/2019ISWRMPBiennialReport.pdf

Metro Vancouver Regional District, (Metro Vancouver, 2022). *2021 Biennial Report, Integrated Solid Waste and Resource Management Plan.* January 11, 2022. http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/2021ISWRMPBiennialProgressReport.pdf

Sperling Hansen Associates (SHA, 2021). *Vancouver Landfill Phase 5 South and North Filling Plan – DOPC Updates*, Technical Memorandum prepared for the City of Vancouver, August 4, 2021.

Sperling Hansen Associates (SHA, 2024a). *Construction Completion Report for the Phase 4 Closure and Gas System Upgrades*, Report prepared for the City of Vancouver, August 2024.

Sperling Hansen Associates (SHA, 2024b). *Phase 5 South Closure and Gas System Upgrades Vancouver Landfill*, Technical Drawings prepared for the City of Vancouver, August 2024.

Sperling Hansen Associates (SHA, 2025). *Vancouver Landfill 2023-03-30 to 2024-05-03 Aerial Mapping Report (DRAFT)*, Technical Memorandum prepared for the City of Vancouver, January 21, 2025.

Stantec Consulting Ltd. (Stantec, 2023) *City of Vancouver Landfill Overhead 25kV Line.* Report prepared for City of Vancouver, September 1, 2023.

Transport Canada, (Transport Canada, 1985). *Transportation of Dangerous Goods Regulation.* January 17, 1985.

WSP Consultants Canada Ltd. (WSP, 2024). *Grit and Screenings Characterization Study 2024 Sub-Report: Landfill Materials Only.* Report prepared for Metro Vancouver, December 17, 2024.

Appendix 1: Progressive closure status

Area	Construction Timeframe	As of Dec 31, 2024			Completed by
		Area Closed	Additional Infrastructure Installed	Spend in year incurred	
Phase 1	2009-2010	14 ha	22 vertical gas wells and 1 horizontal gas collector; 9 stormwater discharge bridges	$ 12M	CH2M Hill, SHA, Tyam Construction
	2012-2013	3.5 ha	Toe closure and ditch to divert stormwater to 2 southern discharge bridges only	Included with Phase 2 below	RF Binnie Civil Engineering Consultants (Binnie), SHA, SCS Engineers (SCS), King Hoe Excavating (King Hoe)
Phase 2	2012-2013	19 ha	89 vertical gas wells and 12 horizontal gas collectors; 1 stormwater retention pond with 11,500 m^3 design capacity	$ 17.4M	Binnie, SHA, SCS, King Hoe
Phase 3W	2013	9.5 ha	13 vertical gas wells; 1 stormwater retention pond with 88,500 m^3 design capacity (to serve all of Phase 3)	$ 15.3M	Binnie, SHA, SCS, BD Hall Constructors (Hall)
Phase 3SE	2017-2018	9.7 ha	11 vertical gas wells	$ 10M	Binnie, Golder, Hall
Phase 3NE	2018-2019	15.2 ha	33 vertical gas wells and 7 horizontal gas collectors	$ 19.9M	Binnie, SHA, SCS, M2K
W40 ha	2017-2020	36.4 ha	27 vertical gas wells, 32 DRAINTUBE gas collectors; 6 stormwater retention ponds with 87,700 m^3 design capacity	$ 23.5M	Binnie, SHA, SCS, King Hoe
Phase 4S	2020	10.8 ha	19 vertical gas wells, 28 horizontal gas collectors; 1 stormwater retention pond with 100,000 m^3 design capacity	$ 11.5M	SHA, SCS, King Hoe
Phase 4N	2021-2022	8.7 ha	27 vertical gas wells; 6 horizontal gas collectors; 7 temporary vertical gas wells	$10.2M	SHA, SCS, King Hoe
Total (ha)		**126.8**			

ha = hectare (equal to 10,000 m^2 or 2.47 acres)

Appendix 2: Annual waste quantities

Table A1: 2024 Material Summary by Source

	Waste Discharge				Cover	Road Construction & Other Beneficial Use					Capital & Closure		VLF Composting	
Source	VSTS MSW tonnes	VLF MSW tonnes	Total MSW tonnes	Demo tonnes	Cover Soil tonnes	Sand tonnes	Demo hog tonnes	Wood Waste tonnes	Crushed Concrete & Asphalt Grindings tonnes	Purchased Aggregate tonnes	Aggregate tonnes	Sand & Soil tonnes	VSTS Yard Trimmings tonnes	VLF Yard Trimmings tonnes
By Municipality	**140,013**	**120,519**	**260,531**										**10,144**	**9,247**
Vancouver Residential Collection	34,500	0	34,500											
Vancouver Public Works	5,969	3,252	9,222		435,823			24	13,035	18,526			1,004	7,185
Vancouver Commercial & Residential Drop-Off	55,771	13,060	68,832	5,332	3,042		6,268	598	5,470	713		29	8,769	300
Delta Residential Contractor		15,407	15,407											
Delta Public Works		4,591	4,591		94,618			12	9,361					162
Delta Commercial	1,049	18,589	19,639	2,027	10,017			159	1,128			124	0.4	159
Delta Residential Drop-Off	21	4,484	4,505					1,590					6	1,089
Richmond	38,428	32,900	71,328	201	47		55,962	484	1,383	29,960			230	109
UEL	3,000	152	3,152	14									10	
Surrey	91	23,561	23,652	6,964	8,308		27,498	416	18			95	34	183
White Rock	14	318	332	316				42	177				0.4	31
Other Municipalities*	1,169	4,204	5,373	6,215	51,164			129	9,722				90	28
Out of Region											1,915			
Regional Waste Transfer		**405,660**	**405,660**											
Coquitlam Recycling and Waste Centre		133,898	133,898											
North Shore Recycling and Waste Centre		98,921	98,921											
Surrey Recycling and Waste Centres		157,209	157,209											
Maple Ridge Recycling and Waste Centre		8,804	8,804											
Langley Recycling and Waste Centre		6,827	6,827											
Other Authorized Waste		**45,936**	**45,936**											
Bottom Ash		39,347	39,347											
Water Treatment Plant Residuals		4,063	4,063											
Sewage Treatment Plant Residuals		2,525	2,525											
Totals	**140,013**	**572,114**	**712,127**	**21,069**	**603,018**	**0**	**89,727**	**3,455**	**40,293**	**49,199**	**1,915**	**248**	**10,144**	**9,247**
Total Materials to Vancouver Landfill												**1,521,050**	**19,391**	

* Burnaby, City of Langley, City of North Vancouver, Coquitlam, District of North Vancouver, District of West Vancouver, Langley Township, Maple Ridge, New Westminster, Pitt Meadows, Port Coquitlam, Port Moody.

Note: Totals may vary due to rounding errors.

Table A2: 2023 Material Summary by Source

	Waste Discharge				Cover	Road Construction & Other Beneficial Use					Capital & Closure		VLF Composting	
Source	VSTS MSW tonnes	VLF MSW tonnes	Total MSW tonnes	Demo tonnes	Cover Soil tonnes	Sand tonnes	Demo hog tonnes	Wood Waste tonnes	Crushed Concrete & Asphalt Grindings tonnes	Purchased Aggregate tonnes	Aggregate tonnes	Sand & Soil tonnes	VSTS Yard Trimmings tonnes	VLF Yard Trimmings tonnes
By Municipality	**134,455**	**133,136**	**267,590**										**11,888**	**9,134**
Vancouver Residential Collection	33,832	26	33,858											
Vancouver Public Works	6,429	9,154	15,583		304,207			21	10,080	20,656	197		1,319	6,778
Vancouver Commercial & Residential Drop-Off	52,509	28,913	81,422	5,254	2,278	775	17,866	628	28,710				10,155	436
Delta Residential Contractor		14,708	14,708											
Delta Public Works		3,338	3,338		71,647			7	8,629					324
Delta Commercial	474	14,039	14,513	1,425	25,176			161	1,166		6,554	150	10	100
Delta Residential Drop-Off	59	4,181	4,240					1,585					7	1,071
Richmond	36,729	30,581	67,310	1,369			55,482	441	5,631	11,417	1,779	2,681	234	114
UEL	2,672	39	2,711					0.1	42				4	0
Surrey	113	24,021	24,133	5,817	31,996		17,443	412	12,022		1	8,995	30	244
White Rock	8	361	369	156				63	142				1	34
Other Municipalities*	1,630	3,775	5,405	6,911	20,595			115	1,366				129	32
Out of Region											13,035			
Regional Waste Transfer		**411,890**	**411,890**											
Coquitlam Recycling and Waste Centre		131,154	131,154											
North Shore Recycling and Waste Centre		110,967	110,967											
Surrey Recycling and Waste Centres		154,900	154,900											
Maple Ridge Recycling and Waste Centre		8,298	8,298											
Langley Recycling and Waste Centre		6,571	6,571											
Other Authorized Waste		**43,196**	**43,196**											
Bottom Ash		38,177	38,177											
Water Treatment Plant Residuals		2,594	2,594											
Sewage Treatment Plant Residuals		2,425	2,425											
Digester Solids		-	-											
Non-Recyclable Marine Debris		-	-											
Totals	**134,455**	**588,222**	**722,676**	**20,932**	**455,900**	**775**	**90,791**	**3,432**	**67,787**	**32,073**	**21,567**	**11,827**	**11,888**	**9,134**
Total Materials to Vancouver Landfill												**1,427,760**		**21,022**

* Burnaby, City of Langley, City of North Vancouver, Coquitlam, District of North Vancouver, District of West Vancouver, Langley Township, Maple Ridge, New Westminster, Pitt Meadows, Port Coquitlam, Port Moody.

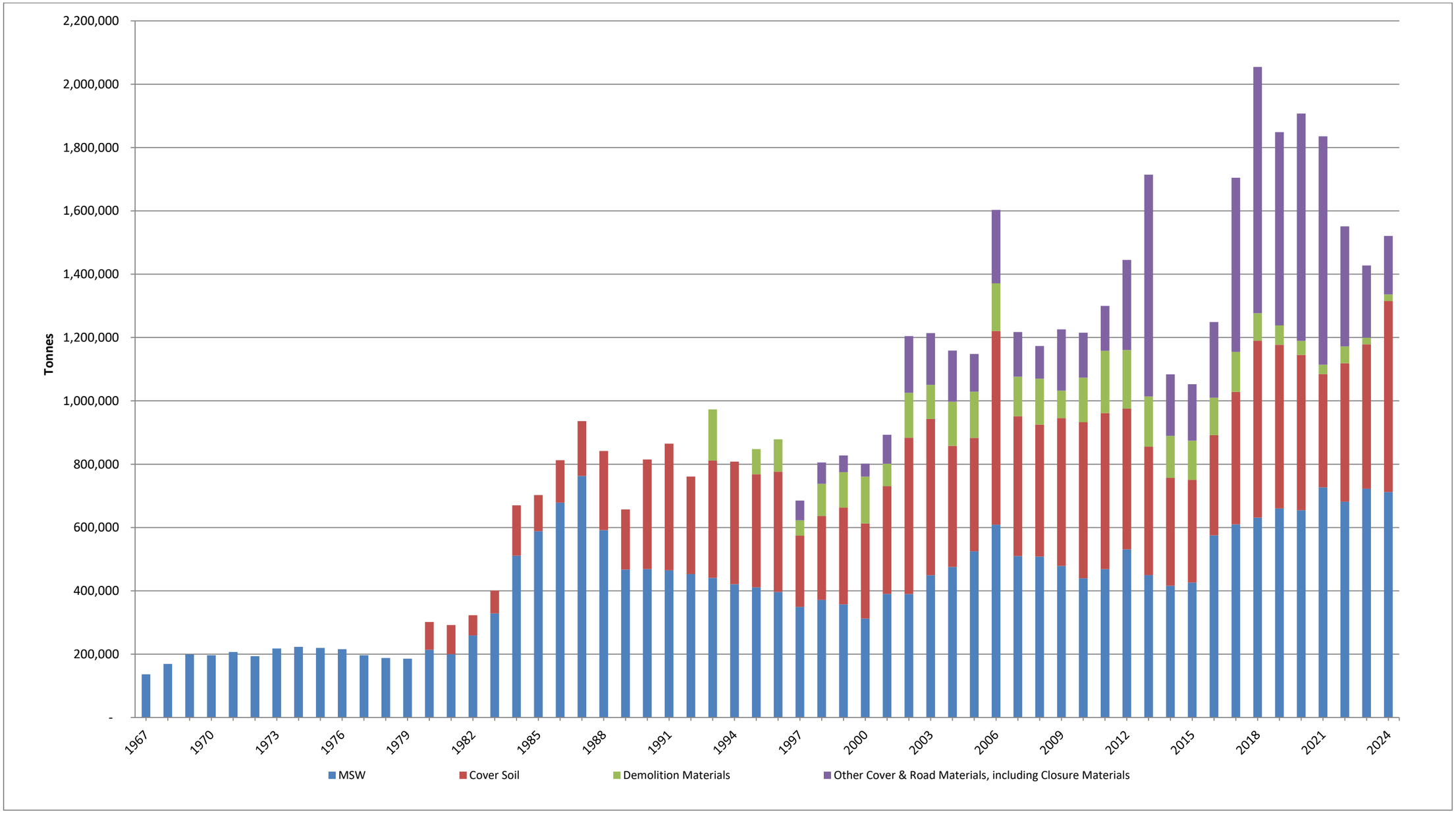
Note: Totals may vary due to rounding errors.

Table A3: 2024 Material Summary by Month

2024	Waste Discharge					Cover, Road, Capital & Closure Materials			VLF Composting		
Month	VSTS tonnes	VLF tonnes	Total tonnes	Bottom Ash tonnes	Demolition Material tonnes	Cover Material tonnes	Road & Other Beneficial Use Materials tonnes	Capital & Closure Materials tonnes	VSTS Yard Trimmings tonnes	VLF Yard Trimmings tonnes	Yard Trimmings Total tonnes
January	11,990	46,418	58,409	3,296	1,138	23,179	15,018	1,401	462	506	968
February	11,290	44,774	56,064	3,098	1,829	33,422	17,617	762	504	402	906
March	10,843	39,969	50,812	3,877	2,197	35,749	16,118	0	929	384	1,313
April	11,774	46,491	58,265	3,104	1,273	42,992	19,277	0	766	369	1,135
May	12,109	45,780	57,888	3,647	2,103	52,792	12,617	0	747	430	1,177
June	10,937	47,438	58,375	3,360	2,269	58,937	12,638	0	713	446	1,159
July	13,120	52,340	65,460	3,355	1,886	84,754	15,415	0	627	342	969
August	12,224	47,812	60,035	4,013	1,862	66,809	13,918	0	643	393	1,035
September	11,264	48,452	59,716	3,128	1,340	49,581	10,955	0	608	339	946
October	11,906	47,513	59,419	2,316	2,152	56,457	10,449	0	1,142	471	1,612
November	10,956	36,971	47,926	2,967	1,685	63,473	20,470	0	2,011	2,576	4,586
December	11,599	28,809	40,408	3,187	1,334	34,874	18,180	0	994	2,590	3,585
Totals	140,013	532,767	672,779	39,347	21,069	603,018	182,674	2,163	10,144	9,247	19,391
Total Materials to Vancouver Landfill								1,521,050			

Note: Totals may vary due to rounding errors.

Figure A1: Historical Regional Waste Quantities



Appendix 3: 2024 Recyclable and banned materials

Recyclable Materials – Accepted for FREE (Residential Only)

- ✓ Aerosol paint and empty containers
- ✓ Antifreeze and empty antifreeze containers
- ✓ Books
- ✓ Cardboard (flatten)
- ✓ Cell phones
- ✓ Clothing
- ✓ Cooking oil and grease (maximum 10 L per day)
- ✓ Electronics, small appliances and power tools (max 5 large items)
- ✓ Flammable liquids
- ✓ Flexible Plastics
- ✓ Fluorescent light bulbs and tubes
- ✓ Foam packaging (no foam peanuts)
- ✓ Glass bottles and jars
- ✓ Household batteries
- ✓ Large appliances (including refrigerators, freezers, air conditioners)
- ✓ Lawnmowers – electric, battery, or gas-powered (drain gasoline and oil)
- ✓ Lead acid car and truck batteries
- ✓ Metal containers (cans, tins, foil, empty aerosol cans excluding spray paint cans)
- ✓ Paint and empty paint cans
- ✓ Paper containers (tetra-packs, coffee cups)
- ✓ Pesticides
- ✓ Plastic containers (jars, jugs, bottles)
- ✓ Printed paper and paper packaging (newspaper, magazines, catalogues, writing paper, paper bags)
- ✓ Propane tanks (maximum 4 disposable and 2 refillable)
- ✓ Scrap metal
- ✓ Smoke and carbon monoxide alarms
- ✓ Thermostats
- ✓ Tires (passenger or light truck with or without rims; maximum of 10)
- ✓ Used oil (maximum 15 litres), oil filters (maximum 3) and empty oil containers

Recyclable Materials – Accepted for a FEE

- ✓ Gypsum drywall, new scraps only (maximum level pick-up truckload)
- ✓ Food scraps (maximum 130 kg)
- ✓ Mattresses and box springs (maximum 8 pieces)
- ✓ Wood waste (includes painted, stained and treated wood, residential quantities)
- ✓ Yard & garden trimmings

Banned Materials

The lists of Banned Materials that follow are taken from City of Vancouver *Solid Waste By-Law No. 8417,* in effect as of January 1, 2024.

Banned Hazardous and Operational Impact Materials (Schedule E)

The following wastes are prohibited from disposal at the Vancouver Landfill and Vancouver South Transfer Station:

1. Automobile bodies.
2. Refuse that is on fire, smoldering, flammable or explosive.
3. Hazardous Waste as defined in the *Hazardous Waste Regulation* (B.C. Reg. 63/88), with the exception of asbestos waste delivered to the Vancouver Landfill in accordance with the Asbestos Policy.
4. Propane tanks, with the exception of Propane Tanks delivered as recyclable materials;

5. Liquids or sludge.
6. Coated or uncoated wire and cable that exceeds either 1% of the total weight of the load or 1% of the total volume of the load.
7. Dead animals from personal or business activities.
8. Inert fill material including soil, sod, gravel, concrete and asphalt exceeding 0.5 cubic metres per load, with the exception of those materials meeting the City Engineer's specifications for landfill cover, road building, and closure.
9. Excrement, other than amounts of pet excrement that are double bagged and discarded with Municipal Solid Waste and that do not exceed either 5% of the total weight of the load or 5% of the total volume of the load.
10. Barrels, drums, pails or other large (205 litre or greater) liquid containers.
11. New or used gypsum (drywall), with the exception of residential used gypsum (drywall) delivered to the Vancouver Landfill in accordance with the Drywall Policy.
12. Mattresses, with the exception of Mattresses that are delivered in dedicated loads to the Vancouver Landfill for management as special handle waste requiring burial
13. Railroad ties or creosote treated wood.
14. Toxic Plants, with the exception of Toxic Plants that are double bagged and delivered in dedicated loads to the Vancouver Landfill for management as special handle waste requiring burial.
15. Personal hygiene products where the personal hygiene products make up more than 10% of the total weight of the load unless the personal hygiene products are double bagged in sealed plastic bags that are sufficiently durable to resist leaking or breaking during collection and disposal.
16. Any material that would cause undue risk of injury or occupational disease to any person at the Vancouver Landfill and Transfer Station or that would otherwise contravene the *Occupational Health and Safety Regulation* (B.C. Reg. 296/97) enacted pursuant to the *Workers Compensation Act*, as amended or replaced from time to time.
17. Any other material deemed by the City Engineer as unacceptable for disposal at the Vancouver Landfill or Vancouver South Transfer Station.

Banned Recyclable Materials (Schedule F)

1. Beverage containers identified in "Schedule 1 — Beverage Container Product Category" to the *Recycling Regulation* (B.C. Reg. 449/2004) of the *Environmental Management Act*.
2. Containers other than beverage containers made of:
    i. Metal,
    ii. Glass,
    iii. Plastic identified by the SPI Code #1 (Polyethylene Terephthalate or PET) or SPI Code #2 (High Density Polyethylene or HDPE) or SPI Code #4 (Low Density Polyethylene or LDPE) or SPI Code #5 (Polypropylene or PP), or
    iv. Composite materials to create rigid packaging consisting of paper and polyethylene (gable top cartons, frozen food boxes, ice cream cartons, and microwaveable dinner cartons) or paper, polyethylene and aluminum (aseptic cartons).
3. Recyclable Paper.
4. Corrugated Cardboard.
5. Yard Waste.
6. Food Waste.
7. Clean Wood Waste.
8. Expanded Polystyrene Packaging.

Banned Product Stewardship Materials (Schedule G)

The following materials included in the effective Product Stewardship Program product categories of the *Recycling Regulation* of the *Environmental Management Act,* are banned from garbage containers, and from disposal as garbage at the Vancouver South Transfer Station, and Vancouver Landfill:

1. The following materials pursuant to Schedule 2 – Residual Product Category to the *Recycling Regulation*:
    - Solvents and flammable liquids;
    - Pesticides;
    - Gasoline;
    - Pharmaceutical products and medications;
    - Oil, oil filters and oil containers;
    - Paint and paint containers;
    - Lead-acid batteries; and
    - Antifreeze and antifreeze containers;
2. Electronics and electrical products, including metal household and commercial appliance, as identified in Schedule 3 – Electronics and Electrical Products Category to the *Recycling Regulation*;
3. Tires pursuant to Schedule 4 – Tire Product Category to the *Recycling Regulation*.

Appendix 4: 2024 Water quality monitoring location plan

Appendix 5: 2024 Water quality monitoring program parameters

Surface Water

alkalinity as $CaCO_3$	dissolved organic carbon	sodium, total dissolved
aluminium, total	hardness as $CaCO_3$	specific conductivity
ammonia	iron, total & dissolved	sulphate
arsenic, total	lead, total	zinc, total
cadmium, total	magnesium, total & dissolved	temperature*
calcium, total & dissolved	manganese, total & dissolved	turbidity
chloride	nickel, total	TSS
chromium, total	pH*	TOC
cobalt, total	true colour	VOCs
copper, total	phenols	
dissolved oxygen*	potassium, total & dissolved	

Groundwater

alkalinity as CaCO3	cobalt, dissolved	pH*
aluminium, dissolved	copper, dissolved	phenols
ammonia	hardness as $CaCO_3$	potassium, dissolved
arsenic, dissolved	iron, dissolved	sodium, dissolved
cadmium, dissolved	lead, dissolved	specific conductivity
calcium, dissolved	magnesium, dissolved	sulphate
chloride	manganese, dissolved	temperature*
chromium, dissolved	nickel, dissolved	zinc, dissolved
		VOCs

Leachate Grab Samples

alkalinity as $CaCO_3$	cyanide	potassium, total & dissolved
aluminium, total	dissolved oxygen*	sodium, total & dissolved
ammonia	hardness as $CaCO_3$	specific conductivity
cadmium, total	iron, total & dissolved	sulphate
calcium, total & dissolved	lead, total	sulphide, total & dissolved
chloride	magnesium, total & dissolved	temperature*
chromium, total	manganese, total & dissolved	toxicity
cobalt, total	pH*	volatile organic compounds
copper, total	phenols, total**	zinc, total

Leachate Composite Samples

aluminium, total	copper, total	nickel, total
cadmium, total	iron, total	pH
chemical oxygen demand	lead, total	total suspended solids
chromium, total	manganese, total	zinc, total
cobalt, total	molybdenum, total	

Note:

* Field Data

** Total of 2,3,4,5 and 2,3,4,6 tetrachlorophenols and pentachlorophenols

Appendix 6: 2024 Annual water quality monitoring report executive summary

The City of Vancouver (CoV) has owned and operated the Vancouver Landfill (landfill) since 1966. AECOM Canada ULC (AECOM) reviewed historical data and interpreted leachate, groundwater, surface water and stormwater quality data collected at the landfill by CoV and AECOM staff between January 1, 2024 and December 31, 2024. This annual monitoring report presents the findings of the monitoring program review in accordance with the landfill Operational Certificate MR-01611 (OC). The requirements of the monitoring program and subsequent interpretation and reporting are specified within the OC and Waste Discharge Permit SC-100168-FSA (WDP). Section 3.5.2 of the OC requires that the annual report include a review and interpretation of the analytical data from receiving environment monitoring for the preceding year, and leachate flow data and Leachate/Drainage Ditch levels. The WDP governs the discharge of leachate from the landfill. Leachate discharged from the landfill is conveyed through City of Delta and Metro Vancouver forcemains to the Annacis Island Wastewater Treatment Plant.

Monitoring data included measurements of leachate flows and leachate quality at the leachate pump station near the southwest corner of the landfill. Groundwater elevations and groundwater quality were measured in the shallow and deep aquifers with monitoring stations that surround the footprint of the landfill and are located immediately outside the perimeter ditch leachate collection system (perimeter ditch system). Surface water elevations and surface water quality were measured in the outer surface water drainage ditch (Drainage Ditch) surrounding the landfill footprint, in downstream municipal ditches, and in Crescent Slough and the Delta Irrigation Enhancement Project Canal (DIEP Canal), which are connected to the Fraser River. A Remote Water Level Monitoring System (RWLMS) was commissioned in 2021 and became operational in May 2022. The new system continuously monitors water levels at 13 stations at the landfill, including the Dredge Pond, stormwater ponds, and the Leachate and Drainage Ditches in support of stormwater management at the landfill.

A routine stormwater monitoring program commenced in December 2019. Stormwater monitoring is not a requirement of the OC or the WDP. The purpose of the program is to monitor the quality of stormwater from closed phases/lined ponds at the landfill to support discharge of stormwater outside the perimeter ditch system. Three pilot stormwater discharge tests were carried out in 2019/2020 to assess the potential impacts of discharging clean stormwater to the Dredge Pond. Following favorable results, discharge of clean stormwater to the Dredge Pond became standard operating practice in 2021.

The 2024 monitoring program met or exceeded the requirements of the OC and WDP with respect to the number of stations, media being monitored, and parameters being analyzed, with the exception of a few surface water monitoring stations when ditches were dry and prohibited monitoring in late summer, similar to previous years.

The 2024 monitoring program included a quality assurance and quality control component that confirmed groundwater, surface water, leachate and stormwater quality data were acceptably precise and reliable. It also included a field sampling audit that confirmed the absence of issues that would materially affect the quality of data collected.

Flow Control System - Perimeter Ditch System

The perimeter ditch system consists of the inner leachate ditch (Leachate Ditch) and the outer drainage ditch (Drainage Ditch), which are separated by an intermediate soil berm. The Drainage Ditch diverts natural surface runoff and shallow groundwater flow from Burns Bog around the landfill footprint. The Leachate Ditch collects the following waters, which are collectively referred to as ‘leachate’ once they reach the Leachate Ditch:

- Leachate – Rainwater that is contaminated after the water percolates through waste.
- Surface Runoff – Rainwater that flows along other surfaces at the landfill such as intermediate cover areas (temporarily closed) and operational areas (i.e. entrance area buildings and scales) that may be impacted by leachate.
- Stormwater – Rainwater that is collected above the impermeable geomembrane in closed areas of the landfill, that is not able to be redirected outside of the leachate collection system. It is not impacted by leachate.

- Impacted Stormwater – Rainwater that is collected above the impermeable geomembrane in closed areas of the landfill that is not yet suitable for discharge to the environment. Impacts are temporary and associated with recently closed phases of the landfill. It is not impacted by leachate.

Water collected in the Leachate Ditch flows to the landfill's leachate pump station before being discharged off-site through the municipal sanitary sewer system. Water in the sanitary line is conveyed to the Annacis Island Wastewater Treatment Plant.

The purpose of the perimeter ditch system is to maintain an inward hydraulic gradient around the landfill footprint to ensure leachate is collected and conveyed to the leachate pump station. To achieve this, water levels in the Leachate Ditch are actively maintained at a lower elevation than the Drainage Ditch through pump station control. Water levels in the Drainage Ditch are reflective of natural inputs from the surrounding lands; however, a system of weirs is in place to increase retention of natural runoff and maintain higher water elevations adjacent to Burns Bog.

Prior to 2022, leachate collection system containment efficiency was assessed using daily/weekly manual measurements from five staff gauge locations, and the average containment efficiency between 1995 to 2021 was 93%. An apparent sudden reduction in containment efficiencies in 2022 (78%) and 2023 (76%) is an artifact of the change in monitoring method, not a result of landfill operational changes, and does not signify a sudden decrease in containment efficiency. A comparison of manual water level measurements and RWLMS outputs was conducted in January 2024 to evaluate the accuracy of the system. Results indicated significant discrepancies (up to 10 cm) that resulted in RWLMS outputs biased toward outward gradients (i.e. lower containment efficiency). CoV identified sediment build-up within stilling wells and conducted cleaning in May 2024 and in August 2024. Following cleaning, the system underwent re-calibration (August 2024).

Based on continuous water level measurements from eight RWLMS stations, the overall efficiency of the system in 2024 was estimated to be 93%, which was higher than the overall containment efficiency in 2023 (76%, which used biased RWLMS data), and similar to average containment efficiency results before the biased RWLMS data was used to calculate containment efficiency (93%). Although temporary outward gradients were observed at nearly all perimeter ditch monitoring stations, calculated groundwater flow velocities across the berm (from Leachate Ditch to the Drainage Ditch) indicate that it is highly unlikely that leachate migrated to the Drainage Ditch in 2024.

Leachate Flow

The CoV maintained suitable flow measuring devices for the purpose of recording the volume of leachate discharged to the sanitary sewer each month as required under Section 3.2.2 of the OC. The total leachate discharge volume was approximately 37% higher than in 2023, while total precipitation in 2024 was about 51% higher than in 2023. The leachate and precipitation ratio in 2024 was 68%, which is noticeably lower than the results recorded between 2010 and 2022. The reduced leachate to precipitation ratio indicates that on-going stormwater management works continue to be effective at decreasing the volume of leachate-impacted waters generated at the landfill.

The highest daily leachate flow rate (35,910 m^3/day) occurred on October 21, 2024. This is below the WDP maximum (under review) daily limit of 45,000 m^3/day. Leachate discharge volumes remained in compliance with OC and WDP requirements during 2024.

Groundwater Flow

Two groundwater flow systems are present beneath the landfill. The shallow aquifer consists primarily of organic peat that extends from ground surface to approximately six metres depth and is underlain by a thick permeable deep sand aquifer (known as the deep aquifer). The shallow and deep aquifers are separated by a low permeability silt/clay aquitard that varies in thickness from 1 to 5 metres. Water levels are monitored in both aquifers on a quarterly basis using a series of monitoring wells located around the perimeter of the landfill. The perimeter ditch system and Dredge Pond are important hydrologic features that influence groundwater levels and flow directions in both aquifers. Groundwater elevations fluctuated on the order of one metre seasonally. Groundwater levels were lower than the historical range in both the shallow and deep aquifers but higher than in 2023, due to higher precipitation in 2024. However, seasonal patterns and flow gradient directions were generally similar to previous years. Groundwater flow

directions were predominantly from northeast to southwest, and because topography is relatively flat, horizontal groundwater gradients and flow velocities in both the shallow and deep aquifers are relatively low.

Surface Water Flow

Regional surface water flows southwest from Burns Bog toward the perimeter ditch system. Surface water and shallow groundwater that enters the perimeter ditch system is diverted around the landfill footprint and discharged into Crescent Slough, the DIEP Canal, or the municipal ditch network from connection points at the northwestern and southwestern corners of the landfill. The City of Delta intermittently opens a floodgate to allow river water to flow into Crescent Slough and the DIEP Canal for irrigation purposes on nearby agricultural lands. As a result, periodic surface water flow reversals have been observed under certain tidal, river discharge and operational scenarios. In late summer, portions of the perimeter ditch system on the north, east and southeast sides of the landfill cease to flow or become dry following prolonged periods of dry weather. Surface water in the Drainage Ditch near the leachate pump station receives water inputs from the municipal ditch network west of the landfill. Surface water in this area is primarily discharged to the DIEP Canal and the municipal ditch network south of the landfill.

Leachate Quality Summary

Monthly leachate quality samples were collected from the approved sampling point at the leachate pump station in accordance with OC and WDP requirements. All samples were analyzed for the parameters stipulated in the OC and WDP. All leachate quality samples met applicable discharge criteria in 2024, with some exceptions. Toxicity exceeded HWR criteria in four leachate grab samples (similar to previous years). Three samples marginally exceeded GVSDD Bylaw 299 criteria for dissolved iron and were associated with fluctuating pH and redox conditions contributing to increased iron solubility. One leachate grab sample marginally exceeded HWR criteria for dissolved manganese. Despite this minor exceedance, overall leachate quality met the intent of the WDP because the annual mean manganese concentration was well below the HWR criteria.

Groundwater Quality

As per the OC, quarterly monitoring must be conducted on five shallow monitoring wells and seven deep monitoring wells. In 2024, the monitoring program included 18 shallow monitoring wells and 20 deep monitoring wells. Quarterly groundwater quality samples were collected from the monitoring stations required by the OC. The remaining monitoring wells were also sampled on a quarterly basis, except for three wells that were only monitored for water levels and field parameters. All samples were analyzed for the parameters stipulated in the OC.

Groundwater quality in the shallow aquifer is strongly influenced by bog water chemistry. Upgradient groundwater flowing from Burns Bog toward the landfill is naturally acidic and contains elevated concentrations of several constituents that are readily mobilized under acidic conditions. Deep groundwater chemistry appears to have minimal influence from Burns Bog and represents a compilation of upgradient sources. Water chemistry in both shallow and deep aquifers naturally evolves along the flow path, particularly in the shallow aquifer, as groundwater travels away from the bog hydrologic system. Professional judgement was used to assess the nature and degree of any water quality impacts that may have occurred due to leachate, road salt, runoff from neighbouring lands, and brackish waters from tidal fluctuations and municipal floodgate operations.

Groundwater quality results were tabulated and compared against applicable *Contaminated Sites Regulation* (CSR) standards. The shallow aquifer is not considered to be a drinking water aquifer due to the presence of organic soils. Primary leachate indicator parameters are considered to be ammonia, conductivity, and chloride. Secondary leachate indicator parameters include alkalinity and hardness. All of these parameters were used to assess any leachate impacts in consideration of background concentrations of leachate indicator parameters and the results of statistical trend analysis.

Similar to previous years, leachate-impacted groundwater was contained within the landfill property.

Shallow Groundwater Quality

Background water quality in the shallow aquifer was similar to previous years and reflected natural water chemistry in Burns Bog. Shallow groundwater quality at all monitoring stations does not appear to be impacted by leachate, with one exception (54-2013).

Shallow groundwater quality at monitoring station 54-2013 (south of the landfill and northeast of the Dredge Pond) continued to exhibit dilute leachate impacts. Based on the results of the *2023 Hydrogeology Review*, groundwater quality at this location, and up to 25 metres beyond the perimeter ditch system, is impacted by dilute leachate. The impacts are relatively minor and are contained within the landfill property boundary due to net-inward hydraulic gradients from the bog towards the perimeter ditch system. Water quality at 54-2013 met all applicable CSR standards.

The consistently elevated ammonia and conductivity in shallow groundwater wells along the southwestern corner of the property (wells 25-2019, 26-2013 and 50) are attributed to the upwelling and mixing of deep groundwater and not associated with leachate impacts due to low chloride concentrations.

Shallow groundwater quality data met all applicable CSR Freshwater Aquatic Life (AW) and Irrigation Water Use (IW) standards in 2024 except at the well adjacent to the Cranberry Research Facility (39-2013), which exceeded the AW standard for arsenic in Q1 and Q2 and the AW standards for chromium and zinc in Q2. Impacts at this location have not been observed historically. The exceedances appear to be temporary, are likely attributed to off-site activities in the vicinity of the well.

Deep Groundwater Quality

In 2024, deep groundwater quality at all monitoring stations does not appear to be impacted by leachate. Background water quality in the deep aquifer was similar to previous years and reflected natural water chemistry. Concentrations of leachate indicator parameters and other dissolved minerals are higher than those observed in the overlying shallow aquifer. Concentrations of select leachate indicator parameters at downgradient monitoring wells are slightly higher than upgradient of the landfill, which may be the result of off-site sources (i.e. upwelling saline waters, municipal irrigation system, road salt impacts, tidal influences, etc.).

Deep groundwater quality data met the applicable CSR Irrigation Water Use (IW) standards, with the exception of chloride at well 124 (located at the southwest corner of the landfill) and chromium at well 57. Chloride concentrations at well 124 are inferred to be the result of DIEP Canal construction in 2013 and potentially impacts associated with land clearing works south of the landfill. Chromium is not considered an accurate indicator of landfill leachate impacts at the landfill due to the low concentrations of chromium in leachate.

Deep groundwater quality data met CSR AW standards, except for chromium at well 57. As mentioned above, localized chromium impacts are not associated with leachate.

Deep groundwater quality data met applicable CSR Drinking Water Use (DW) standards, with the exception of dissolved vanadium at background well 121 and downgradient well 57. Vanadium impacts are not considered an indicator of landfill leachate due to relatively low concentrations of vanadium in leachate and high natural background concentrations.

Surface Water Quality

As per the OC, quarterly monitoring and sampling must be conducted at eight surface water monitoring stations. In 2024, 13 surface water monitoring stations were monitored and sampled to confirm compliance with the OC.

In 2024, the surface water monitoring program exceeded the requirements stipulated in the OC based on the number of stations and parameters monitored. The only exceptions were associated with locations that could not be sampled in the summer when ditches were dry.

Surface water quality at monitoring stations located north, northwest, northeast, and south of the landfill generally does not appear to be impacted by leachate. Water chemistry at these locations is strongly influenced by naturally acidic surface water runoff and groundwater seepage from Burns Bog. Similar to previous years, pH, turbidity, and select metals concentrations exceeded BCWQG AW and IW criteria. Exceedances at these stations are consistent

with background water quality and are attributed to the naturally acidic water quality due to water inputs from Burns Bog. However, dilute leachate impacts were identified at station 96 (northwest corner of site) during Q3 and are likely associated with nearby berm failure and/or berm repair activities. The extent of the impacts was contained on landfill property and water chemistry returned to normal in the subsequent monitoring event (Q4).

Surface water quality at monitoring stations located west and southwest of the landfill do not appear to be impacted by leachate in 2024. Similar to previous years, pH, turbidity, total suspended solids and select metals concentrations exceeded BCWQG AW and IW criteria. Water quality impacts at these locations are attributed to poor water quality in the municipal irrigation network caused by seasonal runoff from nearby agricultural fields, roadways, upwelling of deep saline waters, and influences from the Fraser River.

Stormwater Quality

The purpose of the stormwater monitoring program is to characterize the quality of stormwater discharging from closed landfill phases and lined stormwater detention ponds to confirm if the water is suitable for discharge outside the leachate collection system.

Based on 2024 results, stormwater quality from the closed Phases 1, 2, 3, Western 40 Pond 4, Western 40 Pond 6, and Phase 4 Pond was similar to or better than water quality in nearby on-site and off-site receiving environments (e.g. Dredge Pond, Crescent Slough, and Centre Ditch). Stormwater from these locations was discharged to the Dredge Pond in 2024 and water quality in the Dredge Pond was not affected. As such, it is acceptable to continue discharging stormwater from Phases 1, 2, 3, Western 40 Pond 4, and Phase 4 Pond outside the leachate collection system. Stormwater from Western 40 Pond 6 is discharged into the Leachate Ditch because conveyance infrastructure capable of discharging stormwater beyond the Leachate Ditch was not yet available.

Stormwater quality data collected over the past four years indicates that concentrations of herbicide and pesticide parameters are consistently below analytical detection limits from on-site discharge points and various off-site municipal irrigation network locations. Therefore, the herbicide and pesticide sampling program can be discontinued. Monitoring for these parameters should resume if herbicides or pesticides are used on closed phases of the landfill.

Based on the findings of the 2024 Water Quality Monitoring Program Review, the following recommendations were made, and are presented with ongoing recommendations from previous years.

2024 - Monitoring Network		**Status**
2024-1	Leachate, groundwater, surface water and stormwater monitoring (i.e. water level monitoring and sampling) should be conducted as per the recommended 2025 Water Monitoring Program as outlined in **Appendix G** of this report.	New
2024-2	Manual water level verification checks should be performed monthly (at minimum) to confirm the accuracy of the RWLMS. If discrepancies between manual and system readings exceed 10% or +/- 5 cm are identified, system maintenance and recalibration should be conducted as directed by the manufacturer (DEVA Solutions Inc.).	New
2024-3	Clear vegetation around RWLMS stations, as required based on vegetation growth, to facilitate access for accurate manual water level measurements.	New
2024-4	Continue to resurvey stilling wells on an annual basis to account for settlement impacts.	New
2024 – Stormwater Management		
2024-5	Four years of herbicide and pesticide stormwater quality data from on-site discharge points confirmed the absence of herbicide and pesticide impacts on closed phases of the landfill. Therefore, it is recommended that annual October monitoring of pesticides and herbicides be removed from the routine stormwater monitoring program (**Appendix G4**).	New
2019 - Monitoring Network		
2019-2	Inactive monitoring Wells 19 and 20 should be decommissioned once access to the property south of the landfill is granted. To date, the landowner has not responded to requests from the City.	On-going

CITY OF VANCOUVER

Appendix 7: 2024 Weekly leachate and drainage ditch water elevations

Date	L1/D1		Flow Direction	L2/D2		Flow Direction	L3/D3		Flow Direction	L4/D4		Flow Direction	L5/D5		Flow Direction	L6/D6		Flow Direction	L7/D7		Flow Direction	L8/D8		Flow Direction
	L1 m	D1 m		L2 m	D2 m		L3 m	D3 m		L4 m	D4 m		L5 m	D5 m		L6 m	D6 m		L7 m	D7 m		L8 m	D8 m	
Daily Data - Remote Water Level Monitoring System (Jan 01, 2024 - Dec 31, 2024)																								
2024-01-01	-0.44	-0.29	inward	-0.57	0.34	inward	0.26	0.97	inward	0.52	0.72	inward	-0.06	0.40	inward	1.37	1.72	inward	1.46	1.55	inward	0.83	1.10	inward
2024-01-02	-0.43	-0.30	inward	-0.55	0.32	inward	0.25	0.97	inward	0.51	0.71	inward	-0.07	0.39	inward	1.38	1.72	inward	1.47	1.52	inward	0.82	1.09	inward
2024-01-03	-0.39	-0.29	inward	-0.58	0.30	inward	0.27	0.97	inward	0.56	0.72	inward	-0.05	0.41	inward	1.42	1.70	inward	1.45	1.56	inward	0.84	1.10	inward
2024-01-04	-0.43	-0.29	inward	-0.52	0.34	inward	0.23	0.98	inward	0.54	0.75	inward	-0.04	0.42	inward	1.39	1.71	inward	1.45	1.56	inward	0.83	1.11	inward
2024-01-05	-0.41	-0.28	inward	-0.52	0.33	inward	0.25	1.00	inward	0.57	0.78	inward	-0.05	0.47	inward	1.40	1.73	inward	1.47	1.59	inward	0.84	1.13	inward
2024-01-06	-0.35	-0.26	inward	-0.49	0.33	inward	0.31	1.00	inward	0.61	0.77	inward	-0.02	0.50	inward	1.43	1.71	inward	1.47	1.57	inward	0.86	1.14	inward
2024-01-07	-0.40	-0.28	inward	-0.51	0.34	inward	0.27	1.03	inward	0.60	0.80	inward	-0.03	0.52	inward	1.39	1.73	inward	1.47	1.60	inward	0.86	1.16	inward
2024-01-08	-0.41	-0.28	inward	-0.54	0.33	inward	0.27	1.01	inward	0.56	0.76	inward	-0.04	0.48	inward	1.41	1.74	inward	1.48	1.59	inward	0.84	1.14	inward
2024-01-09	-0.17	-0.04	inward	-0.39	0.37	inward	0.55	1.07	inward	0.87	0.88	inward	0.02	0.62	inward	1.57	1.78	inward	1.56	1.68	inward	0.97	1.21	inward
2024-01-10	-0.19	-0.16	inward	-0.36	0.42	inward	0.31	1.11	inward	0.67	0.89	inward	0.16	0.49	inward	1.47	1.76	inward	1.50	1.69	inward	0.89	1.25	inward
2024-01-11	-0.27	-0.25	inward	-0.41	0.41	inward	0.27	1.07	inward	0.61	0.84	inward	0.10	0.45	inward	1.44	1.75	inward	1.48	1.64	inward	0.87	1.20	inward
2024-01-12	-0.35	-0.28	inward	-0.51	0.35	inward	0.24	1.04	inward	0.56	0.80	inward	-0.05	0.55	inward	1.42	1.73	inward	1.49	1.58	inward	0.83	1.17	inward
2024-01-13	-0.38	-0.28	inward	-0.48	0.34	inward	0.23	1.05	inward	0.52	0.75	inward	-0.08	0.52	inward	1.40	1.74	inward	1.46	1.56	inward	0.82	1.15	inward
2024-01-14	-0.37	-0.30	inward	-0.50	0.34	inward	0.23	1.03	inward	0.52	0.73	inward	-0.10	0.52	inward	1.39	1.71	inward	1.45	1.57	inward	0.82	1.12	inward
2024-01-15	-0.40	-0.26	inward	-0.49	0.32	inward	0.22	0.98	inward	0.50	0.72	inward	-0.14	0.49	inward	1.36	1.70	inward	1.44	1.54	inward	0.80	1.10	inward
2024-01-16	-0.38	-0.31	inward	-0.55	0.30	inward	0.22	0.97	inward	0.50	0.69	inward	-0.15	0.45	inward	1.38	1.69	inward	1.46	1.55	inward	0.79	1.09	inward
2024-01-17	-0.33	-0.33	outward	-0.49	0.32	inward	0.22	0.95	inward	0.52	0.69	inward	-0.12	0.46	inward	1.38	1.71	inward	1.46	1.52	inward	0.80	1.07	inward
2024-01-18	-0.38	-0.32	inward	-0.51	0.31	inward	0.21	0.96	inward	0.48	0.70	inward	-0.14	0.43	inward	1.37	1.71	inward	1.44	1.52	inward	0.79	1.08	inward
2024-01-19	-0.35	-0.30	inward	-0.48	0.31	inward	0.20	0.95	inward	0.47	0.71	inward	-0.14	0.44	inward	1.37	1.71	inward	1.45	1.51	inward	0.79	1.07	inward
2024-01-20	-0.23	-0.29	outward	-0.36	0.34	inward	0.25	0.98	inward	0.52	0.73	inward	-0.10	0.46	inward	1.38	1.72	inward	1.46	1.55	inward	0.81	1.10	inward
2024-01-21	-0.41	-0.28	inward	-0.47	0.33	inward	0.26	0.98	inward	0.51	0.73	inward	-0.09	0.48	inward	1.37	1.71	inward	1.46	1.59	inward	0.80	1.11	inward
2024-01-22	-0.19	-0.15	inward	-0.24	0.38	inward	0.44	1.03	inward	0.70	0.82	inward	0.04	0.52	inward	1.50	1.75	inward	1.47	1.65	inward	0.91	1.16	inward
2024-01-23	-0.19	0.06	inward	-0.23	0.45	inward	0.37	1.14	inward	0.69	0.94	inward	0.13	0.61	inward	1.45	1.82	inward	1.49	1.72	inward	0.90	1.27	inward
2024-01-24	-0.22	0.03	inward	-0.33	0.50	inward	0.31	1.15	inward	0.70	0.94	inward	0.13	0.62	inward	1.47	1.81	inward	1.50	1.71	inward	0.88	1.29	inward
2024-01-25	-0.24	0.04	inward	-0.38	0.49	inward	0.29	1.14	inward	0.70	0.95	inward	0.13	0.61	inward	1.45	1.80	inward	1.49	1.72	inward	0.87	1.29	inward
2024-01-26	-0.28	-0.14	inward	-0.43	0.44	inward	0.27	1.12	inward	0.63	0.92	inward	0.05	0.59	inward	1.43	1.77	inward	1.49	1.70	inward	0.85	1.26	inward
2024-01-27	-0.24	-0.14	inward	-0.35	0.46	inward	0.29	1.12	inward	0.68	0.91	inward	0.00	0.70	inward	1.47	1.81	inward	1.49	1.71	inward	0.88	1.26	inward
2024-01-28	-0.22	0.28	inward	-0.31	0.66	inward	0.75	1.18	inward	0.96	1.06	inward	0.23	0.76	inward	1.66	1.90	inward	1.62	1.76	inward	1.05	1.36	inward
2024-01-29	-0.08	0.29	inward	-0.20	0.56	inward	0.38	1.17	inward	0.78	1.01	inward	0.21	0.74	inward	1.53	1.86	inward	1.50	1.74	inward	0.93	1.33	inward
2024-01-30	-0.32	-0.02	inward	-0.42	0.48	inward	0.27	1.15	inward	0.65	0.95	inward	0.02	0.72	inward	1.48	1.80	inward	1.48	1.70	inward	0.87	1.29	inward
2024-01-31	-0.32	-0.21	inward	-0.47	0.48	inward	0.27	1.11	inward	0.63	0.91	inward	-0.02	0.67	inward	1.48	1.80	inward	1.48	1.71	inward	0.85	1.25	inward
2024-02-01	-0.32	-0.23	inward	-0.42	0.46	inward	0.29	1.13	inward	0.64	0.91	inward	-0.02	0.69	inward	1.46	1.78	inward	1.48	1.71	inward	0.85	1.25	inward
2024-02-02	-0.35	-0.25	inward	-0.46	0.43	inward	0.27	1.12	inward	0.62	0.88	inward	-0.03	0.65	inward	1.44	1.80	inward	1.47	1.70	inward	0.85	1.23	inward
2024-02-03	-0.24	-0.26	outward	-0.30	0.43	inward	0.56	1.09	inward	0.60	0.87	inward	-0.06	0.63	inward	1.46	1.78	inward	1.47	1.68	inward	0.83	1.21	inward
2024-02-04	-0.23	-0.27	outward	-0.28	0.42	inward	0.52	1.06	inward	0.58	0.82	inward	-0.06	0.62	inward	1.45	1.78	inward	1.47	1.66	inward	0.83	1.20	inward
2024-02-05	-0.32	-0.28	inward	-0.45	0.41	inward	0.31	1.06	inward	0.56	0.79	inward	-0.08	0.58	inward	1.43	1.77	inward	1.48	1.65	inward	0.82	1.17	inward
2024-02-06	-0.39	-0.29	inward	-0.46	0.42	inward	0.25	1.03	inward	0.55	0.77	inward	-0.09	0.59	inward	1.44	1.75	inward	1.45	1.64	inward	0.81	1.16	inward
2024-02-07	-0.38	-0.29	inward	-0.49	0.29	inward	0.25	1.04	inward	0.55	0.75	inward	-0.12	0.56	inward	1.43	1.77	inward	1.44	1.61	inward	0.81	1.15	inward
2024-02-08	-0.41	-0.30	inward	-0.49	0.28	inward	0.24	1.00	inward	0.53	0.74	inward	-0.11	0.56	inward	1.42	1.74	inward	1.47	1.60	inward	0.80	1.13	inward
2024-02-09	-0.42	-0.30	inward	-0.51	0.24	inward	0.23	1.00	inward	0.52	0.72	inward	-0.14	0.54	inward	1.41	1.74	inward	1.47	1.60	inward	0.79	1.12	inward
2024-02-10	-0.47	-0.30	inward	-0.51	0.26	inward	0.24	0.97	inward	0.51	0.71	inward	-0.15	0.54	inward	1.40	1.74	inward	1.47	1.59	inward	0.78	1.10	inward
2024-02-11	-0.44	-0.30	inward	-0.45	0.24	inward	0.23	0.97	inward	0.51	0.69	inward	-0.14	0.52	inward	1.40	1.72	inward	1.45	1.59	inward	0.78	1.08	inward
2024-02-12	-0.36	-0.28	inward	-0.43	0.31	inward	0.27	1.01	inward	0.59	0.77	inward	-0.09	0.54	inward	1.45	1.77	inward	1.48	1.65	inward	0.82	1.13	inward
2024-02-13	-0.39	-0.27	inward	-0.45	0.30	inward	0.27	1.04	inward	0.58	0.83	inward	-0.10	0.60	inward	1.42	1.77	inward	1.47	1.67	inward	0.82	1.18	inward
2024-02-14	-0.39	-0.29	inward	-0.47	0.26	inward	0.24	1.04	inward	0.55	0.81	inward	-0.11	0.58	inward	1.43	1.74	inward	1.46	1.67	inward	0.80	1.16	inward
2024-02-15	-0.38	-0.29	inward	-0.49	0.24	inward	0.25	1.02	inward	0.53	0.75	inward	-0.12	0.57	inward	1.43	1.76	inward	1.45	1.65	inward	0.80	1.14	inward
2024-02-16	-0.43	-0.30	inward	-0.52	0.24	inward	0.22	1.00	inward	0.52	0.73	inward	-0.15	0.53	inward	1.40	1.76	inward	1.46	1.61	inward	0.79	1.12	inward
2024-02-17	-0.40	-0.30	inward	-0.54	0.21	inward	0.22	1.01	inward	0.54	0.71	inward	-0.14	0.53	inward	1.41	1.72	inward	1.44	1.62	inward	0.78	1.11	inward
2024-02-18	-0.38	-0.30	inward	-0.53	0.22	inward	0.23	0.96	inward	0.53	0.70	inward	-0.13	0.51	inward	1.40	1.74	inward	1.47	1.59	inward	0.78	1.09	inward
2024-02-19	-0.39	-0.30	inward	-0.55	0.19	inward	0.22	0.95	inward	0.52	0.70	inward	-0.14	0.49	inward	1.40	1.73	inward	1.44	1.60	inward	0.77	1.08	inward
2024-02-20	-0.39	-0.31	inward	-0.50	0.18	inward	0.22	0.94	inward	0.52	0.69	inward	-0.16	0.53	inward	1.40	1.74	inward	1.46	1.57	inward	0.78	1.08	inward
2024-02-21	-0.38	-0.30	inward	-0.51	0.18	inward	0.24	0.93	inward	0.52	0.69	inward	-0.15	0.57	inward	1.41	1.74	inward	1.45	1.60	inward	0.78	1.07	inward
2024-02-22	-0.38	-0.30	inward	-0.48	0.21	inward	0.22	0.97	inward	0.53	0.71	inward	-0.12	0.59	inward	1.40	1.73	inward	1.47	1.61	inward	0.78	1.08	inward
2024-02-23	-0.38	-0.30	inward	-0.50	0.21	inward	0.22	0.98	inward	0.52	0.89	inward	-0.11	0.59	inward	1.43	1.76	inward	1.45	1.62	inward	0.78	1.10	inward
2024-02-24	-0.36	-0.30	inward	-0.47	0.22	inward	0.22	0.98	inward	0.52	0.86	inward	-0.15	0.60	inward	1.43	1.76	inward	1.46	1.63	inward	0.78	1.11	inward
2024-02-25	-0.34	-0.30	inward	-0.46	0.23	inward	0.25	0.97	inward	0.52	0.80	inward	-0.14	0.60	inward	1.44	1.74	inward	1.43	1.61	inward	0.78	1.10	inward
2024-02-26	-0.45	-0.30	inward	-0.50	0.22	inward	0.23	0.97	inward	0.52	0.81	inward	-0.12	0.60	inward	1.43	1.72	inward	1.45	1.59	inward	0.78	1.10	inward
2024-02-27	-0.46	-0.31	inward	-0.50	0.22	inward	0.23	0.98	inward	0.51	0.79	inward	-0.13	0.59	inward	1.41	1.73	inward	1.46	1.58	inward	0.77	1.08	inward
2024-02-28	-0.41	-0.30	inward	-0.45	0.24	inward	0.24	0.96	inward	0.53	0.79	inward	-0.12	0.58	inward	1.42	1.74	inward	1.46	1.61	inward	0.78	1.09	inward
2024-02-29	-0.21	-0.11	inward	-0.22	0.30	inward	0.36	1.07	inward	0.66	0.89	inward	0.01	0.68	inward	1.49	1.78	inward	1.48	1.71	inward	0.86	1.19	inward
2024-03-01	-0.28	-0.26	inward	-0.46	0.33	inward	0.28	1.10	inward	0.58	0.89	inward	-0.05	0.66	inward	1.45	1.76	inward	1.47	1.69	inward	0.81	1.20	inward
2024-03-02	-0.29	-0.27	inward	-0.46	0.31	inward	0.26	1.06	inward	0.55	0.82	inward	-0.06	0.66	inward	1.46	1.77	inward	1.48	1.65	inward	0.79	1.17	inward
2024-03-03	-0.33	-0.28	inward	-0.50	0.28	inward	0.24	1.05	inward	0.53	0.79	inward	-0.10	0.62	inward	1.45	1.76	inward	1.47	1.62	inward	0.78	1.15	inward
2024-03-04	-0.32	-0.27	inward	-0.42	0.29	inward	0.29	1.03	inward	0.59	0.82	inward	-0.09	0.63	inward	1.49	1.77	inward	1.46	1.64	inward	0.80	1.15	inward
2024-03-05	-0.37	-0.28	inward	-0.51	0.28	inward	0.26	1.04	inward	0.56	0.83	inward	-0.09	0.64	inward	1.43	1.78	inward	1.48	1.67	inward	0.80	1.16	inward
2024-03-06	-0.41	-0.29	inward	-0.50	0.28	inward	0.25	1.04	inward	0.56	0.79	inward	-0.11	0.62	inward	1.44	1.76	inward	1.45	1.64	inward	0.79	1.16	inward
2024-03-07	-0.42	-0.29	inward	-0.51	0.24	inward	0.24	1.02	inward	0.53	0.78	inward	-0.14	0.65	inward	1.42	1.76	inward	1.48	1.61	inward	0.78	1.14	inward

Date	L1/D1		Flow Direction	L2/D2		Flow Direction	L3/D3		Flow Direction	L4/D4		Flow Direction	L5/D5		Flow Direction	L6/D6		Flow Direction	L7/D7		Flow Direction	L8/D8		Flow Direction
	L1 m	D1 m		L2 m	D2 m		L3 m	D3 m		L4 m	D4 m		L5 m	D5 m		L6 m	D6 m		L7 m	D7 m		L8 m	D8 m	
2024-03-08	-0.43	-0.30	inward	-0.53	0.22	inward	0.24	1.00	inward	0.52	0.75	inward	-0.14	0.52	inward	1.43	1.76	inward	1.46	1.61	inward	0.77	1.12	inward
2024-03-09	-0.38	-0.29	inward	-0.51	0.23	inward	0.25	0.99	inward	0.52	0.81	inward	-0.15	0.49	inward	1.43	1.75	inward	1.47	1.60	inward	0.78	1.11	inward
2024-03-10	-0.33	-0.29	inward	-0.48	0.20	inward	0.23	1.00	inward	0.52	0.80	inward	-0.15	0.55	inward	1.45	1.73	inward	1.48	1.59	inward	0.77	1.11	inward
2024-03-11	-0.42	-0.30	inward	-0.54	0.19	inward	0.22	0.97	inward	0.53	0.83	inward	-0.14	0.53	inward	1.43	1.75	inward	1.47	1.59	inward	0.77	1.10	inward
2024-03-12	-0.37	-0.29	inward	-0.49	0.21	inward	0.24	0.98	inward	0.56	0.83	inward	-0.12	0.60	inward	1.44	1.75	inward	1.46	1.61	inward	0.79	1.10	inward
2024-03-13	-0.42	-0.30	inward	-0.53	0.18	inward	0.21	0.98	inward	0.52	0.87	inward	-0.14	0.57	inward	1.44	1.77	inward	1.46	1.61	inward	0.78	1.11	inward
2024-03-14	-0.44	-0.30	inward	-0.55	0.19	inward	0.19	0.97	inward	0.52	0.83	inward	-0.18	0.60	inward	1.43	1.76	inward	1.45	1.61	inward	0.76	1.10	inward
2024-03-15	-0.41	-0.30	inward	-0.54	0.17	inward	0.20	0.97	inward	0.51	0.80	inward	-0.18	0.58	inward	1.43	1.75	inward	1.45	1.60	inward	0.77	1.09	inward
2024-03-16	-0.39	-0.31	inward	-0.53	0.17	inward	0.21	0.95	inward	0.52	0.79	inward	-0.16	0.62	inward	1.44	1.74	inward	1.48	1.61	inward	0.76	1.09	inward
2024-03-17	-0.39	-0.32	inward	-0.52	0.16	inward	0.20	0.94	inward	0.51	0.78	inward	-0.18	0.63	inward	1.44	1.74	inward	1.45	1.60	inward	0.75	1.08	inward
2024-03-18	-0.39	-0.31	inward	-0.56	0.16	inward	0.20	0.93	inward	0.50	0.80	inward	-0.19	0.62	inward	1.44	1.74	inward	1.47	1.58	inward	0.76	1.08	inward
2024-03-19	-0.36	-0.31	inward	-0.54	0.16	inward	0.21	0.93	inward	0.52	0.78	inward	-0.17	0.62	inward	1.45	1.71	inward	1.45	1.55	inward	0.75	1.07	inward
2024-03-20	-0.35	-0.32	inward	-0.55	0.18	inward	0.23	0.93	inward	0.50	0.79	inward	-0.17	0.52	inward	1.44	1.74	inward	1.48	1.56	inward	0.75	1.06	inward
2024-03-21	-0.33	-0.31	inward	-0.51	0.17	inward	0.20	0.91	inward	0.51	0.76	inward	-0.19	0.58	inward	1.45	1.73	inward	1.47	1.53	inward	0.76	1.07	inward
2024-03-22	-0.33	-0.31	inward	-0.52	0.15	inward	0.20	0.90	inward	0.51	0.77	inward	-0.18	0.60	inward	1.42	1.73	inward	1.45	1.51	inward	0.75	1.06	inward
2024-03-23	-0.29	-0.31	outward	-0.51	0.16	inward	0.22	0.90	inward	0.50	0.74	inward	-0.16	ERR	-	1.45	1.74	inward	1.44	1.52	inward	0.76	1.07	inward
2024-03-24	-0.25	-0.30	outward	-0.43	0.19	inward	0.24	0.92	inward	0.55	0.80	inward	-0.13	ERR	-	1.44	1.76	inward	1.48	1.59	inward	0.77	1.09	inward
2024-03-25	-0.42	-0.30	inward	-0.54	0.17	inward	0.21	0.94	inward	0.51	0.85	inward	-0.15	ERR	-	1.44	1.76	inward	1.48	1.61	inward	0.76	1.09	inward
2024-03-26	-0.41	-0.31	inward	-0.56	0.17	inward	0.22	0.92	inward	0.50	0.79	inward	-0.16	ERR	-	1.43	1.76	inward	1.46	1.62	inward	0.76	1.10	inward
2024-03-27	-0.38	-0.30	inward	-0.57	0.21	inward	0.23	0.92	inward	0.52	0.78	inward	-0.16	ERR	-	1.43	1.76	inward	1.48	1.59	inward	0.76	1.10	inward
2024-03-28	-0.30	-0.25	inward	-0.42	0.22	inward	0.26	0.95	inward	0.56	0.80	inward	-0.12	ERR	-	1.46	1.76	inward	1.48	1.64	inward	0.79	1.12	inward
2024-03-29	-0.32	-0.30	inward	-0.49	0.25	inward	0.22	0.96	inward	0.54	0.86	inward	-0.13	ERR	-	1.46	1.77	inward	1.47	1.70	inward	0.78	1.14	inward
2024-03-30	-0.33	-0.30	inward	-0.52	0.23	inward	0.22	0.96	inward	0.55	0.82	inward	-0.15	ERR	-	1.44	1.77	inward	1.48	1.68	inward	0.76	1.14	inward
2024-03-31	-0.45	-0.30	inward	-0.55	0.27	inward	0.22	0.96	inward	0.52	0.80	inward	-0.15	ERR	-	1.45	1.75	inward	1.48	1.68	inward	0.76	1.14	inward
2024-04-01	-0.47	-0.31	inward	-0.56	0.25	inward	0.20	0.95	inward	0.54	0.81	inward	-0.17	ERR	-	1.43	1.77	inward	1.48	1.64	inward	0.76	1.13	inward
2024-04-02	-0.48	-0.31	inward	-0.56	0.22	inward	0.20	0.95	inward	0.52	0.77	inward	-0.18	ERR	-	1.41	1.76	inward	1.48	1.62	inward	0.75	1.13	inward
2024-04-03	-0.46	-0.31	inward	-0.53	0.23	inward	0.21	0.93	inward	0.53	0.78	inward	-0.18	ERR	-	1.44	1.74	inward	1.48	1.62	inward	0.76	1.12	inward
2024-04-04	-0.42	-0.30	inward	-0.56	0.22	inward	0.21	0.93	inward	0.54	0.76	inward	-0.18	ERR	-	1.43	1.75	inward	1.45	1.58	inward	0.76	1.11	inward
2024-04-05	-0.41	-0.31	inward	-0.54	0.23	inward	0.21	0.91	inward	0.52	0.75	inward	-0.19	ERR	-	1.41	1.75	inward	1.47	1.59	inward	0.75	1.11	inward
2024-04-06	-0.43	-0.31	inward	-0.54	0.21	inward	0.18	0.93	inward	0.52	0.74	inward	-0.19	ERR	-	1.42	1.75	inward	1.44	1.57	inward	0.74	1.10	inward
2024-04-07	-0.46	-0.32	inward	-0.56	0.19	inward	0.19	0.91	inward	0.51	0.74	inward	-0.20	ERR	-	1.38	1.74	inward	1.45	1.56	inward	0.75	1.10	inward
2024-04-08	-0.48	-0.31	inward	-0.54	0.20	inward	0.21	0.92	inward	0.50	0.74	inward	-0.21	ERR	-	1.38	1.73	inward	1.46	1.54	inward	0.74	1.08	inward
2024-04-09	-0.45	-0.31	inward	-0.53	0.21	inward	0.20	0.90	inward	0.50	0.73	inward	-0.21	ERR	-	1.40	1.73	inward	1.43	1.56	inward	0.75	1.10	inward
2024-04-10	-0.48	-0.32	inward	-0.54	0.19	inward	0.19	0.90	inward	0.49	0.71	inward	-0.22	ERR	-	1.38	1.73	inward	1.46	1.52	inward	0.74	1.08	inward
2024-04-11	-0.43	-0.31	inward	-0.56	0.20	inward	0.19	0.90	inward	0.49	0.73	inward	-0.21	ERR	-	1.38	1.73	inward	1.46	1.55	inward	0.74	1.09	inward
2024-04-12	-0.42	-0.31	inward	-0.52	0.22	inward	0.21	0.90	inward	0.51	0.72	inward	-0.21	ERR	-	1.39	1.73	inward	1.47	1.54	inward	0.76	1.09	inward
2024-04-13	-0.43	-0.31	inward	-0.54	0.20	inward	0.22	0.90	inward	0.52	0.71	inward	-0.21	ERR	-	1.37	1.73	inward	1.47	1.54	inward	0.76	1.09	inward
2024-04-14	-0.47	-0.31	inward	-0.53	0.23	inward	0.21	0.90	inward	0.52	0.71	inward	-0.20	ERR	-	1.38	1.72	inward	1.46	1.54	inward	0.75	1.08	inward
2024-04-15	-0.49	-0.32	inward	-0.56	0.19	inward	0.18	0.89	inward	0.52	0.72	inward	-0.21	ERR	-	1.37	1.69	inward	1.43	1.54	inward	0.70	1.08	inward
2024-04-16	-0.51	-0.32	inward	-0.53	0.16	inward	0.19	0.88	inward	0.52	0.69	inward	-0.23	ERR	-	1.34	1.71	inward	1.46	1.51	inward	0.69	1.08	inward
2024-04-17	-0.51	-0.31	inward	-0.56	0.12	inward	0.18	0.88	inward	0.50	0.69	inward	-0.23	ERR	-	1.34	1.71	inward	1.43	1.51	inward	0.69	1.07	inward
2024-04-18	-0.49	-0.32	inward	-0.54	0.14	inward	0.20	0.88	inward	0.50	0.68	inward	-0.23	ERR	-	1.35	1.70	inward	1.43	1.50	inward	0.69	1.07	inward
2024-04-19	-0.47	-0.32	inward	-0.54	0.15	inward	0.19	0.86	inward	0.51	0.67	inward	-0.22	ERR	-	1.33	1.69	inward	1.43	1.52	inward	0.70	1.06	inward
2024-04-20	-0.46	-0.33	inward	-0.54	0.13	inward	0.19	0.85	inward	0.50	0.67	inward	-0.21	ERR	-	1.34	1.70	inward	1.45	1.52	inward	0.70	1.06	inward
2024-04-21	-0.54	-0.33	inward	-0.57	0.07	inward	0.18	0.84	inward	0.52	0.66	inward	-0.22	ERR	-	1.35	1.69	inward	1.45	1.51	inward	0.70	1.06	inward
2024-04-22	-0.53	-0.34	inward	-0.56	0.09	inward	0.18	0.84	inward	0.51	0.65	inward	-0.22	ERR	-	1.35	1.66	inward	1.42	1.50	inward	0.69	1.05	inward
2024-04-23	-0.49	-0.33	inward	-0.54	0.10	inward	0.17	0.84	inward	0.49	0.64	inward	-0.20	ERR	-	1.34	1.68	inward	1.42	1.48	inward	0.70	1.05	inward
2024-04-24	-0.50	-0.33	inward	-0.56	0.08	inward	0.17	0.83	inward	0.49	0.65	inward	-0.21	ERR	-	1.33	1.69	inward	1.44	1.48	inward	0.71	1.04	inward
2024-04-25	-0.48	-0.33	inward	-0.54	0.09	inward	0.19	0.81	inward	0.49	0.65	inward	-0.21	ERR	-	1.35	1.69	inward	1.42	1.51	inward	0.71	1.05	inward
2024-04-26	-0.43	-0.31	inward	-0.49	0.16	inward	0.23	0.87	inward	0.55	0.69	inward	-0.17	ERR	-	1.38	1.72	inward	1.43	1.57	inward	0.73	1.10	inward
2024-04-27	-0.44	-0.31	inward	-0.55	0.16	inward	0.22	0.89	inward	0.54	0.76	inward	-0.16	ERR	-	1.38	1.77	inward	1.43	1.63	inward	0.73	1.12	inward
2024-04-28	-0.44	-0.31	inward	-0.51	0.17	inward	0.25	0.92	inward	0.56	0.80	inward	-0.15	ERR	-	1.42	1.79	inward	1.46	1.70	inward	0.74	1.15	inward
2024-04-29	-0.48	-0.31	inward	-0.52	0.17	inward	0.22	0.92	inward	0.55	0.80	inward	-0.15	ERR	-	1.41	1.78	inward	1.45	1.71	inward	0.74	1.16	inward
2024-04-30	-0.48	-0.32	inward	-0.51	0.19	inward	0.20	0.93	inward	0.53	0.78	inward	-0.16	ERR	-	1.41	1.77	inward	1.46	1.69	inward	0.73	1.16	inward
2024-05-01	-0.50	-0.32	inward	-0.55	0.17	inward	0.20	0.94	inward	0.52	0.77	inward	-0.18	ERR	-	1.39	1.75	inward	1.45	1.67	inward	0.73	1.15	inward
2024-05-02	-0.48	-0.32	inward	-0.54	0.21	inward	0.20	0.92	inward	0.54	0.74	inward	-0.19	ERR	-	1.38	1.76	inward	1.45	1.64	inward	0.72	1.15	inward
2024-05-03	-0.48	-0.32	inward	-0.53	0.18	inward	0.19	0.90	inward	0.55	0.73	inward	-0.18	ERR	-	1.36	1.74	inward	1.43	1.60	inward	0.72	1.14	inward
2024-05-04	-0.47	-0.32	inward	-0.56	0.17	inward	0.20	0.92	inward	0.52	0.72	inward	-0.17	ERR	-	1.38	1.74	inward	1.43	1.59	inward	0.72	1.14	inward
2024-05-05	-0.47	-0.31	inward	-0.56	0.18	inward	0.19	0.89	inward	0.51	0.72	inward	-0.17	ERR	-	1.37	1.71	inward	1.46	1.58	inward	0.72	1.12	inward
2024-05-06	-0.49	-0.32	inward	-0.55	0.14	inward	0.20	0.88	inward	0.49	0.70	inward	-0.19	ERR	-	1.36	1.71	inward	1.46	1.55	inward	0.72	1.13	inward
2024-05-07	-0.51	-0.34	inward	-0.54	0.14	inward	0.19	0.88	inward	0.47	0.70	inward	-0.21	ERR	-	1.34	1.72	inward	1.43	1.55	inward	0.72	1.12	inward
2024-05-08	-0.53	-0.34	inward	-0.56	0.09	inward	0.17	0.87	inward	0.46	0.69	inward	-0.24	ERR	-	1.33	1.71	inward	1.43	1.52	inward	0.71	1.11	inward
2024-05-09	-0.52	-0.34	inward	-0.54	0.08	inward	0.20	0.88	inward	0.44	0.67	inward	-0.23	ERR	-	1.33	1.70	inward	1.44	1.52	inward	0.71	1.09	inward
2024-05-10	-0.50	-0.33	inward	-0.56	0.12	inward	0.19	0.83	inward	0.45	0.66	inward	-0.22	ERR	-	1.34	1.70	inward	1.44	1.52	inward	0.72	1.08	inward
2024-05-11	-0.47	-0.33	inward	-0.57	0.09	inward	0.19	0.83	inward	0.46	0.67	inward	-0.20	ERR	-	1.34	1.69	inward	1.44	1.51	inward	0.72	1.08	inward
2024-05-12	-0.49	-0.34	inward	-0.53	0.08	inward	0.20	0.82	inward	0.45	0.64	inward	-0.19	ERR	-	1.32	1.66	inward	1.44	1.52	inward	0.72	1.07	inward
2024-05-13	-0.49	-0.34	inward	-0.54	0.10	inward	0.19	0.80	inward	0.46	0.64	inward	-0.21	ERR	-	1.31	1.68	inward	1.43	1.49	inward	0.72	1.06	inward
2024-05-14	-0.50	-0.34	inward	-0.59	0.06	inward	0.21	0.80	inward	0.44	0.64	inward	-0.23	ERR	-	1.33	1.67	inward	1.44	1.48	inward	0.72	1.05	inward

Date	L1/D1		Flow Direction	L2/D2		Flow Direction	L3/D3		Flow Direction	L4/D4		Flow Direction	L5/D5		Flow Direction	L6/D6		Flow Direction	L7/D7		Flow Direction	L8/D8		Flow Direction
	L1 m	D1 m		L2 m	D2 m		L3 m	D3 m		L4 m	D4 m		L5 m	D5 m		L6 m	D6 m		L7 m	D7 m		L8 m	D8 m	
2024-05-15	-0.48	-0.35	inward	-0.56	0.08	inward	0.21	0.80	inward	0.43	0.61	inward	-0.24	ERR	-	1.33	1.64	inward	1.43	1.48	inward	0.72	1.04	inward
2024-05-16	-0.46	-0.35	inward	-0.55	0.06	inward	0.20	0.79	inward	0.43	0.60	inward	-0.22	ERR	-	1.35	1.65	inward	1.43	1.50	inward	0.73	1.03	inward
2024-05-17	-0.46	-0.35	inward	-0.54	0.06	inward	0.21	0.77	inward	0.43	0.61	inward	-0.22	ERR	-	1.34	1.65	inward	1.43	1.49	inward	0.73	1.03	inward
2024-05-18	-0.46	-0.36	inward	-0.26	ERR	-	0.17	0.75	inward	0.43	0.59	inward	-0.23	ERR	-	1.32	1.65	inward	1.35	1.49	inward	0.70	1.02	inward
2024-05-19	-0.46	-0.36	inward	-0.22	ERR	-	0.16	0.75	inward	0.41	0.59	inward	-0.24	ERR	-	1.32	1.63	inward	1.37	1.49	inward	0.72	1.01	inward
2024-05-20	-0.48	-0.36	inward	-0.22	ERR	-	0.17	0.73	inward	0.42	0.58	inward	-0.25	ERR	-	1.33	1.64	inward	1.37	1.46	inward	0.72	1.00	inward
2024-05-21	-0.45	-0.35	inward	-0.21	ERR	-	0.18	0.72	inward	0.40	0.57	inward	-0.24	ERR	-	1.33	1.64	inward	1.36	1.45	inward	0.72	1.00	inward
2024-05-22	-0.33	-0.32	inward	-0.17	ERR	-	0.18	0.77	inward	0.47	0.63	inward	-0.77	ERR	-	1.35	1.69	inward	1.36	1.54	inward	0.76	1.06	inward
2024-05-23	-0.52	-0.27	inward	-0.19	ERR	-	0.19	0.78	inward	0.42	0.64	inward	-0.25	ERR	-	1.30	1.69	inward	1.37	1.51	inward	0.72	1.03	inward
2024-05-24	-0.54	-0.28	inward	-0.19	ERR	-	0.17	0.79	inward	0.41	0.61	inward	-0.26	ERR	-	1.31	1.66	inward	1.37	1.52	inward	0.71	1.02	inward
2024-05-25	-0.52	-0.28	inward	-0.18	ERR	-	0.18	0.78	inward	0.43	0.62	inward	-0.26	ERR	-	1.31	1.68	inward	1.36	1.50	inward	0.72	1.02	inward
2024-05-26	-0.58	-0.29	inward	-0.19	ERR	-	0.18	0.77	inward	0.42	0.61	inward	-0.26	ERR	-	1.28	1.66	inward	1.37	1.52	inward	0.71	1.01	inward
2024-05-27	-0.52	-0.27	inward	-0.18	ERR	-	0.18	0.79	inward	0.43	0.64	inward	-0.23	ERR	-	1.30	1.70	inward	1.36	1.54	inward	0.72	1.04	inward
2024-05-28	-0.51	-0.28	inward	-0.18	0.14	inward	0.17	0.80	inward	0.44	0.65	inward	-0.25	0.56	inward	1.29	1.70	inward	1.37	1.52	inward	0.72	1.04	inward
2024-05-29	-0.49	-0.27	inward	-0.13	0.07	inward	0.20	0.81	inward	0.44	0.66	inward	-0.22	0.60	inward	1.28	1.73	inward	1.35	1.55	inward	0.73	1.06	inward
2024-05-30	-0.49	-0.27	inward	-0.20	0.05	inward	0.17	0.81	inward	0.41	0.67	inward	-0.25	0.62	inward	1.29	1.70	inward	1.37	1.57	inward	0.72	1.05	inward
2024-05-31	-0.50	-0.27	inward	-0.20	0.04	inward	0.20	0.81	inward	0.43	0.67	inward	-0.25	0.59	inward	1.31	1.71	inward	1.37	1.56	inward	0.72	1.06	inward
2024-06-01	-0.47	-0.28	inward	-0.22	0.09	inward	0.17	0.79	inward	0.43	0.68	inward	-0.24	0.59	inward	1.30	1.69	inward	1.35	1.53	inward	0.72	1.05	inward
2024-06-02	-0.52	-0.27	inward	-0.21	0.05	inward	0.18	0.79	inward	0.44	0.67	inward	-0.21	0.62	inward	1.32	1.72	inward	1.35	1.56	inward	0.73	1.06	inward
2024-06-03	-0.27	0.02	inward	0.04	0.12	inward	0.22	0.88	inward	0.54	0.76	inward	-0.10	0.65	inward	1.36	1.76	inward	1.38	1.66	inward	0.77	1.10	inward
2024-06-04	-0.31	-0.25	inward	-0.07	0.16	inward	0.22	0.91	inward	0.52	0.86	inward	-0.12	0.66	inward	1.37	1.83	inward	1.41	1.72	inward	0.77	1.13	inward
2024-06-05	-0.50	-0.25	inward	-0.19	0.19	inward	0.19	0.93	inward	0.54	0.81	inward	-0.14	0.70	inward	1.35	1.81	inward	1.39	1.74	inward	0.76	1.15	inward
2024-06-06	-0.50	-0.27	inward	-0.19	0.29	inward	0.21	0.92	inward	0.51	0.78	inward	-0.18	0.68	inward	1.35	1.79	inward	1.40	1.71	inward	0.76	1.14	inward
2024-06-07	-0.47	-0.27	inward	-0.14	0.30	inward	0.19	0.93	inward	0.51	0.75	inward	-0.09	0.27	inward	1.36	1.78	inward	1.40	1.67	inward	0.75	1.15	inward
2024-06-08	-0.48	-0.28	inward	-0.18	0.19	inward	0.21	0.91	inward	0.49	0.72	inward	-0.14	0.26	inward	1.34	1.76	inward	1.37	1.65	inward	0.74	1.13	inward
2024-06-09	-0.48	-0.28	inward	-0.24	0.17	inward	0.19	0.89	inward	0.48	0.70	inward	-0.14	0.21	inward	1.33	1.73	inward	1.38	1.63	inward	0.74	1.13	inward
2024-06-10	-0.57	-0.28	inward	-0.23	0.14	inward	0.19	0.90	inward	0.44	0.68	inward	-0.19	0.23	inward	1.34	1.72	inward	1.39	1.59	inward	0.74	1.11	inward
2024-06-11	-0.54	-0.29	inward	-0.25	0.12	inward	0.20	0.88	inward	0.45	0.68	inward	-0.19	0.22	inward	1.32	1.73	inward	1.39	1.59	inward	0.73	1.11	inward
2024-06-12	-0.56	-0.29	inward	-0.16	0.21	inward	0.19	0.86	inward	0.43	0.67	inward	-0.22	0.25	inward	1.29	1.72	inward	1.38	1.54	inward	0.73	1.10	inward
2024-06-13	-0.54	-0.29	inward	-0.18	0.18	inward	0.19	0.85	inward	0.42	0.66	inward	-0.21	0.31	inward	1.31	1.68	inward	1.39	1.52	inward	0.72	1.08	inward
2024-06-14	-0.54	-0.30	inward	-0.25	0.14	inward	0.19	0.83	inward	0.42	0.67	inward	-0.22	0.30	inward	1.31	1.67	inward	1.38	1.53	inward	0.73	1.07	inward
2024-06-15	-0.50	-0.30	inward	-0.26	0.13	inward	0.19	0.82	inward	0.41	0.65	inward	-0.25	0.33	inward	1.29	1.66	inward	1.35	1.52	inward	0.72	1.06	inward
2024-06-16	-0.53	-0.30	inward	-0.19	0.17	inward	0.20	0.80	inward	0.42	0.64	inward	-0.25	0.34	inward	1.29	1.67	inward	1.36	1.51	inward	0.72	1.06	inward
2024-06-17	-0.57	-0.30	inward	-0.25	0.22	inward	0.20	0.83	inward	0.41	0.63	inward	-0.26	0.31	inward	1.30	1.65	inward	1.35	1.49	inward	0.72	1.06	inward
2024-06-18	-0.56	-0.30	inward	-0.26	0.26	inward	0.19	0.79	inward	0.42	0.62	inward	-0.22	0.30	inward	1.31	1.66	inward	1.36	1.51	inward	0.70	1.05	inward
2024-06-19	-0.55	-0.30	inward	-0.21	0.22	inward	0.21	0.80	inward	0.41	0.63	inward	-0.23	0.31	inward	1.31	1.64	inward	1.37	1.48	inward	0.70	1.05	inward
2024-06-20	-0.54	-0.30	inward	-0.17	0.28	inward	0.21	0.78	inward	0.40	0.63	inward	-0.23	0.31	inward	1.30	1.64	inward	1.36	1.48	inward	0.70	1.03	inward
2024-06-21	-0.54	-0.31	inward	-0.17	0.26	inward	0.18	0.76	inward	0.40	0.63	inward	-0.22	0.33	inward	1.30	1.64	inward	1.34	1.48	inward	0.69	1.02	inward
2024-06-22	-0.53	-0.31	inward	-0.27	0.25	inward	0.20	0.74	inward	0.40	0.63	inward	-0.22	0.33	inward	1.30	1.64	inward	1.34	1.48	inward	0.70	1.01	inward
2024-06-23	-0.57	-0.25	inward	-0.27	0.25	inward	0.19	0.73	inward	0.40	0.63	inward	-0.21	0.33	inward	1.30	1.64	inward	1.34	1.48	inward	0.70	1.00	inward
2024-06-24	-0.59	-0.16	inward	-0.19	0.25	inward	0.19	0.71	inward	0.40	0.63	inward	-0.21	0.33	inward	1.27	1.64	inward	1.34	1.48	inward	0.70	0.98	inward
2024-06-25	-0.58	-0.29	inward	-0.22	0.33	inward	0.19	0.70	inward	0.40	0.63	inward	-0.17	0.34	inward	1.28	1.64	inward	1.34	1.48	inward	0.67	0.99	inward
2024-06-26	-0.58	-0.31	inward	-0.22	0.24	inward	0.19	0.69	inward	0.40	0.55	inward	-0.17	0.33	inward	1.28	1.60	inward	1.35	1.44	inward	0.68	0.96	inward
2024-06-27	-0.58	-0.32	inward	-0.23	0.24	inward	0.19	0.68	inward	0.40	0.55	inward	-0.08	0.31	inward	1.28	1.60	inward	1.35	1.44	inward	0.70	0.98	inward
2024-06-28	-0.58	-0.32	inward	-0.20	0.25	inward	0.18	0.70	inward	0.40	0.55	inward	-0.10	0.31	inward	1.28	1.60	inward	1.35	1.44	inward	0.69	0.98	inward
2024-06-29	-0.57	-0.31	inward	-0.18	0.27	inward	0.19	0.68	inward	0.40	0.55	inward	-0.10	0.30	inward	1.28	1.60	inward	1.35	1.44	inward	0.70	0.96	inward
2024-06-30	-0.58	-0.31	inward	-0.26	0.32	inward	0.18	0.67	inward	0.40	0.55	inward	-0.10	0.30	inward	1.28	1.60	inward	1.35	1.44	inward	0.69	0.94	inward
2024-07-01	-0.59	-0.30	inward	-0.27	0.30	inward	0.18	0.65	inward	0.40	0.55	inward	-0.05	0.32	inward	1.25	1.60	inward	1.35	1.44	inward	0.69	0.95	inward
2024-07-02	-0.60	-0.31	inward	-0.19	0.27	inward	0.19	0.65	inward	0.40	0.55	inward	-0.03	0.32	inward	1.25	1.60	inward	1.35	1.44	inward	0.69	0.94	inward
2024-07-03	-0.60	-0.31	inward	-0.18	0.24	inward	0.18	0.66	inward	0.38	0.51	inward	0.00	0.31	inward	1.25	1.59	inward	1.34	1.42	inward	0.69	0.93	inward
2024-07-04	-0.59	-0.31	inward	-0.19	0.23	inward	0.18	0.63	inward	0.38	0.50	inward	0.04	0.30	inward	1.26	1.58	inward	1.33	1.39	inward	0.68	0.91	inward
2024-07-05	-0.58	-0.31	inward	-0.27	0.22	inward	0.17	0.62	inward	0.38	0.50	inward	0.07	0.29	inward	1.27	1.56	inward	1.32	1.39	inward	0.68	0.91	inward
2024-07-06	-0.57	-0.31	inward	-0.28	0.27	inward	0.17	0.61	inward	0.40	0.50	inward	0.10	0.29	inward	1.28	1.56	inward	1.34	1.41	inward	0.69	0.90	inward
2024-07-07	-0.57	-0.31	inward	-0.22	0.20	inward	0.17	0.61	inward	0.40	0.50	inward	0.09	0.31	inward	1.27	1.56	inward	1.34	1.38	inward	0.70	0.88	inward
2024-07-08	-0.56	-0.31	inward	-0.21	0.22	inward	0.16	0.60	inward	0.40	0.50	inward	0.10	0.30	inward	1.27	1.54	inward	1.34	1.38	inward	0.70	0.86	inward
2024-07-09	-0.55	-0.31	inward	-0.17	0.27	inward	0.17	0.57	inward	0.40	0.50	inward	0.12	0.28	inward	1.28	1.54	inward	1.34	1.38	inward	0.69	0.87	inward
2024-07-10	-0.56	-0.30	inward	-0.18	0.20	inward	0.17	0.57	inward	0.40	0.50	inward	0.14	0.27	inward	1.28	1.55	inward	1.34	1.38	inward	0.69	0.83	inward
2024-07-11	-0.58	-0.28	inward	-0.17	0.26	inward	0.17	0.55	inward	0.40	0.50	inward	0.18	0.27	inward	1.25	1.55	inward	1.34	1.38	inward	0.68	0.83	inward
2024-07-12	-0.56	-0.29	inward	-0.27	0.16	inward	0.17	0.54	inward	0.40	0.50	inward	0.18	0.28	inward	1.27	1.55	inward	1.34	1.38	inward	0.67	0.83	inward
2024-07-13	-0.54	-0.32	inward	-0.16	0.24	inward	0.16	0.53	inward	0.40	0.50	inward	0.22	0.26	inward	1.27	1.55	inward	1.34	1.31	outward	0.69	0.82	inward
2024-07-14	-0.52	-0.32	inward	-0.15	0.18	inward	0.17	0.52	inward	0.40	0.50	inward	0.21	0.27	inward	1.27	1.55	inward	1.34	1.31	outward	0.69	0.81	inward
2024-07-15	-0.52	-0.31	inward	-0.23	0.19	inward	0.16	0.50	inward	0.40	0.50	inward	0.25	0.25	inward	1.27	1.55	inward	1.34	1.31	outward	0.66	0.77	inward
2024-07-16	-0.50	-0.21	inward	-0.14	0.20	inward	0.17	0.49	inward	0.40	0.50	inward	0.26	0.26	outward	1.27	1.55	inward	1.34	1.31	outward	0.66	0.79	inward
2024-07-17	-0.49	-0.29	inward	-0.27	0.18	inward	0.16	0.48	inward	0.40	0.50	inward	0.24	0.23	outward	1.27	1.55	inward	1.34	1.31	outward	0.67	0.75	inward
2024-07-18	-0.50	-0.32	inward	-0.25	0.24	inward	0.17	0.46	inward	0.40	0.42	inward	0.25	0.25	outward	1.29	1.50	inward	1.29	1.25	outward	0.67	0.77	inward
2024-07-19	-0.50	-0.33	inward	-0.19	0.20	inward	0.16	0.45	inward	0.40	0.40	inward	0.28	0.25	outward	1.28	1.49	inward	1.31	1.25	outward	0.65	0.76	inward
2024-07-20	-0.50	-0.31	inward	-0.26	0.18	inward	0.17	0.43	inward	0.38	0.40	inward	0.26	0.23	outward	1.25	1.46	inward	1.31	1.22	outward	0.67	0.72	inward
2024-07-21	-0.47	-0.31	inward	-0.26	0.20	inward	0.17	0.42	inward	ERR	ERR	-	0.26	0.25	outward	ERR	ERR	-	ERR	ERR	-	0.65	0.71	inward

Date	L1/D1		Flow Direction	L2/D2		Flow Direction	L3/D3		Flow Direction	L4/D4		Flow Direction	L5/D5		Flow Direction	L6/D6		Flow Direction	L7/D7		Flow Direction	L8/D8		Flow Direction
	L1 m	D1 m		L2 m	D2 m		L3 m	D3 m		L4 m	D4 m		L5 m	D5 m		L6 m	D6 m		L7 m	D7 m		L8 m	D8 m	
2024-07-22	-0.47	-0.32	inward	-0.16	0.19	inward	0.18	0.41	inward	ERR	ERR	-	0.27	0.25	outward	ERR	ERR	-	ERR	ERR	-	0.69	0.72	inward
2024-07-23	-0.48	-0.33	inward	-0.17	0.12	inward	0.18	0.39	inward	ERR	ERR	-	-0.14	0.26	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.72	inward
2024-07-24	-0.46	-0.33	inward	-0.19	0.21	inward	0.19	0.38	inward	ERR	ERR	-	-0.10	0.24	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.69	inward
2024-07-25	-0.46	-0.32	inward	-0.16	0.13	inward	0.19	0.37	inward	ERR	ERR	-	-0.07	0.25	inward	ERR	ERR	-	ERR	ERR	-	0.65	0.68	inward
2024-07-26	-0.48	-0.32	inward	-0.19	0.16	inward	0.19	0.36	inward	ERR	ERR	-	-0.01	0.22	inward	ERR	ERR	-	ERR	ERR	-	0.65	0.66	inward
2024-07-27	-0.46	-0.32	inward	-0.18	0.19	inward	0.20	0.35	inward	ERR	ERR	-	0.05	0.21	inward	ERR	ERR	-	ERR	ERR	-	0.68	0.67	outward
2024-07-28	-0.45	-0.31	inward	-0.25	0.11	inward	0.21	0.34	inward	ERR	ERR	-	0.06	0.20	inward	ERR	ERR	-	ERR	ERR	-	0.69	0.65	outward
2024-07-29	-0.45	-0.29	inward	-0.25	0.10	inward	0.21	0.33	inward	ERR	ERR	-	0.07	0.22	inward	ERR	ERR	-	ERR	ERR	-	0.66	0.67	inward
2024-07-30	-0.45	-0.21	inward	-0.18	0.21	inward	0.23	0.43	inward	ERR	ERR	-	0.10	0.24	inward	ERR	ERR	-	ERR	ERR	-	0.66	0.71	inward
2024-07-31	-0.47	-0.29	inward	-0.28	0.19	inward	0.23	0.44	inward	ERR	ERR	-	0.14	0.24	inward	ERR	ERR	-	ERR	ERR	-	0.65	0.71	inward
2024-08-01	-0.48	-0.30	inward	-0.26	0.14	inward	0.22	0.42	inward	ERR	ERR	-	0.17	0.23	inward	ERR	ERR	-	ERR	ERR	-	0.65	0.68	inward
2024-08-02	-0.48	-0.32	inward	-0.26	0.14	inward	0.23	0.39	inward	ERR	ERR	-	0.16	0.22	inward	ERR	ERR	-	ERR	ERR	-	0.68	0.68	inward
2024-08-03	-0.48	-0.32	inward	-0.17	0.19	inward	0.23	0.37	inward	ERR	ERR	-	0.17	0.21	inward	ERR	ERR	-	ERR	ERR	-	0.65	0.64	outward
2024-08-04	-0.44	-0.32	inward	-0.21	0.19	inward	0.22	0.34	inward	ERR	ERR	-	0.21	0.19	outward	ERR	ERR	-	ERR	ERR	-	0.69	0.63	outward
2024-08-05	-0.44	-0.32	inward	-0.15	0.14	inward	0.23	0.33	inward	ERR	ERR	-	0.18	0.21	inward	ERR	ERR	-	ERR	ERR	-	0.69	0.66	outward
2024-08-06	-0.45	-0.33	inward	-0.17	0.09	inward	0.22	0.31	inward	ERR	ERR	-	0.16	0.21	inward	ERR	ERR	-	ERR	ERR	-	0.68	0.63	outward
2024-08-07	-0.48	-0.33	inward	-0.19	0.18	inward	0.22	0.30	inward	ERR	ERR	-	0.16	0.24	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.61	outward
2024-08-08	-0.44	-0.33	inward	-0.19	0.16	inward	0.22	0.29	inward	ERR	ERR	-	0.17	0.29	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.60	outward
2024-08-09	-0.43	-0.33	inward	-0.24	0.11	inward	0.23	0.27	inward	ERR	ERR	-	-0.08	0.29	inward	ERR	ERR	-	ERR	ERR	-	0.66	0.61	outward
2024-08-10	-0.42	-0.33	inward	-0.19	0.07	inward	0.22	0.27	inward	ERR	ERR	-	-0.21	0.30	inward	ERR	ERR	-	ERR	ERR	-	0.68	0.58	outward
2024-08-11	-0.42	-0.33	inward	-0.15	0.13	inward	0.22	0.27	inward	ERR	ERR	-	-0.18	0.31	inward	ERR	ERR	-	ERR	ERR	-	0.65	0.58	outward
2024-08-12	-0.40	-0.33	inward	-0.13	0.04	inward	0.21	0.26	inward	ERR	ERR	-	-0.17	0.31	inward	ERR	ERR	-	ERR	ERR	-	0.66	0.60	outward
2024-08-13	-0.39	-0.33	inward	-0.16	0.14	inward	0.21	0.25	inward	ERR	ERR	-	-0.16	0.35	inward	ERR	ERR	-	ERR	ERR	-	0.68	0.59	outward
2024-08-14	-0.41	-0.33	inward	-0.13	0.14	inward	0.23	0.24	inward	ERR	ERR	-	-0.16	0.33	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.57	outward
2024-08-15	-0.41	-0.33	inward	-0.13	0.04	inward	0.22	0.24	inward	ERR	ERR	-	-0.15	0.34	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.56	outward
2024-08-16	-0.39	-0.34	inward	-0.21	0.05	inward	0.22	0.23	inward	ERR	ERR	-	-0.14	0.37	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.54	outward
2024-08-17	-0.38	-0.34	inward	-0.18	0.03	inward	0.22	0.23	inward	ERR	ERR	-	-0.16	0.36	inward	ERR	ERR	-	ERR	ERR	-	0.69	0.56	outward
2024-08-18	-0.40	-0.34	inward	-0.15	0.03	inward	0.22	0.22	inward	ERR	ERR	-	-0.14	0.37	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.55	outward
2024-08-19	-0.42	-0.33	inward	-0.22	0.00	inward	0.23	0.32	inward	ERR	ERR	-	-0.13	0.39	inward	ERR	ERR	-	ERR	ERR	-	0.66	0.55	outward
2024-08-20	-0.42	-0.33	inward	-0.16	-0.06	inward	0.23	0.28	inward	ERR	ERR	-	-0.14	0.40	inward	ERR	ERR	-	ERR	ERR	-	0.66	0.56	outward
2024-08-21	-0.41	-0.33	inward	-0.24	-0.09	inward	0.22	0.28	inward	ERR	ERR	-	-0.16	0.40	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.55	outward
2024-08-22	-0.38	-0.33	inward	-0.16	0.00	inward	0.24	0.26	inward	ERR	ERR	-	-0.14	0.40	inward	ERR	ERR	-	ERR	ERR	-	0.67	0.52	outward
2024-08-23	-0.37	-0.33	inward	-0.23	-0.09	inward	0.24	0.26	inward	ERR	ERR	-	-0.14	0.43	inward	ERR	ERR	-	ERR	ERR	-	0.69	0.54	outward
2024-08-24	-0.35	-0.31	inward	-0.06	-0.07	outward	0.30	0.38	inward	ERR	ERR	-	0.00	0.24	inward	ERR	ERR	-	ERR	ERR	-	0.72	0.64	outward
2024-08-25	-0.35	-0.29	inward	-0.09	0.07	inward	0.30	0.48	inward	ERR	ERR	-	-0.08	0.18	inward	ERR	ERR	-	ERR	ERR	-	0.75	0.72	outward
2024-08-26	-0.42	-0.30	inward	-0.08	-0.06	inward	0.28	0.46	inward	ERR	ERR	-	-0.12	0.21	inward	ERR	ERR	-	ERR	ERR	-	0.72	0.71	outward
2024-08-27	-0.34	-0.29	inward	0.09	0.05	outward	0.37	0.51	inward	ERR	ERR	-	-0.12	0.22	inward	ERR	ERR	-	ERR	ERR	-	0.73	0.79	inward
2024-08-28	-0.42	-0.27	inward	-0.16	-0.04	inward	0.28	0.47	inward	ERR	ERR	-	-0.14	0.26	inward	ERR	ERR	-	ERR	ERR	-	0.73	0.76	inward
2024-08-29	-0.48	-0.37	inward	-0.18	-0.22	outward	0.13	0.30	inward	0.30	0.25	outward	-0.21	0.08	inward	1.13	1.34	inward	1.33	1.22	outward	0.64	0.74	inward
2024-08-30	-0.46	-0.38	inward	-0.19	-0.22	outward	0.13	0.29	inward	0.32	0.26	outward	-0.31	0.05	inward	1.14	1.31	inward	1.34	1.20	outward	0.63	0.73	inward
2024-08-31	-0.46	-0.39	inward	-0.21	-0.14	inward	0.13	0.27	inward	0.30	0.24	outward	-0.29	0.07	inward	1.13	1.31	inward	1.33	1.21	outward	0.62	0.69	inward
2024-09-01	-0.48	-0.39	inward	-0.27	-0.24	inward	0.13	0.26	inward	0.30	0.24	outward	-0.35	0.05	inward	1.12	1.30	inward	1.30	1.20	outward	0.63	0.68	inward
2024-09-02	-0.48	-0.39	inward	-0.26	-0.17	inward	0.12	0.25	inward	0.30	0.22	outward	-0.36	0.05	inward	1.11	1.30	inward	1.32	1.18	outward	0.64	0.67	inward
2024-09-03	-0.52	-0.40	inward	-0.33	-0.20	inward	0.12	0.24	inward	0.30	0.22	outward	-0.35	0.03	inward	1.10	1.32	inward	1.33	1.19	outward	0.62	0.67	inward
2024-09-04	-0.55	-0.39	inward	-0.26	-0.23	inward	0.11	0.23	inward	0.29	0.22	outward	-0.36	0.03	inward	1.09	1.29	inward	1.32	1.17	outward	0.62	0.65	inward
2024-09-05	-0.54	-0.40	inward	-0.26	-0.25	inward	0.12	0.23	inward	0.30	0.20	outward	-0.38	0.03	inward	1.10	1.31	inward	1.31	1.17	outward	0.63	0.64	inward
2024-09-06	-0.51	-0.40	inward	-0.26	-0.25	inward	0.11	0.21	inward	0.30	0.19	outward	-0.35	0.05	inward	1.10	1.28	inward	1.31	1.17	outward	0.63	0.65	inward
2024-09-07	-0.49	-0.40	inward	-0.33	-0.20	inward	0.12	0.19	inward	0.30	0.19	outward	-0.34	0.03	inward	1.13	1.30	inward	1.30	1.14	outward	0.62	0.61	outward
2024-09-08	-0.46	-0.40	inward	-0.34	-0.15	inward	0.12	0.20	inward	0.31	0.18	outward	-0.36	0.01	inward	1.13	1.28	inward	1.28	1.14	outward	0.64	0.63	outward
2024-09-09	-0.48	-0.40	inward	-0.26	-0.26	outward	0.12	0.19	inward	0.30	0.18	outward	-0.37	0.01	inward	1.12	1.27	inward	1.30	1.13	outward	0.61	0.62	inward
2024-09-10	-0.49	-0.40	inward	-0.27	-0.17	inward	0.12	0.19	inward	0.29	0.16	outward	-0.36	0.01	inward	1.11	1.28	inward	1.30	1.13	outward	0.60	0.60	inward
2024-09-11	-0.45	-0.39	inward	-0.33	-0.19	inward	0.12	0.17	inward	0.30	0.17	outward	-0.34	0.04	inward	1.13	1.26	inward	1.30	1.14	outward	0.60	0.58	outward
2024-09-12	-0.48	-0.40	inward	-0.26	-0.25	inward	0.11	0.19	inward	0.29	0.19	outward	-0.34	0.04	inward	1.10	1.28	inward	1.29	1.15	outward	0.62	0.61	outward
2024-09-13	-0.52	-0.40	inward	-0.29	-0.26	inward	0.12	0.18	inward	0.29	0.17	outward	-0.36	0.02	inward	1.12	1.27	inward	1.28	1.12	outward	0.62	0.57	outward
2024-09-14	-0.49	-0.39	inward	-0.31	-0.19	inward	0.13	0.27	inward	0.30	0.23	outward	-0.34	0.03	inward	1.12	1.28	inward	1.32	1.14	outward	0.65	0.63	outward
2024-09-15	-0.49	-0.39	inward	-0.26	-0.16	inward	0.12	0.29	inward	0.30	0.23	outward	-0.30	0.03	inward	1.12	1.29	inward	1.32	1.15	outward	0.66	0.65	outward
2024-09-16	-0.52	-0.40	inward	-0.33	-0.21	inward	0.12	0.27	inward	0.30	0.23	outward	-0.34	0.03	inward	1.10	1.28	inward	1.31	1.16	outward	0.63	0.63	inward
2024-09-17	-0.48	-0.40	inward	-0.31	-0.18	inward	0.11	0.25	inward	0.29	0.20	outward	-0.35	0.04	inward	1.12	1.29	inward	1.32	1.14	outward	0.62	0.62	outward
2024-09-18	-0.52	-0.40	inward	-0.28	-0.27	inward	0.10	0.23	inward	0.29	0.21	outward	-0.33	0.02	inward	1.12	1.29	inward	1.31	1.15	outward	0.63	0.61	outward
2024-09-19	-0.54	-0.40	inward	-0.34	-0.26	inward	0.10	0.22	inward	0.28	0.20	outward	-0.35	0.04	inward	1.10	1.27	inward	1.29	1.15	outward	0.62	0.58	outward
2024-09-20	-0.53	-0.40	inward	-0.28	-0.27	inward	0.09	0.22	inward	0.28	0.19	outward	-0.34	0.01	inward	1.11	1.27	inward	1.28	1.12	outward	0.64	0.59	outward
2024-09-21	-0.59	-0.41	inward	-0.30	-0.18	inward	0.09	0.20	inward	0.27	0.18	outward	-0.34	0.00	inward	1.09	1.25	inward	1.27	1.14	outward	0.62	0.58	outward
2024-09-22	-0.57	-0.40	inward	-0.28	-0.23	inward	0.09	0.19	inward	0.27	0.18	outward	-0.34	0.02	inward	1.09	1.25	inward	1.29	1.11	outward	0.61	0.55	outward
2024-09-23	-0.56	-0.40	inward	-0.31	-0.18	inward	0.10	0.18	inward	0.28	0.18	outward	-0.33	0.01	inward	1.12	1.28	inward	1.28	1.13	outward	0.63	0.57	outward
2024-09-24	-0.55	-0.40	inward	-0.32	-0.24	inward	0.11	0.24	inward	0.29	0.21	outward	-0.34	0.01	inward	1.11	1.28	inward	1.31	1.14	outward	0.63	0.59	outward
2024-09-25	-0.45	-0.40	inward	-0.31	-0.24	inward	0.12	0.23	inward	0.30	0.21	outward	-0.39	0.01	inward	1.11	1.28	inward	1.28	1.15	outward	0.64	0.56	outward
2024-09-26	-0.45	-0.35	inward	-0.12	-0.15	outward	0.17	0.37	inward	0.43	0.27	outward	-0.36	0.10	inward	1.16	1.34	inward	1.35	1.21	outward	0.72	0.74	inward
2024-09-27	-0.48	-0.37	inward	-0.12	-0.18	outward	0.18	0.36	inward	0.34	0.27	outward	-0.33	0.21	inward	1.12	1.35	inward	1.33	1.23	outward	0.70	0.76	inward

Date	L1/D1		Flow Direction	L2/D2		Flow Direction	L3/D3		Flow Direction	L4/D4		Flow Direction	L5/D5		Flow Direction	L6/D6		Flow Direction	L7/D7		Flow Direction	L8/D8		Flow Direction
	L1 m	D1 m		L2 m	D2 m		L3 m	D3 m		L4 m	D4 m		L5 m	D5 m		L6 m	D6 m		L7 m	D7 m		L8 m	D8 m	
2024-09-28	-0.53	-0.37	inward	-0.19	-0.16	inward	0.16	0.35	inward	0.32	0.26	outward	-0.36	0.26	inward	1.11	1.35	inward	1.34	1.25	outward	0.67	0.72	inward
2024-09-29	-0.52	-0.36	inward	-0.23	-0.24	outward	0.15	0.33	inward	0.33	0.27	outward	-0.38	0.27	inward	1.13	1.32	inward	1.32	1.24	outward	0.64	0.73	inward
2024-09-30	-0.62	-0.36	inward	-0.22	-0.20	inward	0.12	0.32	inward	0.32	0.26	outward	-0.38	0.27	inward	1.11	1.34	inward	1.31	1.22	outward	0.62	0.71	inward
2024-10-01	-0.58	-0.38	inward	-0.29	-0.25	inward	0.12	0.32	inward	0.31	0.27	outward	-0.38	0.29	inward	1.10	1.32	inward	1.31	1.24	outward	0.64	0.69	inward
2024-10-02	-0.58	-0.31	inward	-0.27	-0.26	inward	0.13	0.31	inward	0.32	0.26	outward	-0.38	0.31	inward	1.11	1.32	inward	1.30	1.22	outward	0.61	0.70	inward
2024-10-03	-0.61	-0.38	inward	-0.24	-0.24	outward	0.12	0.31	inward	0.29	0.28	outward	-0.18	0.07	inward	1.11	1.34	inward	1.31	1.23	outward	0.61	0.70	inward
2024-10-04	-0.51	-0.39	inward	-0.27	-0.21	inward	0.13	0.31	inward	0.30	0.27	outward	-0.32	0.08	inward	1.13	1.35	inward	1.33	1.24	outward	0.64	0.71	inward
2024-10-05	-0.58	-0.38	inward	-0.23	-0.19	inward	0.13	0.36	inward	0.33	0.27	outward	-0.29	0.10	inward	1.13	1.36	inward	1.33	1.25	outward	0.64	0.72	inward
2024-10-06	-0.58	-0.37	inward	-0.25	-0.20	inward	0.13	0.35	inward	0.29	0.30	inward	-0.32	0.09	inward	1.14	1.36	inward	1.31	1.25	outward	0.62	0.75	inward
2024-10-07	-0.58	-0.37	inward	-0.27	-0.20	inward	0.13	0.33	inward	0.30	0.28	outward	-0.34	0.09	inward	1.14	1.36	inward	1.32	1.24	outward	0.61	0.74	inward
2024-10-08	-0.53	-0.37	inward	-0.27	-0.17	inward	0.14	0.32	inward	0.32	0.28	outward	-0.32	0.07	inward	1.11	1.37	inward	1.33	1.27	outward	0.64	0.74	inward
2024-10-09	-0.54	-0.37	inward	-0.21	-0.17	inward	0.15	0.36	inward	0.34	0.29	outward	-0.31	0.08	inward	1.15	1.37	inward	1.33	1.29	outward	0.64	0.75	inward
2024-10-10	-0.60	-0.37	inward	-0.24	-0.17	inward	0.16	0.35	inward	0.33	0.31	outward	-0.30	0.08	inward	1.11	1.39	inward	1.32	1.28	outward	0.65	0.78	inward
2024-10-11	-0.57	-0.37	inward	-0.27	-0.19	inward	0.15	0.87	inward	0.31	0.70	inward	-0.35	0.09	inward	1.12	1.39	inward	1.32	1.28	outward	0.62	0.76	inward
2024-10-12	-0.56	-0.38	inward	-0.27	-0.18	inward	0.15	0.85	inward	0.30	0.69	inward	-0.35	0.09	inward	1.11	1.37	inward	1.32	1.29	outward	0.61	0.77	inward
2024-10-13	-0.59	-0.38	inward	-0.26	-0.20	inward	0.16	0.85	inward	0.29	0.70	inward	-0.34	0.09	inward	1.11	1.40	inward	1.34	1.29	outward	0.63	0.76	inward
2024-10-14	-0.56	-0.38	inward	-0.28	-0.20	inward	0.14	0.83	inward	0.30	0.68	inward	-0.35	0.08	inward	1.12	1.40	inward	1.34	1.28	outward	0.62	0.73	inward
2024-10-15	-0.58	-0.37	inward	-0.25	-0.17	inward	0.15	0.87	inward	0.33	0.69	inward	-0.33	0.08	inward	1.13	1.40	inward	1.33	1.30	outward	0.65	0.76	inward
2024-10-16	-0.55	-0.37	inward	-0.26	-0.19	inward	0.14	0.87	inward	0.32	0.71	inward	-0.32	0.09	inward	1.11	1.39	inward	1.34	1.28	outward	0.62	0.80	inward
2024-10-17	-0.53	-0.37	inward	-0.24	-0.20	inward	0.16	0.27	inward	0.35	0.18	outward	-0.18	0.25	inward	1.12	1.39	inward	1.34	1.30	outward	0.64	0.79	inward
2024-10-18	-0.60	-0.38	inward	-0.23	-0.17	inward	0.14	0.26	inward	0.30	0.20	outward	-0.33	0.26	inward	1.10	1.41	inward	1.32	1.30	outward	0.63	0.81	inward
2024-10-19	-0.33	-0.19	inward	0.25	-0.02	outward	0.50	0.33	outward	0.71	0.25	outward	-0.10	0.35	inward	1.34	1.47	inward	1.51	1.42	outward	0.87	0.94	inward
2024-10-20	0.51	0.42	outward	0.82	0.46	outward	1.04	0.86	outward	1.05	0.86	outward	0.77	0.77	outward	1.69	1.82	inward	1.79	1.77	outward	1.28	1.31	inward
2024-10-21	0.51	0.52	inward	0.83	0.64	outward	0.96	0.92	outward	1.00	0.82	outward	0.77	0.78	inward	1.62	1.77	inward	1.70	1.74	inward	1.25	1.32	inward
2024-10-22	0.04	0.44	inward	0.45	0.53	inward	0.50	0.88	inward	0.80	0.70	outward	0.39	0.64	inward	1.43	1.70	inward	1.56	1.71	inward	0.97	1.27	inward
2024-10-23	-0.23	0.12	inward	0.12	0.46	inward	0.36	0.85	inward	0.62	0.66	inward	0.31	0.44	inward	1.35	1.64	inward	1.49	1.69	inward	0.87	1.22	inward
2024-10-24	-0.32	-0.13	inward	0.02	0.40	inward	0.33	0.83	inward	0.60	0.64	inward	0.20	0.40	inward	1.31	1.61	inward	1.44	1.67	inward	0.82	1.20	inward
2024-10-25	-0.35	-0.25	inward	-0.01	0.38	inward	0.29	0.83	inward	0.55	0.59	inward	0.12	0.49	inward	1.28	1.62	inward	1.39	1.66	inward	0.80	1.16	inward
2024-10-26	-0.38	-0.29	inward	-0.02	0.41	inward	0.29	0.81	inward	0.55	0.58	inward	-0.08	0.59	inward	1.29	1.60	inward	1.37	1.64	inward	0.79	1.15	inward
2024-10-27	-0.39	-0.28	inward	-0.01	0.43	inward	0.30	0.81	inward	0.58	0.61	inward	-0.06	0.60	inward	1.28	1.62	inward	1.42	1.65	inward	0.83	1.16	inward
2024-10-28	-0.41	-0.29	inward	-0.05	0.45	inward	0.31	0.80	inward	0.59	0.61	inward	-0.06	0.60	inward	1.28	1.61	inward	1.39	1.64	inward	0.82	1.16	inward
2024-10-29	-0.42	-0.30	inward	-0.04	0.41	inward	0.28	0.80	inward	0.53	0.60	inward	-0.06	0.60	inward	1.26	1.60	inward	1.37	1.64	inward	0.82	1.15	inward
2024-10-30	-0.40	-0.31	inward	-0.03	0.37	inward	0.28	0.77	inward	0.53	0.58	inward	-0.09	0.62	inward	1.24	1.60	inward	1.38	1.60	inward	0.80	1.14	inward
2024-10-31	-0.33	-0.31	inward	0.07	0.38	inward	0.31	0.79	inward	0.49	0.61	inward	0.01	0.62	inward	1.30	1.61	inward	1.40	1.63	inward	0.84	1.15	inward
2024-11-01	-0.35	-0.38	outward	0.00	0.39	inward	0.31	0.79	inward	0.42	0.61	inward	-0.03	0.65	inward	1.27	1.61	inward	1.40	1.62	inward	0.83	1.15	inward
2024-11-02	-0.30	0.14	inward	0.12	0.45	inward	0.43	0.90	inward	0.55	0.79	inward	0.09	0.63	inward	1.33	1.64	inward	1.45	1.68	inward	0.89	1.20	inward
2024-11-03	-0.34	-0.09	inward	0.05	0.44	inward	0.42	0.92	inward	0.47	0.75	inward	0.03	0.66	inward	1.31	1.62	inward	1.43	1.66	inward	0.87	1.20	inward
2024-11-04	-0.37	-0.21	inward	0.02	0.43	inward	0.39	0.87	inward	0.41	0.72	inward	-0.04	0.62	inward	1.28	1.61	inward	1.41	1.64	inward	0.83	1.17	inward
2024-11-05	-0.33	-0.06	inward	0.08	0.46	inward	0.40	0.90	inward	0.50	0.76	inward	0.04	0.67	inward	1.32	1.63	inward	1.42	1.71	inward	0.88	1.21	inward
2024-11-06	-0.37	-0.20	inward	0.01	0.43	inward	0.37	0.89	inward	0.42	0.70	inward	-0.03	0.63	inward	1.28	1.60	inward	1.40	1.67	inward	0.84	1.17	inward
2024-11-07	-0.38	-0.22	inward	0.01	0.42	inward	0.37	0.85	inward	0.41	0.68	inward	-0.09	0.65	inward	1.27	1.59	inward	1.37	1.62	inward	0.82	1.16	inward
2024-11-08	-0.38	-0.23	inward	-0.02	0.43	inward	0.36	0.83	inward	0.40	0.65	inward	-0.09	0.62	inward	1.27	1.58	inward	1.39	1.60	inward	0.81	1.13	inward
2024-11-09	-0.38	-0.22	inward	-0.05	0.47	inward	0.37	0.82	inward	0.37	0.63	inward	-0.10	0.63	inward	1.27	1.58	inward	1.39	1.62	inward	0.82	1.13	inward
2024-11-10	-0.34	-0.19	inward	0.00	0.45	inward	0.38	0.87	inward	0.45	0.69	inward	0.00	0.66	inward	1.30	1.63	inward	1.42	1.68	inward	0.85	1.17	inward
2024-11-11	-0.42	-0.18	inward	-0.02	0.47	inward	0.41	0.86	inward	0.42	0.67	inward	-0.08	0.64	inward	1.29	1.61	inward	1.39	1.65	inward	0.85	1.17	inward
2024-11-12	-0.37	-0.07	inward	0.02	0.48	inward	0.42	0.90	inward	0.52	0.74	inward	0.03	0.66	inward	1.33	1.65	inward	1.45	1.73	inward	0.89	1.21	inward
2024-11-13	-0.39	-0.16	inward	-0.05	0.48	inward	0.41	0.88	inward	0.45	0.71	inward	-0.07	0.65	inward	1.30	1.62	inward	1.40	1.64	inward	0.86	1.19	inward
2024-11-14	-0.33	-0.03	inward	0.10	0.49	inward	0.45	0.91	inward	0.53	0.74	inward	0.00	0.66	inward	1.35	1.65	inward	1.46	1.74	inward	0.91	1.22	inward
2024-11-15	-0.35	0.11	inward	0.04	0.43	inward	0.41	0.93	inward	0.55	0.77	inward	0.05	0.68	inward	1.36	1.65	inward	1.47	1.74	inward	0.91	1.22	inward
2024-11-16	-0.42	-0.15	inward	-0.06	0.45	inward	0.40	0.90	inward	0.49	0.73	inward	-0.04	0.68	inward	1.29	1.61	inward	1.42	1.67	inward	0.86	1.20	inward
2024-11-17	0.39	0.43	inward	0.75	0.50	outward	1.04	1.01	outward	0.93	0.93	outward	0.69	0.72	inward	1.67	1.80	inward	1.79	1.77	outward	1.21	1.32	inward
2024-11-18	0.05	0.49	inward	0.40	0.49	inward	0.56	0.99	inward	0.73	1.04	inward	0.40	0.70	inward	1.47	1.68	inward	1.59	1.76	inward	0.98	1.28	inward
2024-11-19	-0.31	0.20	inward	0.11	0.45	inward	0.49	0.97	inward	0.55	1.00	inward	0.09	0.69	inward	1.40	1.64	inward	1.52	1.73	inward	0.90	1.24	inward
2024-11-20	-0.33	-0.05	inward	0.08	0.46	inward	0.48	0.91	inward	0.53	0.99	inward	0.02	0.67	inward	1.37	1.65	inward	1.48	1.69	inward	0.88	1.22	inward
2024-11-21	-0.35	-0.03	inward	0.04	0.47	inward	0.47	0.94	inward	0.56	0.97	inward	0.04	0.68	inward	1.38	1.63	inward	1.48	1.75	inward	0.88	1.22	inward
2024-11-22	-0.39	-0.11	inward	-0.01	0.45	inward	0.43	0.90	inward	0.50	0.94	inward	-0.02	0.68	inward	1.35	1.62	inward	1.43	1.69	inward	0.86	1.20	inward
2024-11-23	-0.39	-0.11	inward	0.00	0.45	inward	0.42	0.88	inward	0.51	0.92	inward	-0.06	0.66	inward	1.32	1.61	inward	1.39	1.68	inward	0.85	1.19	inward
2024-11-24	-0.44	-0.12	inward	-0.06	0.45	inward	0.41	0.88	inward	0.47	0.89	inward	-0.06	0.65	inward	1.31	1.60	inward	1.40	1.69	inward	0.83	1.17	inward
2024-11-25	-0.46	-0.12	inward	-0.05	0.43	inward	0.40	0.86	inward	0.45	0.90	inward	-0.07	0.66	inward	1.30	1.61	inward	1.39	1.68	inward	0.81	1.16	inward
2024-11-26	-0.49	-0.15	inward	-0.07	0.44	inward	0.38	0.86	inward	0.46	0.86	inward	-0.10	0.66	inward	1.29	1.61	inward	1.36	1.68	inward	0.79	1.14	inward
2024-11-27	-0.50	-0.10	inward	-0.08	0.45	inward	0.45	0.87	inward	0.50	0.99	inward	-0.10	0.72	inward	1.52	1.61	inward	1.42	1.77	inward	0.83	1.08	inward
2024-11-28	-0.50	-0.11	inward	-0.11	0.42	inward	0.47	0.86	inward	0.47	0.96	inward	-0.10	0.70	inward	1.48	1.63	inward	1.41	1.76	inward	0.83	1.07	inward
2024-11-29	-0.50	-0.10	inward	-0.09	0.45	inward	0.45	0.82	inward	0.48	0.94	inward	-0.12	0.69	inward	1.49	1.63	inward	1.39	1.73	inward	0.82	1.06	inward
2024-11-30	-0.51	-0.11	inward	-0.11	0.44	inward	0.45	0.84	inward	0.46	0.94	inward	-0.15	0.70	inward	1.50	1.62	inward	1.39	1.72	inward	0.82	1.05	inward
2024-12-01	-0.51	-0.11	inward	-0.13	0.43	inward	0.44	0.82	inward	0.48	0.92	inward	-0.17	0.68	inward	1.49	1.62	inward	1.40	1.70	inward	0.81	1.04	inward
2024-12-02	-0.54	-0.12	inward	-0.13	0.44	inward	0.45	0.80	inward	0.46	0.92	inward	-0.19	0.67	inward	1.49	1.61	inward	1.37	1.72	inward	0.81	1.04	inward
2024-12-03	-0.55	-0.12	inward	-0.13	0.33	inward	0.45	0.80	inward	0.44	0.90	inward	-0.21	0.67	inward	1.46	1.62	inward	1.36	1.69	inward	0.80	1.03	inward
2024-12-04	-0.56	-0.12	inward	-0.15	0.30	inward	0.44	0.78	inward	0.46	0.89	inward	-0.20	0.68	inward	1.49	1.60	inward	1.38	1.69	inward	0.80	1.01	inward

Date	L1/D1		Flow Direction	L2/D2		Flow Direction	L3/D3		Flow Direction	L4/D4		Flow Direction	L5/D5		Flow Direction	L6/D6		Flow Direction	L7/D7		Flow Direction	L8/D8		Flow Direction
	L1 m	D1 m		L2 m	D2 m		L3 m	D3 m		L4 m	D4 m		L5 m	D5 m		L6 m	D6 m		L7 m	D7 m		L8 m	D8 m	
2024-12-05	-0.57	-0.13	inward	-0.17	0.30	inward	0.46	0.77	inward	0.45	0.89	inward	-0.20	0.66	inward	1.47	1.60	inward	1.35	1.67	inward	0.79	1.01	inward
2024-12-06	-0.58	-0.13	inward	-0.16	0.30	inward	0.43	0.76	inward	0.46	0.92	inward	-0.23	0.65	inward	1.45	1.62	inward	1.36	1.66	inward	0.78	1.01	inward
2024-12-07	-0.51	-0.12	inward	-0.03	0.35	inward	0.56	0.78	inward	0.49	0.92	inward	-0.18	0.67	inward	1.49	1.62	inward	1.39	1.69	inward	0.84	1.04	inward
2024-12-08	-0.41	-0.08	inward	-0.02	0.38	inward	0.50	0.86	inward	0.55	1.01	inward	-0.06	0.74	inward	1.52	1.68	inward	1.43	1.79	inward	0.89	1.14	inward
2024-12-09	-0.48	-0.09	inward	-0.09	0.37	inward	0.47	0.89	inward	0.51	1.00	inward	-0.10	0.74	inward	1.51	1.64	inward	1.44	1.78	inward	0.86	1.13	inward
2024-12-10	-0.52	-0.08	inward	-0.12	0.39	inward	0.47	0.87	inward	0.49	0.97	inward	-0.14	0.72	inward	1.48	1.65	inward	1.39	1.76	inward	0.82	1.10	inward
2024-12-11	-0.51	-0.10	inward	-0.07	0.55	inward	0.44	0.85	inward	0.48	0.97	inward	-0.17	0.70	inward	1.48	1.62	inward	1.41	1.73	inward	0.80	1.09	inward
2024-12-12	-0.47	-0.10	inward	-0.05	0.54	inward	0.44	0.84	inward	0.46	0.97	inward	-0.17	0.70	inward	1.49	1.61	inward	1.40	1.72	inward	0.80	1.07	inward
2024-12-13	-0.47	-0.12	inward	-0.08	0.51	inward	0.44	0.84	inward	0.47	0.98	inward	-0.19	0.71	inward	1.49	1.63	inward	1.41	1.72	inward	0.80	1.06	inward
2024-12-14	-0.37	-0.10	inward	0.08	0.54	inward	0.51	0.84	inward	0.55	0.98	inward	-0.13	0.71	inward	1.53	1.63	inward	1.43	1.74	inward	0.84	1.08	inward
2024-12-15	-0.47	-0.06	inward	0.00	0.53	inward	0.48	0.87	inward	0.52	1.01	inward	-0.13	0.74	inward	1.50	1.66	inward	1.43	1.80	inward	0.84	1.10	inward
2024-12-16	-0.49	-0.08	inward	-0.04	0.56	inward	0.45	0.84	inward	0.49	0.98	inward	-0.16	0.71	inward	1.49	1.63	inward	1.43	1.72	inward	0.82	1.10	inward
2024-12-17	-0.48	-0.11	inward	-0.01	0.54	inward	0.45	0.84	inward	0.49	0.98	inward	-0.13	0.72	inward	1.50	1.63	inward	1.41	1.77	inward	0.82	1.09	inward
2024-12-18	-0.21	0.29	inward	0.36	0.61	inward	0.72	0.92	inward	0.77	1.09	inward	0.09	0.76	inward	1.66	1.73	inward	1.58	1.79	inward	0.99	1.17	inward
2024-12-19	-0.16	0.57	inward	0.30	0.67	inward	0.60	0.99	inward	0.88	1.21	inward	0.00	0.82	inward	1.68	1.75	inward	1.55	1.83	inward	1.00	1.23	inward
2024-12-20	-0.26	0.40	inward	0.19	0.66	inward	0.54	0.98	inward	0.88	1.21	inward	0.17	0.76	inward	1.64	1.73	inward	1.53	1.83	inward	0.94	1.20	inward
2024-12-21	-0.31	0.11	inward	0.08	0.63	inward	0.50	0.94	inward	0.88	1.21	inward	0.09	0.78	inward	1.63	1.68	inward	1.50	1.82	inward	0.91	1.17	inward
2024-12-22	-0.37	-0.01	inward	0.07	0.65	inward	0.49	0.95	inward	0.88	1.21	inward	0.00	0.75	inward	1.61	1.69	inward	1.51	1.83	inward	0.89	1.16	inward
2024-12-23	-0.35	0.06	inward	0.10	0.64	inward	0.50	0.93	inward	0.88	1.21	inward	0.01	0.75	inward	1.61	1.69	inward	1.53	1.83	inward	0.90	1.16	inward
2024-12-24	-0.36	-0.06	inward	0.02	0.62	inward	0.48	0.93	inward	0.88	1.21	inward	0.00	0.77	inward	1.58	1.67	inward	1.52	1.75	inward	0.88	1.14	inward
2024-12-25	-0.42	-0.07	inward	0.03	0.63	inward	0.48	0.92	inward	0.54	1.08	inward	0.00	0.76	inward	1.59	1.68	inward	1.50	1.82	inward	0.87	1.13	inward
2024-12-26	-0.28	-0.06	inward	0.11	0.61	inward	0.54	0.92	inward	0.60	1.10	inward	0.02	0.77	inward	1.60	1.68	inward	1.52	1.78	inward	0.89	1.14	inward
2024-12-27	-0.23	0.44	inward	0.19	0.67	inward	0.58	1.00	inward	0.71	1.17	inward	0.21	0.78	inward	1.69	1.75	inward	1.59	1.81	inward	0.98	1.21	inward
2024-12-28	-0.28	0.13	inward	0.13	0.59	inward	0.53	0.98	inward	0.64	1.12	inward	0.08	0.76	inward	1.66	1.71	inward	1.55	1.81	inward	0.92	1.18	inward
2024-12-29	-0.30	0.05	inward	0.12	0.58	inward	0.50	0.95	inward	0.65	1.13	inward	0.09	0.78	inward	1.66	1.71	inward	1.54	1.86	inward	0.92	1.18	inward
2024-12-30	-0.33	0.05	inward	0.09	0.63	inward	0.51	0.94	inward	0.62	1.10	inward	0.04	0.76	inward	1.63	1.70	inward	1.52	1.87	inward	0.90	1.16	inward
2024-12-31	-0.32	0.08	inward	0.09	0.65	inward	0.50	0.94	inward	0.63	1.09	inward	0.04	0.78	inward	1.65	1.71	inward	1.55	1.83	inward	0.91	1.17	inward
Summary Statistics - Remote Water Level Monitoring System																								
Mean	-0.429	-0.250		-0.267	0.205		0.258	0.748		0.488	0.684		-0.112	0.435		1.349	1.633		1.416	1.539		0.754	0.990	
Standard Deviation	0.131	0.161		0.231	0.224		0.135	0.276		0.130	0.235		0.176	0.230		0.134	0.151		0.076	0.182		0.097	0.212	
Number of Remote Measurements			366			356			366			327			300			327			327			366
Number of Days with Outward or No Flow			8			13			4			49			9			0			62			42
Outward Flow Percentage			2.2%			3.7%			1.1%			15.0%			3.0%			0.0%			19.0%			11.5%
2024 Average Outward Flow	6.92%																							

Notes:

1) All measured data are converted to geodetic elevations.

2) Data Source: Remote Water Level Monitoring System

Outward Flow Percentages are averaged to get the overall Average Outward Flow. The system efficiency is 100% - Average Outward Flow. This information is used in Table 6-A.

ERR = Indicates erroneous values resulting during maintenance or from system communication issues. Maintenance was performed at the end of May and the end of August 2024.

Indicates outward gradient flow direction

Appendix 8: 2024 Public complaint and resolution log

No.	Issue	Resolution
1	A customer wrote to report that the notice at the top of the Landfill's Compost webpage was confusing. The customer suggested to add a note stating that compost is still available to residential customers.	No response was requested. The City website was updated to improve clarity.
2	A customer called stating that they were at the Landfill with a load of asbestos waste for disposal with the required paperwork and had provided prior notice for disposal but were being rejected at the scales.	No response was requested. Landfill staff communicated to the customer that the paperwork required for disposal was incomplete. The customer later returned with completed paperwork. The waste was accepted for disposal.
3	A customer wrote to report that the website for the Zero Waste Centre was not clear. The customer was looking to dispose of speakers and an electric kettle but could not determine if they were accepted as electronics based on their search of the website and the Waste Wizard. The customer requested an update to the Waste Wizard and to add the Waste Wizard tool to the Landfill webpage.	Customer call returned. The website and Waste Wizard were updated to include these items and provide links to the relevant Extended Producer Responsibility program websites.
4	A customer wrote to report that they found contradicting information on two different City webpages regarding dimension limits for disposal of trees with yard trimmings. The customer found stated limits on the City website of 25 cm and 45 cm.	No response was requested. The webpages were reviewed and changed to be consistent. The maximum tree or branch diameter for disposal as yard trimmings is 25 cm.
5	A customer called that they had tried to drive to the Landfill to pick up compost, but the gates were not open.	The gate the customer found closed was not the Landfill entrance gate. The customer was called back and given the correct directions to the Landfill from the instructions on the City website.
6	A customer called to suggest that current wait times for Landfill scales are posted on the City website for the public.	No response was requested. The set-up of a camera showing the Landfill entrance line-up for public viewing should be in place in 2025.
7	A customer called regarding their truck load of garbage that was impacted by a fire. The customer was upset that the material was rejected for disposal and provided a complaint about the tone of the employee rejecting the load.	The customer was called back and was provided proper direction for disposal of fire impacted materials, and rationale behind Landfill policy. Landfill staff reviewed the customer service event and materials related to assisting customers with fire-impacted waste. The City website was updated to include additional information.

No.	Issue	Resolution
8	A customer called stating that they went to the Landfill to attempt to dispose of used drywall that contains asbestos. The customer reported that they when arriving at the Landfill were told the material needed to be double bagged in 6mil poly bags. The customer stated that they went out to purchase the proper bags and returned to the Landfill with the double bagged in the 6mil poly bags, but an employee rejected the load due to the colour of the bags. The customer believed they followed the requirements and requested to speak with Landfill staff before returning.	The customer was called back, and it was determined that they had purchased 3mil poly bags, which do not meet disposal requirements. The hazards associated with disposing of asbestos using the incorrect bags were communicated to the customer. The customer was able to return to the Landfill to dispose of the drywall with the correct bags.
9	A customer called to suggest that there should be a live traffic camera at the Landfill and Transfer Station for public viewing so customers can determine how bust the facilities are before coming to the site.	The customer was called back, and it was communicated that the set-up of a camera showing the Landfill entrance line-up for public viewing is being pursued.
10	A customer called to complain that they had brought antifreeze to the Landfill Zero Waste Centre for disposal but was turned away as they had more than the allowable amount. The customer expressed frustration that they drove to the site and were turned away with the material.	The customer was called back, and it was explained that the Zero Waste Centre is limited to accepting residential quantities for materials collected under Extended Producer Responsibility programs, as stated on the City website. If Zero Waste Centre staff believe that material comes from a commercial source, they may reject the load.

Appendix 9: 2024 Annual Compliance Status Form

Annual Compliance Status Form

AUTHORIZATION NUMBER:	1611
AUTHORIZATION TYPE:	Operational Certificate
LEGAL AUTHORIZATION HOLDER NAME:	City of Vancouver
PERIOD OF COMPLIANCE STATUS ASSESSMENT:	2024-01-01 to 2024-12-31

AUTHORIZED PERSON NAME:	Mike Budzik
AUTHORIZED PERSON SIGNATURE:	
SIGNATURE DATE:	March 19, 2025

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.
I have been given the authority by the authorization holder to sign this form.

AUTHORIZATION CLAUSE NUMBER	AUTHORIZATION CLAUSE DESCRIPTION	COMPLIANT? (Yes/No/ND)	RATIONALE FOR YOUR COMPLIANCE DETERMINATION	LOCATION OF SUPPORTING INFORMATION IN ANNUAL REPORT
1.1.1	The discharge of refuse [to a sanitary landfill from sources within the Greater Vancouver Regional District and other sources as specifically authorized by the Regional Waste Manager] is authorized for the full term of the Greater Vancouver Regional District Solid Waste Management Plan, dated July 1995. The solid waste management plan must be amended to authorize the discharge beyond this term.	Yes	Discharging waste under authorizations.	2024 Annual Report for the Vancouver Landfill (Sections referenced herein), Executive Summary. Greater Regional District Solid Waste Management Plan (Metro Vancouver, 2010)
1.1.2	The maximum authorized rate of discharge is 750,000 tonnes per year	Yes	Discharged less than 750 000 tonnes in 2024.	Annual Report Sections 5. Waste disposal, Appendix 2 Table A1
1.1.3	The characteristics of the discharge shall be typical municipal solid waste and other materials as specifically authorized by the Regional Waste Manager. Asbestos waste may be discharged in accordance with the The characteristics of the discharge shall be typical municipal solid waste and other materials as specifically authorized by the Regional Waste Manager. Asbestos waste may be discharged in accordance with the *Special Waste Regulation*.	Yes	MSW and other specifically authorized waste only accepted for discharge. All other authorized wastes are listed as separate line items in annual report. Special Waste (other than asbestos) is not accepted for disposal in the landfill.	Annual Report Sections 5. Waste disposal, Appendix 2 Table A1
1.1.4	Waste shall not be discharged within a buffer zone as identified in Section 2.9. Putrescible and household waste shall not be discharged into water. The burning of waste is prohibited.	Yes	Minimum 50 metres wide buffer is present along all boundaries except where 30 metres maximum is allowed on northern boundary.	2019 Operating Plan report (Golder 2021b), Site Layout Plan (first drawing after references)
1.1.5	The authorized works common to this Section and Sections 1.2, 1.3 and 1.4 are a locking gate to control access by the public, a weigh scale and fire protection equipment, approximately located as shown on attached Site Plan A.	Yes	Locking gate and weigh scales operating near landfill entrance. Works laid out in accordance with Site Plan A from OC.	Annual Report Section 2. Design and operating plans, Figure 2
1.1.6	The authorized works specific to this Section are those associated with a landfill operation and include berms, covering material, surface water diversionary works, environmental monitoring systems, leachate collection/pumping works and a landfill gas management system consisting of existing and future collection works, a blower/flare station and gas utilization works, approximately located as shown on attached Site Plan B.	Yes	Environmental controls in operation include perimeter ditch system for leachate (inner) and surface water (outer) collection, stormwater ponds, suitable daily and final cover, gas collection system including blower and flare station.	Annual Report Sections 8. Environmental protection programs, 9. Operational information
1.1.7	The location of the point of discharge is Lot 9, Section 5 and 6, New Westminster District, Plan 38013. Discharge within the area identified as the "100 Acre Reserve", approximately as shown on Site Plan B, is · restricted to construction and demolition waste in accordance with the approved closure plan required in Section 2.8.	Yes	Currently discharging within areas shown in Site Plan B. "100 Acre Reserve" is closed.	Annual Report Section 2. Design and operating Plans, Figure 3

Authorized Person Initial: MB

Date: March 19, 2025

AUTHORIZATION CLAUSE NUMBER	AUTHORIZATION CLAUSE DESCRIPTION	COMPLIANT? (Yes/No/ND)	RATIONALE FOR YOUR COMPLIANCE DETERMINATION	LOCATION OF SUPPORTING INFORMATION IN ANNUAL REPORT
1.2.1	The characteristics of the waste [at the landfill transfer station facility] are the same as set out in Section 1.1.3.	Yes	Waste accepted for discharge is typical MSW and other authorized wastes, all other materials accepted at this facility are for off-site recycling (Recycling depot and household hazardous waste storage facility, compost facility) or beneficial use.	Annual Report Section 5. Waste disposal, Appendix 2 Table A1, Section 7. Waste reduction and recycling initiatives
1.2.2	The authorized works are those associated with a transfer station and include a paved access area and roll off bins, approximately located as shown on attached Site Plan C.	Yes	The facility has paved access and roll off bins, operating as shown in Site Plan C of OC.	Annual Report Sections 7. Waste reduction and recycling initiatives, 2. Design and operating plans, Figure 2
1.2.3	The location of the facilities is Lot 9, Section 5 and 6, New Westminster District, Plan 38013.	Yes	Location is as described.	Annual Report Section 2. Design and operating plans, Figure 2
1.3.1	The type of materials which may be managed at this facility [recycling depot and household hazardous waste storage facility] are typical recyclable materials and household hazardous waste.	Yes	Accepting recyclables and household hazardous waste at this facility. See complete list of accepted items.	Annual Report Section 7. Waste reduction and recycling initiatives, Table 8 and Appenidx 3
1.3.2	The authorized works are those associated with a recycling depot and household hazardous waste storage facility and include roll off bins, recycling containers, a secure (fenced) storage area and storage shed for household hazardous waste, approximately located as shown on attached Site Plan C.	Yes	Listed works are present at the facility, as shown on Site Plan C.	Annual Report Section 7. Waste reduction and recycling initiatives (7.1 and 7.2) and Figure 2
1.3.3	The location of the facilities is the same location as set out in Section 1.2.3.	Yes	Same location as as set out in Section 1.2.3.	Annual Report Section 2. Design and operating plans, Figure 2
1.4.1	The type of waste that may be composted is restricted to fruit and vegetable waste, typical yardwaste and christmas trees.	Yes	Yard trimmings/green waste only accepted for compost, no food scraps are composted on site.	Annual Report Section 7. Waste reduction and recycling initiatives (7.4)
1.4.2	The authorized works are those associated with a composting facility and include an impermeable pad, a stationary grinding plant, and windrow turning equipment, approximately located as shown on attached Site Plan A.	Yes	Facility is on paved pad, equipment include grinder, windrow turner and screener. Located in area shown in Site Plan A.	Annual Report Section 7. Waste reduction and recycling initiatives (7.4) and Figure 2
1.4.3	The location of the facilities [compost] is the same location as set out in Section 1.2.3.	Yes	Located as described.	Annual Report Figure 2
2.1	In the event of an emergency which prevents compliance with a requirement of this operational certificate, that requirement will be suspended for such time as the emergency continues or until otherwise directed by the Regional Waste Manager.	Yes	No emergencies in 2024 causing prevention of compliance.	N/A
2.2	The operational certificate holder shall inspect the authorized works regularly and maintain them in good working order. Notify the Regional Waste Manager of any malfunction of these works.	Yes	Landfill staff/contractors perform various regular inspection on works.	Annual Report Section 9. Operational information (9.2)
2.3	The operational certificate holder shall inspect the property boundaries regularly and notify the Regional Waste Manager of any visual evidence of environmental impacts on adjacent properties.	Yes	Monitoring effects on surrounding area (Burns Bog) through regular inspection of perimeter ditch system. Issues noticed in inspection are brought to attention of staff and environmental concerns are reported to ENV.	Annual Report Section 9. Operational information (9.2 and 9.3)
2.4	Provision of fencing, site access, vehicle safety barriers, surface water diversionary works, firebreaks and site restoration as required, shall be carried out to the satisfaction of the Regional Waste Manager.	Yes	Site access limited to entrance. Vehicle safety barriers present on main roads. Surface water diversionary works include perimeter ditch system and ponds. Firebreaks used in filling of active areas as per Design Plan.	Surface water diversionary works found in Annual report Section 8. Environmental protection programs (8.1). Other information not required in annual report by OC, available in Design and Operating Plans .
2.5	In preparation for the placement of putrescible waste, the operational certificate, holder shall construct a base cell consisting of an approximate 3 metre lift of demolition and construction waste covered with a minimum 0.15 metre layer of suitable cover material. Firebreaks shall be incorporated into each cell in such quantity and manner as to prevent fires from becoming an environmental or safety hazard. Putrescible and household waste shall not be discharged in the base cell. suitable cover consists of soil, utilized in accordance with Section 2.7 or other material as deemed acceptable by the Regional Waste Manager.	Yes	Base cell layer contains only construction and demolition waste. Firebreaks present throughout according to Landfill design, soil cover used on each lift.	Annual Report Section 8.0 Environmental protection programs. Detailed information available in 2019 Design Plan report (Golder, 2019a) Section 6.0 Regulatory Design and Closure Requirements

Authorized Person Initial: MB

Date: March 19, 2025

AUTHORIZATION CLAUSE NUMBER	AUTHORIZATION CLAUSE DESCRIPTION	COMPLIANT? (Yes/No/ND)	RATIONALE FOR YOUR COMPLIANCE DETERMINATION	LOCATION OF SUPPORTING INFORMATION IN ANNUAL REPORT
2.6	All waste shall be placed in cells of a size acceptable to the Regional Waste Manager. The working face shall be confined to the smallest practical area. Waste shall be discharged in layers of 0.6 metres or less and compacted to the smallest practical volume. Intermediate cover, consisting of a minimum 0.30 metre of suitable cover material shall he applied as the filling proceeds. Side slopes shall be a maximum of I :3 (vertical:horizontal). During non-discharge hours, the working face shall be covered with a tarp or other measures to the satisfaction of the manager to provide vector and litter control. The working face shall be covered with a minimum of 0.15 metres of suitable cover material once a week. The manager may vary the frequency of covering when freezing conditions adversely affect normal operation.	Yes	Active face kept as small as possible per operating procedure. Daily soil cover - minimum 0.15 m used. Intermediate soil cover - typical 0.6 m used. Litter fencing installed around active area. Side sloped maximum 1:3.	2019 Operating Plan Report (Golder, 2019b), Section 7.2 Operating Parameters (7.2.3 Active Face)
2.7	Urban park quality soil may be utilized for berm construction, intermediate and final cover, top dressing and landscaping. Soil with any substance with a concentration exceeding the lowest applicable numerical soil standard for urban park land may only be used for internal berms or intermediate cover. The utilization or discharge of special waste soil is prohibited.	Yes	Urban Park quality soil is sourced and used for landscaping, berms, intermediate and final cover. Other soils exceeding PL soil quality are used for daily and intermediate cover or are stockpiled. PL soil stockpiled separately when needed.	2019 Operating Plan report, Sections 3.0 Regulatory Operating Requirements and 6.2.4 Temporary Soil Stockpile Area
2.8	The operational certificate holder shall submit a closure plan for the area identified as the "100 acre reserve"... the Regional Waste Manager by December 31, 2001 for approval. For the remainder of the landfill, the operational certificate holder shall apply final cover to any area of the landfill, which will not receive any further waste. Final cover shall be applied within one (I) year of completing the subject area. Final cover shall consist of a minimum of 1.0 metre of low permeability (<I x 10·5 emfs) compacted soil (or equivalent) cap plus a minimum of 0.15 metre of topsoil and suitable vegetative cover. Soil shall be utilized in accordance with Section 2.7. Final cover shall be sloped to promote surface water runoff. Surface water runoff shall be directed outside of the leachate collection system.	Yes	Final closure of "100 Acre reserve" referred to as Western 40 Hectares was completed in 2019.	2019 Operating Plan report, Section 5.4 Filling Progression 2018 to 2024. Closure design available in the report.
2.9	The operational certificate holder shall maintain a buffer zone along the north, east and south perimeters of the site, approximately as shown on Site Plan B and as follows: a minimum of 50 metres wide along the west half of the northern boundary and 30 metres wide along the balance of the northern boundary; and a minimum of 50 meters wide along all remaining boundaries . The buffer zone along the southern boundary of the site shall include a minimum fifteen (15) metre wide natural or landscaped screen.	Yes	Minimum buffer zones maintained.	2019 Operating Plan report, Site Layout Plan (first drawing after references)
2.10	The operational certificate holder shall post a sign, to the satisfaction of the Regional Waste Manager, at the entrance of the landfill site with the following current information: site name, owner and operator, contact telephone number and address for owner or operator, telephone number in case of emergency, hours of operation, materials and wastes accepted for recycling and landfilling, prohibited materials and wastes, and tipping fees.	Yes	Sign posted behind gates at landfill entrance with required information.	Google Maps Street View. 5400 72nd St. Delta, BC.
2.11	The operational certificate holder shall take all reasonable measures necessary to prevent fires from occurring at the site. Provide and maintain fire fighting equipment and materials to the satisfaction of the Regional Waste Manager. The operational certificate holder is responsible for complying with all municipal fire safety requirements. In the event of a landfill fire, immediately notify the local fire department, the Provincial Emergency Program and the manager.	Yes	Fire prevention and control plans in place. Safe Operating Guidelines in place for staff use with respect to fire monitoring, prevention and response.	2019 Operating Plan report Section 12.0 Fire Safety Plan
2.12	This operational certificate does not authorize the discharge of leachate to the environment. The operational certificate holder shall, to the satisfaction of the Regional Waste Manager, take measures to minimize leachate generation, including but not limited to, providing effective covering and surface water runoff. Measures taken, their effectiveness and any proposed measures shall be detailed in the annual report required in Section 3.5.2. The leachate collection works shall be maintained in accordance with sound engineering principles as supported by qualified personnel.	Yes	Leachate contained through perimeter ditch system and discharged to Annacis Island Waste Water Treatment Plant via sewers. Storm water runoff from closed areas of the landfill is collected in storage ponds. This water is discharged to the environment when proven to meet water quality criteria - otherwise it managed as leachate.	Annual Report Section 8.0 Environmental protection programs. (8.1 and 8.2)

Authorized Person Initial: MB

Date: March 19, 2025

CITY OF VANCOUVER

AUTHORIZATION CLAUSE NUMBER	AUTHORIZATION CLAUSE DESCRIPTION	COMPLIANT? (Yes/No/ND)	RATIONALE FOR YOUR COMPLIANCE DETERMINATION	LOCATION OF SUPPORTING INFORMATION IN ANNUAL REPORT
2.13	Submit a report to the Regional Waste Manager by April 30, 2001 detailing measures taken to minimize odours and greenhouse gas emissions and their effectiveness. The report shall also include a description of any planned measures, including energy recovery, and an implementation schedule. The annual report required by Section 3.5.2. shall include a description of measures taken and the beneficial results accomplished by those measures, any revisions to the implementation schedule and any new measures planned for the coming year.	Yes	Report submitted in 1999. LFG collection system reduces odours and greenhouse gas emissions by collecting LFG and conveying to flare plant. Gas conditioning plants to convert LFG to RNG currently in construction.	Final Report Vancouver Landfill Gas Management System Project I (Conestoga-Rovers & Associates, 1999) Annual Report Section 8.4 Landfill gas management system
2.14	The amount of compostable materials and finished compost accumulated at the facility authorized in Section 1.4 shall be limited to the maximum which can be properly managed at the site.	Yes	Compostable materials receieved and compost produced reported in annual report. Amounts produced are manageable at the site.	Annual Report Section 7.4 Yard trimmings collection and composting
2.15	The amount of recyclable materials and household hazardous waste accumulated at the facility authorized in Section 1.3 shall be limited to the maximum which can be properly managed at the site.	Yes	Residential volumes only accepted for HHW and recyclable materials. Quantities and manageable and reported annually.	Annual Report Sections 7. Waste reduction and recycling initiatives (7.1 and 7.2)
2.16	Conduct a hydrogeological assessment to determine the following: the hydrogeological impact of continuing extraction of sand and water from the dredge pond and it's effect on leachate management; the natural attenuation properties of the peat and silt layers in the long term; the effect of additional height of waste on the horizontal hydraulic conductivity of the demolition layer (base cell); and the hydrogeological impact of current operating practices. The hydrogeological assessment shall be reviewed and updated every five (5) years. The first review shall occur prior to December 31, 2005.	Yes	Current hydrogeological review was completed in 2023. The next review will be submitted by end of 2028.	2023 Hydrogeology Review - Submitted to ENV Dec 22 2023
2.17	Register a covenant or other legal notification acceptable to the Regional Waste Manager, not later than 6 months following the subdivision of the property described in Section 1.1.7, that the property was used for the purpose of waste disposal as a charge against the title to the property. Notify the manager of the registration of the covenant or legal notification.	ND	N/A in 2024	N/A
2.18	Operate the facilities authorized in Sections 1.1, 1.2, 1.3 and 1.4 in accordance with a design and operating plan certified by a qualified professional licensed to practice in the Province of British Columbia. The operational certificate holder shall review the plan on an annual basis. Any revisions to the plan shall be submitted to the Regional Waste Manager as part of the annual report.	Yes	Updates to Operating Plan available in annual report.	Annual Report Section 2. Design and operating plan. Full reports are 2019 Design Plan report and 2019 Operating plan report.
2.19	Accrue, during the life of the landfill, a dedicated reserve fund in a form acceptable to the Regional Waste Manager, sufficient to finance closure, post-closure and environmental contingencies related to the landfill. The estimated cost of carrying out closure and post-closure activities for a minimum post-closure period of twenty five (25) years and how the fund will be accrued shall be included in the design and operating plan. The estimated costs of closure and post-closure activities shall be updated annually and reported to the manager as part of the annual report. Should the estimated costs of closure and post-closure increase then the operational certificate holder shall increase the rate of accrual accordingly.	Yes	NPV for closure + post closure costs = $148 million Capital reserve balance = $89 million	Annual Report Section 3. Closure and post closure costs
2.20	The operational certificate holder shall submit a closure plan for the facilities at least six (6) months prior to the closure of the landfill to the Regional Waste Manager for approval. The plan shall incorporate details of the closure plan and include the required information.	ND	N/A in 2024	N/A
2.21	In accordance with the Waste Management Act and its regulations, the operational certificate holder shall submit a site profile to the Regional Waste Manager not less than IO days prior to decommissioning the facilities authorized in Section 1.	ND	Not yet decommissioned.	N/A
3.1	Record the quantity, in tonnes, of waste received at the landfill, recycling and composting facilities. Also, the quantity and destination of recyclable materials and mature compost removed from these facilities shall be recorded.	Yes	Records kept for all materials received at landfill and for outbound recycled materials. Summaries available in annual report.	For waste: Annual Report Appendix 2 Table A1 For recycling and compost: Annual Report Section 7. Waste reduction and recycling initiatives, Table 8. (7.1 and 7.3)

Authorized Person Initial: MB

Date: March 19, 2025

AUTHORIZATION CLAUSE NUMBER	AUTHORIZATION CLAUSE DESCRIPTION	COMPLIANT? (Yes/No/ND)	RATIONALE FOR YOUR COMPLIANCE DETERMINATION	LOCATION OF SUPPORTING INFORMATION IN ANNUAL REPORT
3.2.1	Maintain leachate, surface water and groundwater monitoring stations, approximately located as shown on the attached Site Plan D, and as outlined in Table I. Obtain grab samples at each station and analyze for each parameter at a frequency as indicated in Table 2. Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.	Yes	Currently exceeding the number of required monitoring stations. Samples taken at required frequency at all stations and best practices are used for sampling, storing and transporting including QA/QC .	Annual Report Section 8. Environmental protection programs, Appendix 4
3.2.2	Provide and maintain a suitable flow measuring device and record the volume of leachate discharged to sanitary sewer each month.	Yes	Monthly flows recorded and tabulated in annual report.	Annual Report Section 8. Environmental protection programs, Table 11
3.2.3	Establish and maintain a minimum of four (4) ditch water level monitoring stations and record once per month the water level elevation in the leachate and drainage ditches at each station.	Yes	Exceeding required monitoring in both number of stations and frequency of recordings. Using remote water level monitoring system at 8 stations in both ditches to record water level every 5 minutes.	Annual Report Section 8. Environmental protection programs, Appendix 7
3.3.1	Sampling and flow measurement shall be carried out in accordance with the procedures described in "British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples", 1996 Edition (Permittee), 312 pp., or by suitable alternative procedures as authorized by the Regional Waste Manager.	Yes	Sampling is periodically supervised by contracted qualified professionals to verify that best practices are used during sampling.	Annual Report Section 8. Environmental protection programs, Appendix 6
3.3.2	Analyses are to be carried out in accordance with procedures described in the latest version of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials, (March 1994 Permittee Edition)", or by suitable alternative procedures as authorized by the Regional Waste Manager.	Yes	Samples are only sent to laboratories certified to perform the analyses.	Annual Report Section 8. Environmental protection programs, Appendix 6
3.3.3	All data analyses required to be submitted by the permit shall be conducted by a laboratory acceptable to the Regional Waste Manager. At the request of the manager, the operational certificate holder shall provide the laboratory quality assurance data, associated field blanks, and duplicate analysis results along with the submission of data required.	Yes	Same as 3.3.2.	Same as 3.3.2.
3.4	The operational certificate holder shall maintain the following information and records, current and suitably tabulated, at the landfill office for inspection: a copy of Operational Certificate MR-01611; training procedures and personnel training records; contingency plans and notification procedures; the current design and operating plan; inspection records from staff and regulatory agencies; hydrogeological, geotechnical and landfill gas assessments; incoming waste, and soil records; records of recyclable materials shipped off site; environmental monitoring results and interpretations;· and annual operating and monitoring reports for the previous year.	Yes	All required records are stored at the Landfill Technical Trailer and electronically.	N/A. Documents available upon request.
3.5.1	Maintain data of analyses and records of waste and recyclable material quantities for inspection. Submit the data of analyses suitably tabulated, to the Regional Waste Manager for the previous three months. The reporting period ends March 31, June 30, September 30 and December 31. All reports shall be received by the manager within 31 days of the end of the reporting period.	Yes	Data maintained and reported in accordance with described schedule.	N/A. Reports submitted before each deadline.
3.5.2	Prepare an annual report which shall include a compendium of data submitted under Section 3.5.1. In addition, the annual report shall include the following: a review and interpretation of the analytical data from receiving environment monitoring for the preceding year; waste, recyclable material and compost records; leachate flow data and leachate/drainage ditch levels suitably tabulated; an evaluation of leachate generation control measures; an evaluation of the efficiency of the landfill gas management system, including an estimation of the landfill gas generation rate, percent recovery and the actual rates/volumes of gas collected, utilized and flared; revised closure/post closure costs and amount of funds currently available; revised design and operating plan and planned improvements; identification of operating problems and corrective actions taken; an evaluation of the recycling and composting programs including waste diversion projections; and public complaint/resolution log for the landfill. The annual report shall be submitted to the Regional Waste Manager on or before March 31 of the following year.	Yes	2024 annual report submitted meeting operational certificate requirements.	2024 Annual Report for the Vancouver Landfill

Authorized Person Initial: MB

Date: March 19, 2025