11. CONCLUSIONS

1. The Dundalk landfill accepted waste until 2003 at which time the Site was converted into a waste transfer facility for the Township. The Landfill footprint occupies approximately 0.8 ha within the 6.6 ha site.

2. During the reporting period, no leachate seeps were observed and the ground cover system, site drainage and fencing continued to appear adequate.

3. The groundwater flow within the shallow overburden is generally to the southwest, with a radial flow pattern inferred to exist in the vicinity of the fill area. The groundwater table intersects ground surface to the south and west of the landfill within the extensive wetland area downgradient of the landfill which generally drains to the south across the southwestern portion of the Site. As a result, it is inferred that groundwater recharge from the landfill footprint becomes part of the shallow groundwater system, primarily flowing horizontally through the shallow unconsolidated silt till with some discharging to the surface within the wetland area.

4. Based on the downward gradient that exists between the shallow overburden and the underlying less permeable hardpan unit, a portion of the groundwater recharge may migrate downwards into the hardpan. However, based on the overburden thickness of greater than 24 m of predominantly low permeability overburden soils (i.e., hardpan), it is reasonable to expect that there would be limited impacts to the deeper groundwater system. This is supported by the limited impacts noted directly downgradient of the landfill within well DL3D.

5. Comparison of the water levels to the cross-sections (Appendix E) indicates that there is little to no separation between the bottom of the refuse pile and the groundwater table in several parts of the fill area. As a result, leachate generation can be achieved via the migration of groundwater through the bottom of the waste pile. Therefore, although the cover material is serving to limit the volume of surface water percolating down through the refuse, thereby limiting leachate production via surface water infiltration, leachate production resulting from groundwater migration through the bottom of the refuse pile may be occurring. Concentrations of the primary leachate-indicator parameters appear to be relatively stable, supporting that leachate production via groundwater migration through the base of the refuse pile is likely occurring and indicating that the landfill may not be past its peak contaminating period.

6. Background water quality, as measured at DL1S/D, and water quality at cross-gradient well MW3 located to the southeast of the fill area, show elevated concentrations of sodium and chloride, suggesting that road salt application to area roads is resulting in widespread and sustained impacts to the shallow groundwater in the area. These measurable road salt derived impacts are also noted at the background surface water monitoring location SW4.

7. Compliance along the property boundary to the northwest of the landfill has been measured at wells MW1 and MW2, installed in June 2014. Comparison of water quality results from MW1 to background suggests that minor, if any, leachate-derived impacts at this monitoring location may be occurring. Monitoring well MW2 is located directly downgradient of the fill area, approximately 10 m from the compliance limit. The concentrations of the majority of leachate indicator parameters identified herein are elevated at this monitoring location, with several RUC exceedances noted. However, although locally the groundwater is inferred to flow to the west in this area of the Site, provided its proximal location to the wetland area and the main drainage channel (i.e., the flow channel that originates in the vicinity of Grey Road 9), it is inferred that shallow groundwater entering the wetland areas will be influenced by the regional system and ultimately flow in a southerly direction across the southwestern portion of the Site. In other words, the localized shallow groundwater migration to the west will ultimately be limited by the larger-scale groundwater flow system associated with the wetland area.

8. Although there is potential for landfill-leachate derived influence to surface water downgradient of the landfill, surface water quality measured downgradient generally meets the applicable standards. Observed exceedances can typically be attributed to, at least in part, background surface water conditions.

9. Although methane gas has historically been measured at DL5R-04, situated within the landfill mound, based on the potential methane gas migration distance, which is considered to be limited by the proximity of the bottom of the refuse pile to the water table, and the extensive wetland area/saturated soil conditions that border the majority of the Site, the risk for off-site methane gas migration is considered to be low. The installation of six gas probes along the compliance limits to the northwest and southeast of the Site confirms that methane gas migration off-site to the northeast towards the Village of Dundalk is not occurring.

10. Adequate ventilation has reportedly been established in all buildings associated with the transfer station. Furthermore, as an additional precaution the Township has developed an on-site gas protection protocol that requires the use of a handheld methane detector prior to entering all storage buildings at the Site.

12. RECOMMENDATIONS

1. As per Schedule C of the ECA, as amended in June 2018, water quality monitoring should continue to occur once annually from the three surface water sampling locations SW2, SW3 and SW4 and the nine groundwater monitoring locations including well nest DL3S/I/D and wells DL2, DL4, DL5R-04, MW-1, MW-2 and MW-3. Once every four years groundwater samples should also be obtained from background well nest DL1S/D; sampling from the background wells will be required in 2025. A summary of the monitoring program for the Dundalk Landfill site is provided below.

MONITORING PROGRAM (FALL ONLY)

PARAMETERS	GROUNDWATER		SURFACE WATER	
	Locations	Parameters	Locations	Parameters
Arsenic	OW-3S OW-3I OW-3D DL2 DL4 DL5R-04 MW-1 MW-2 MW-3 DL1S** DL1D**	X	SW-2 SW-3 SW-4	
Barium		X		X
Boron		X		X
Calcium		X		
Iron		X		X
Magnesium		X		
Manganese		X		X
Phosphorus		X		X
Potassium		X		X
Sodium		X		X
Chloride		X		X
Nitrite		X		
Nitrate		X		
Sulphate		X		X
Alkalinity		X		X
Conductivity		X		X
Hardness		X		X
pH		X		X
Ammonia		X		X
DOC		X		X
TDS		X		X
TKN		X		
Field Temp.				X
EVERY 4 YEARS: VOCs at DL4 and DL-5R				
VOCs (DL4 and DL-5R only)		**2025 and 2029**		

** Sampling from OW-1S and OW-1D is only required every 4 years (in 2021, 2025 and 2029)

2. It is recommended that visual inspections of the premises and monitoring wells continue to be conducted in conjunction with the water quality and gas monitoring programs for the Site.

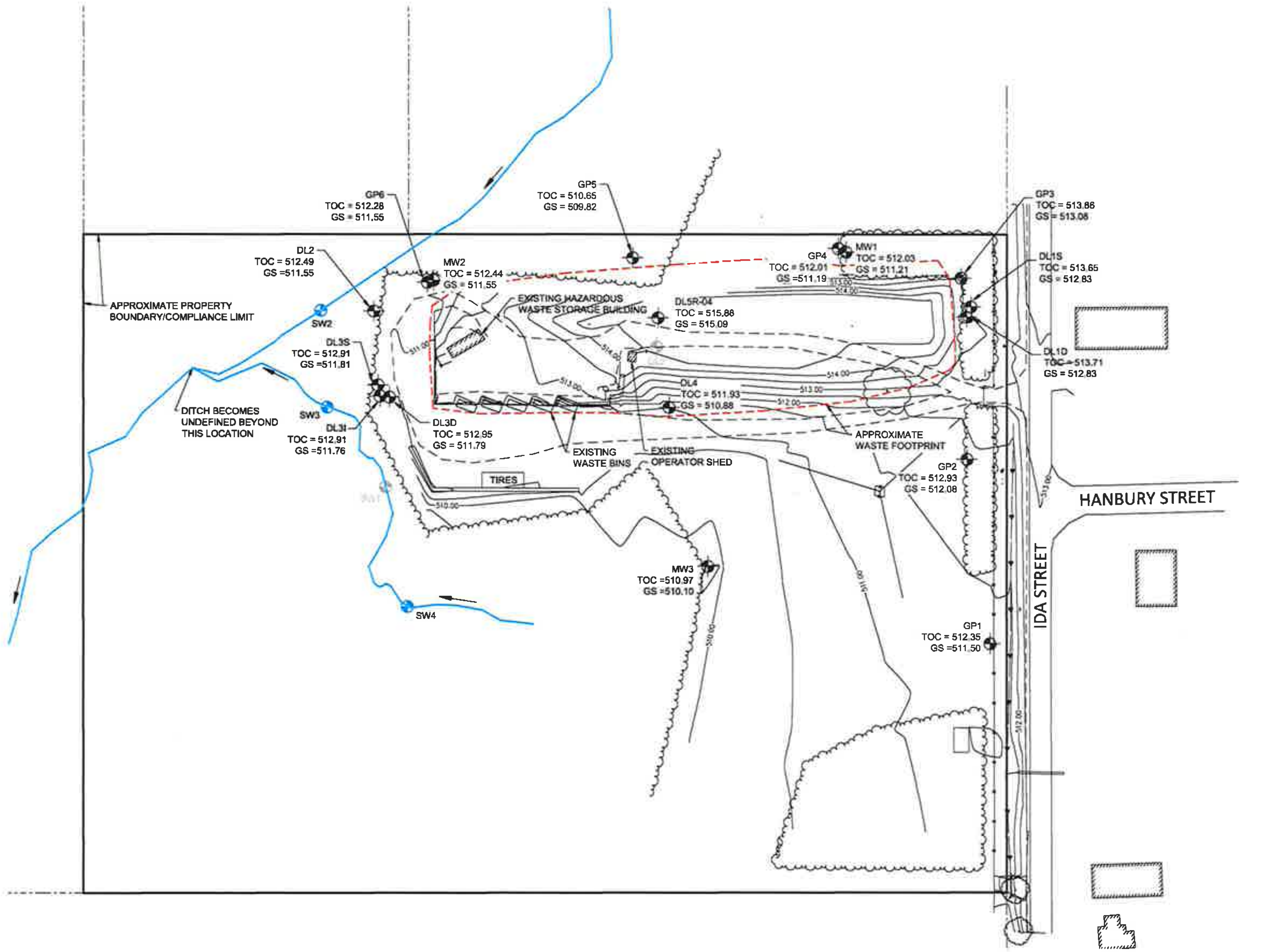
3. As per Schedule C of the ECA, it is recommended that the landfill gas monitoring program continue to include DL5R-04 and gas probes GP1 through GP6. In addition to landfill gas readings from the GP-series monitoring locations, water levels should also be measured to evaluate the potential for the detection of landfill gas, if any (i.e., check whether the water level remains below the top of the screened interval) and also to provide additional water level data for the Site.

4. Once annual groundwater level monitoring should continue from all available groundwater monitoring locations and gas probes. As previously noted, water levels in the gas probes should also be measured, after the landfill gas measurement has been completed.

All of which is respectfully submitted,

GM BLUEPLAN ENGINEERING LIMITED

Per:	Per:
Andrea Nelson, M.Sc.	Alen Bringleson, B.E.S., C.E.T.



212298-2
Annual Monitoring Report
Dundalk Waste Transfer Station
Township of Southgate

LEGEND

- MONITORING WELL
- SURFACE WATER SAMPLING STATION
- DECOMMISSIONED MONITORING WELL
- HISTORICAL SURFACE WATER SAMPLING STATION-NO LONGER SAMPLED
- TOC — TOP OF PVC PIPE masl (MEASURING POINT)
- GS — GROUND SURFACE ELEVATION masl
- APPROXIMATE LIMIT OF FILL
- 512.0 — EXISTING GROUND CONTOUR

15 0 25 50
1:1250(m)

SCALE = 1:1250
FEBRUARY 2023

SITE PLAN

Figure No. 3

GM BluePlan ENGINEERING

FILE:C:\Civil 3D Projects\212298-2 AMR 2022 Fig3-5-K.dwg LAYOUT:Figure 3-Site Plan
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