

Figure 3: Refined Interpolated Groundwater Level Contours Based on Information from the MOE Water Well Information System (WWIS)

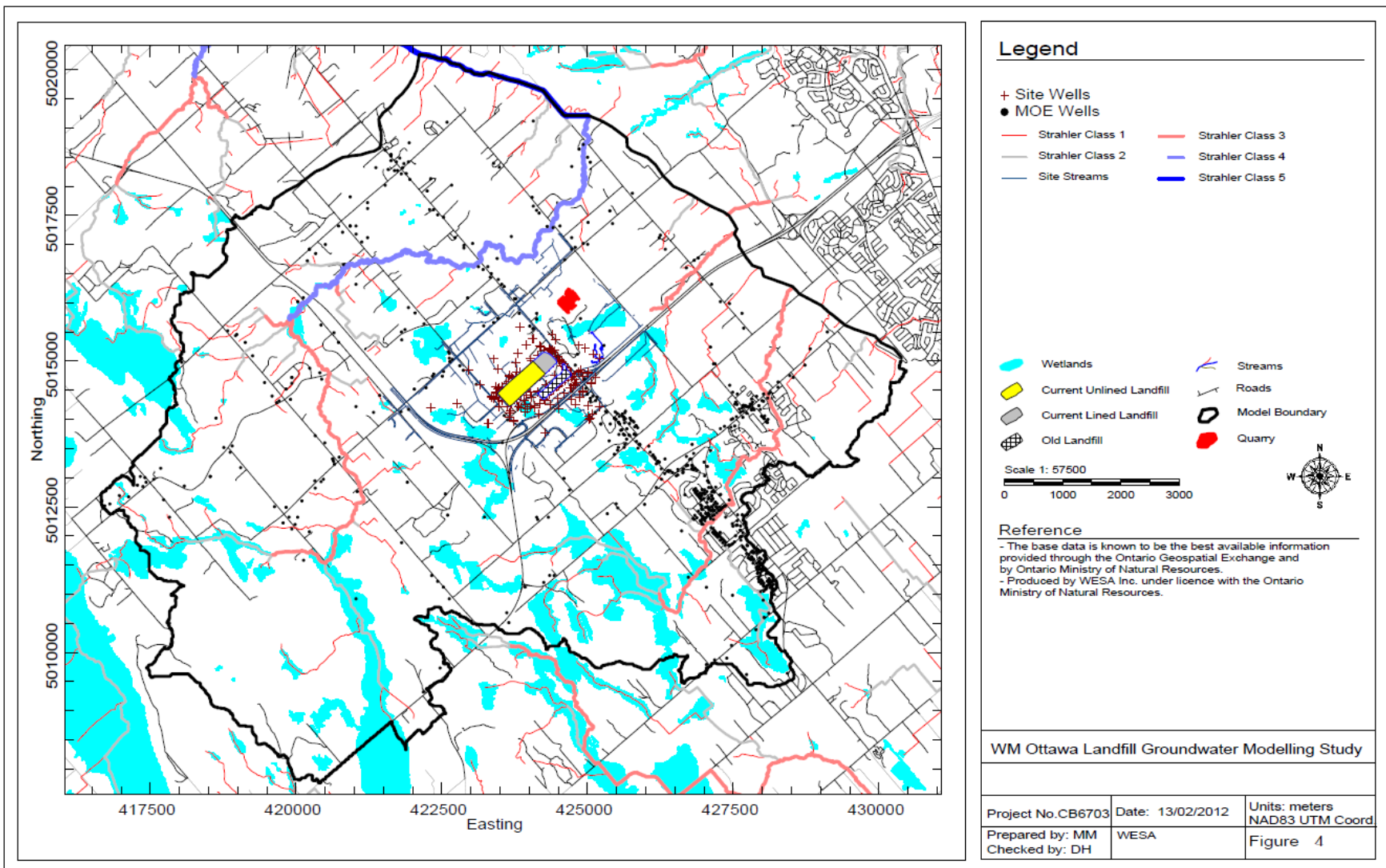


Figure 4: Strahler Classes 1 through 4 Defined as Drains and Rivers

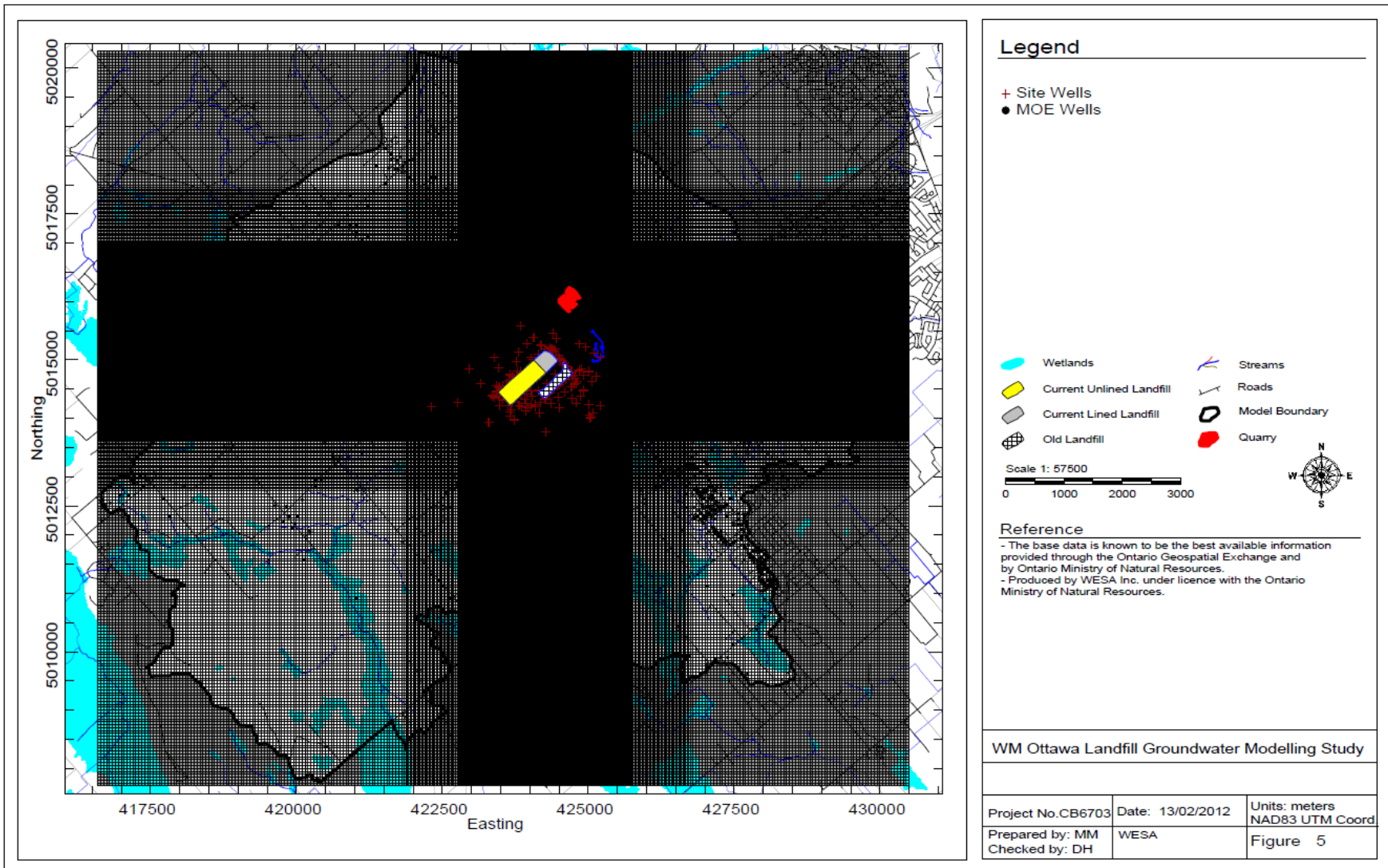


Figure 5: Groundwater Model Extent and Grid

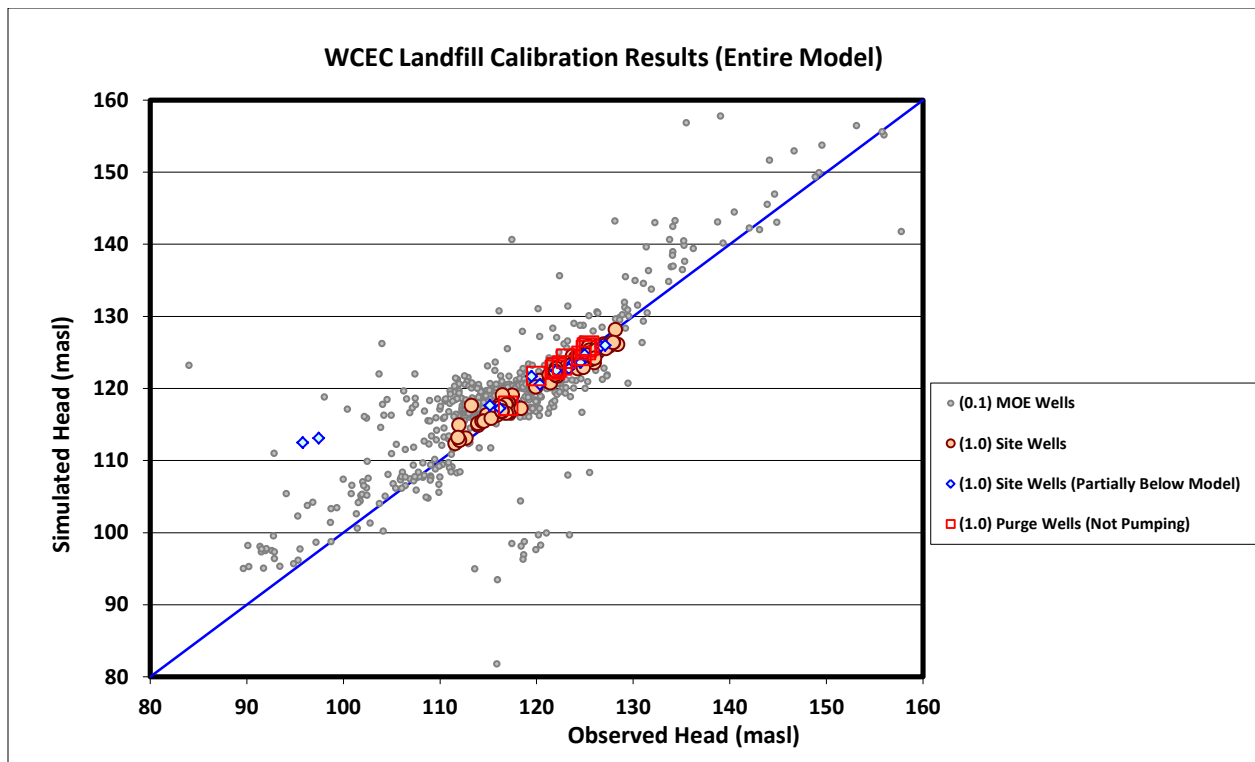


Figure 6: Simulated vs. Observed Heads used in Calibration

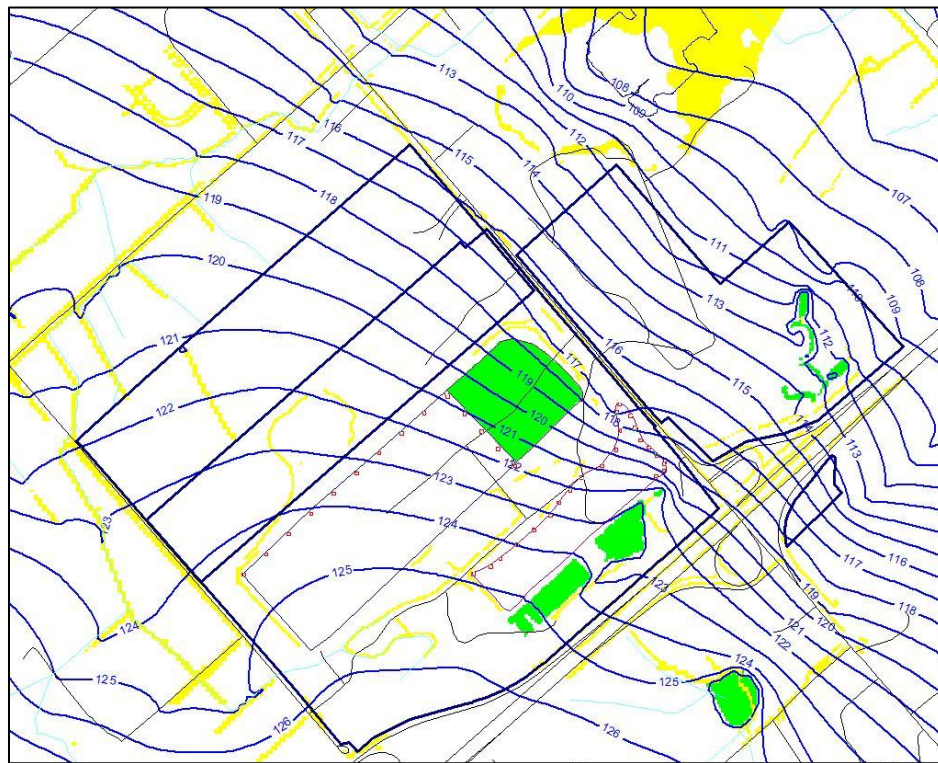


Figure 7: Groundwater Head Contours of Current Conditions (mASL)

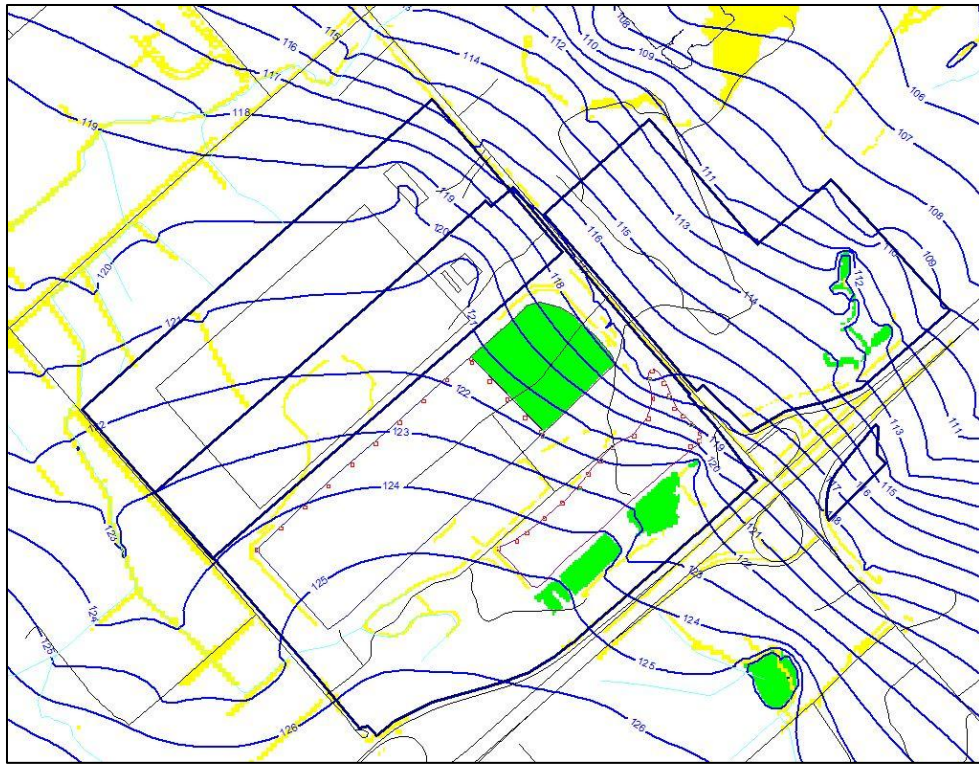


Figure 8: Groundwater Head Contours with the New Landfill and Stormwater Management Ponds

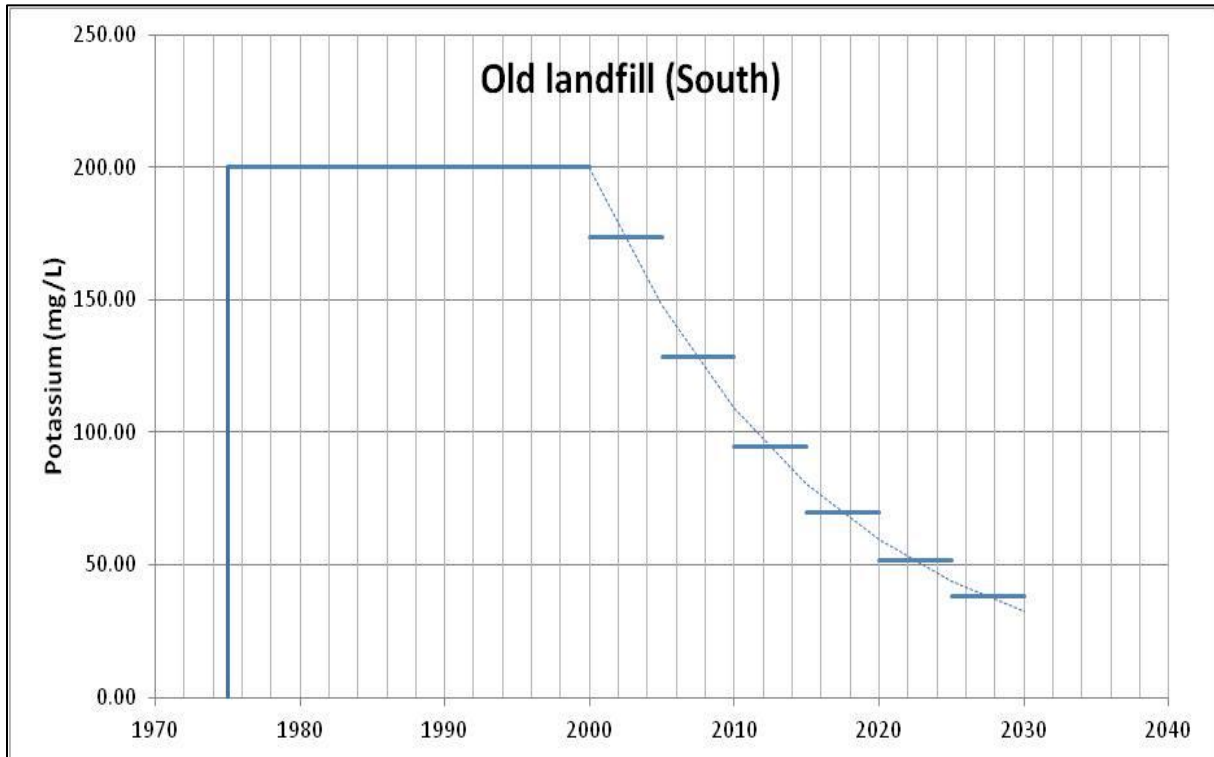


Figure 9: Potassium Source Calibration Curve for the Closed South Cell

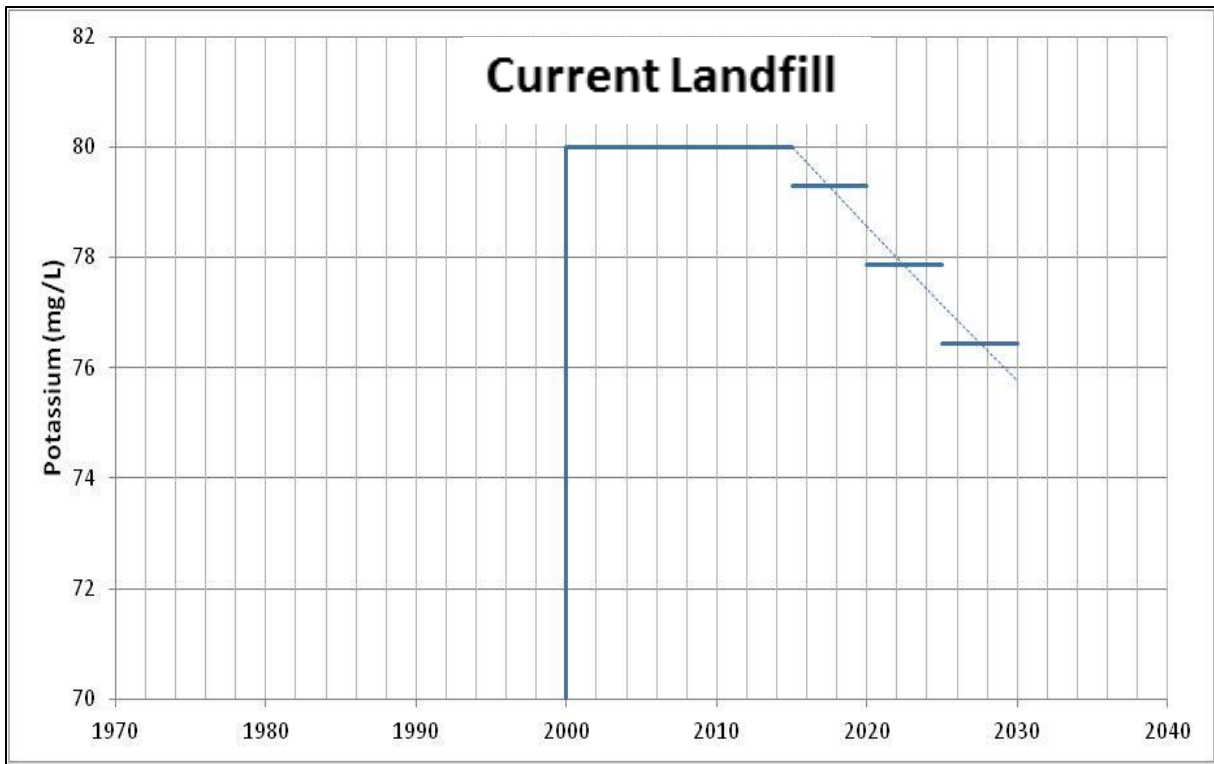


Figure 10: Potassium Source Calibration Curve for the Existing Landfill

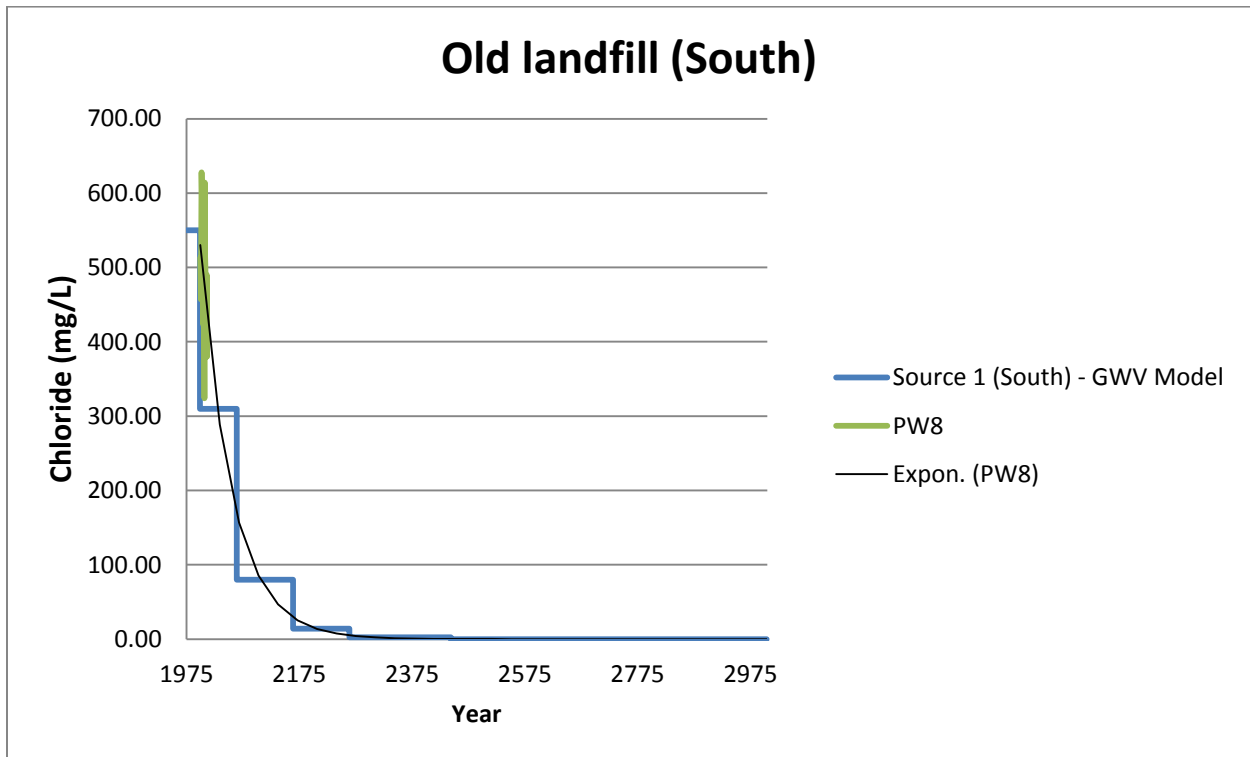


Figure 11: Chloride Source Curve for the Closed South Cell

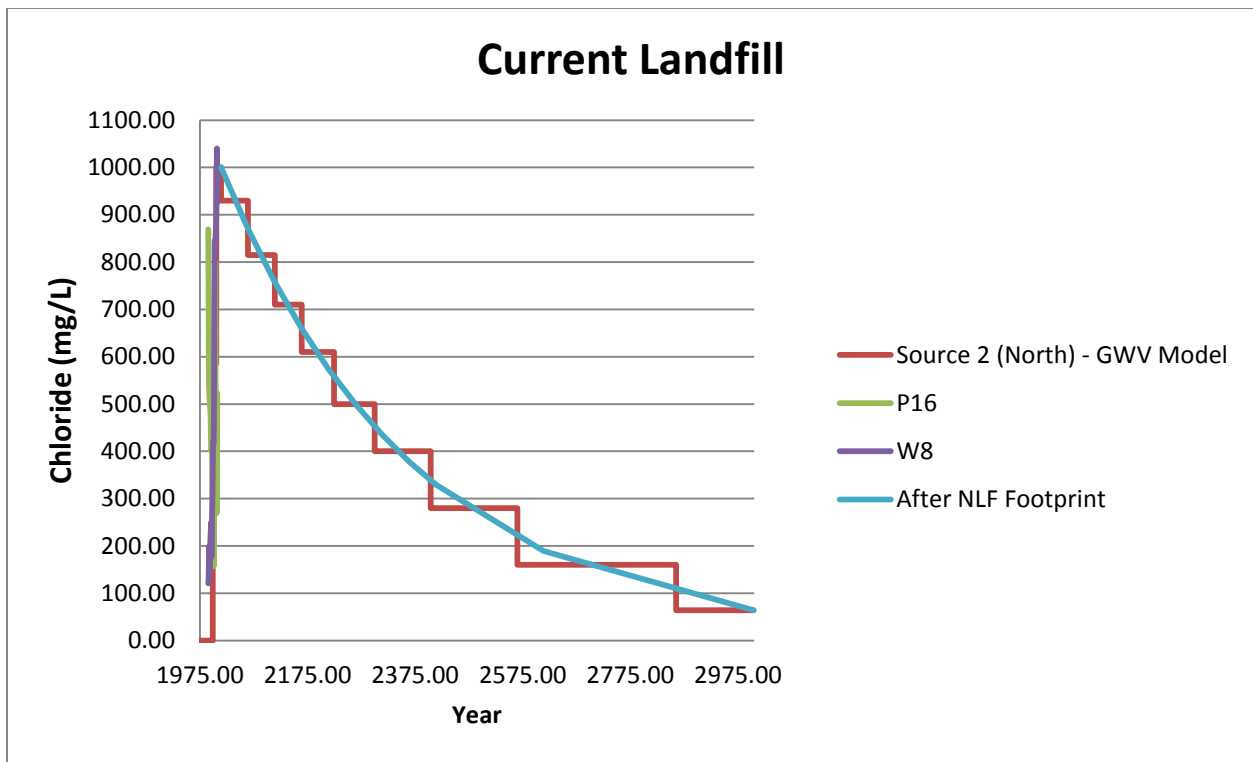


Figure 12: Chloride Source Curve for the Existing Landfill

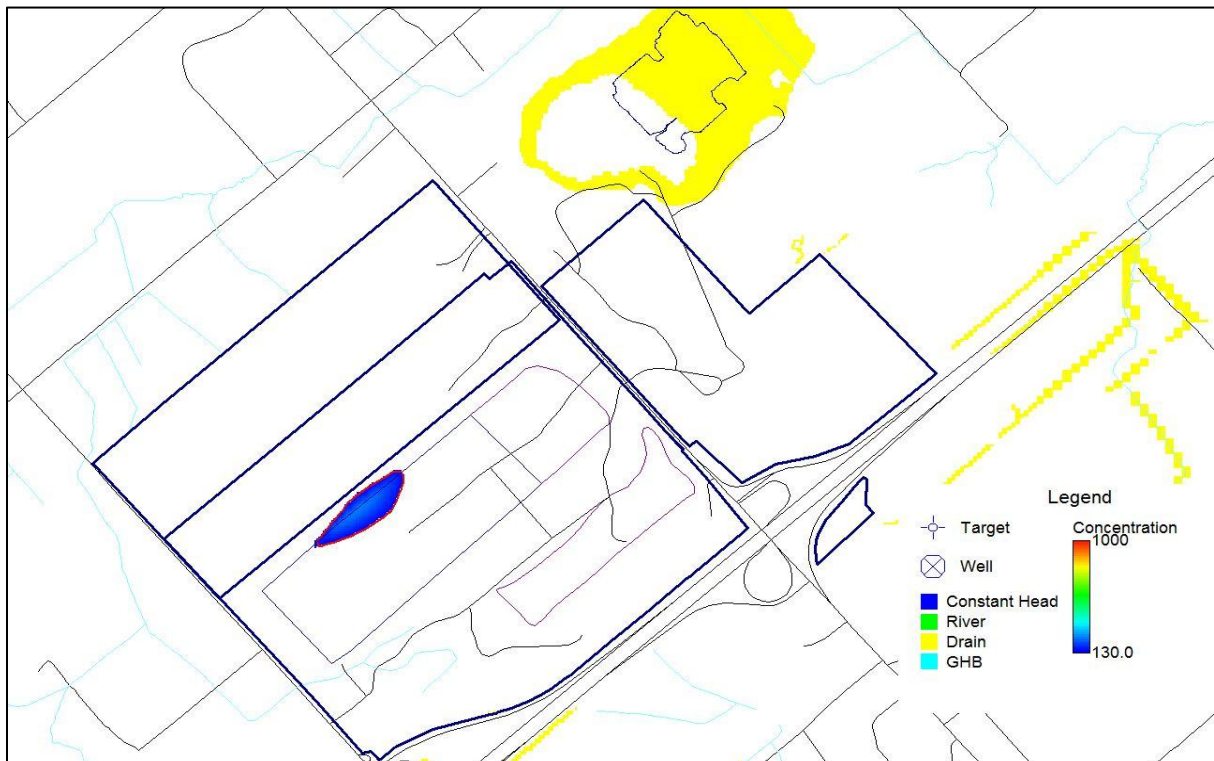


Figure 13: Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2005, Layer 3

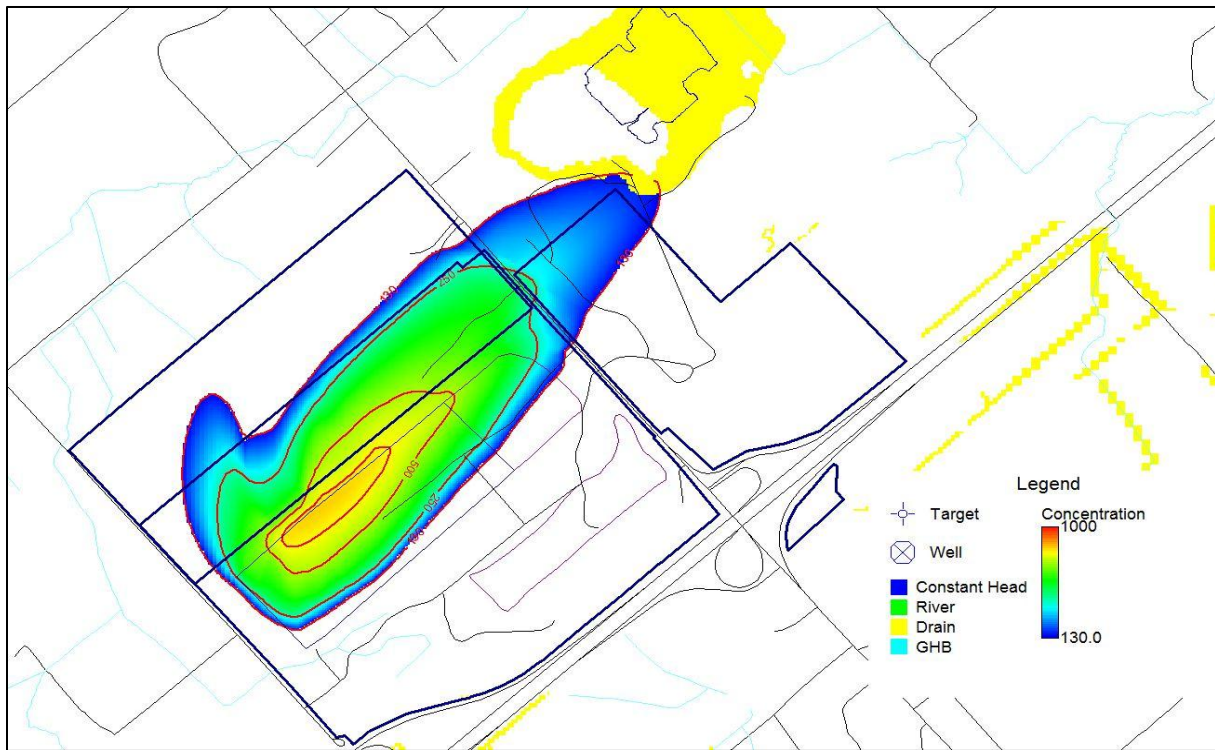


Figure 14: Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2037, Layer 3

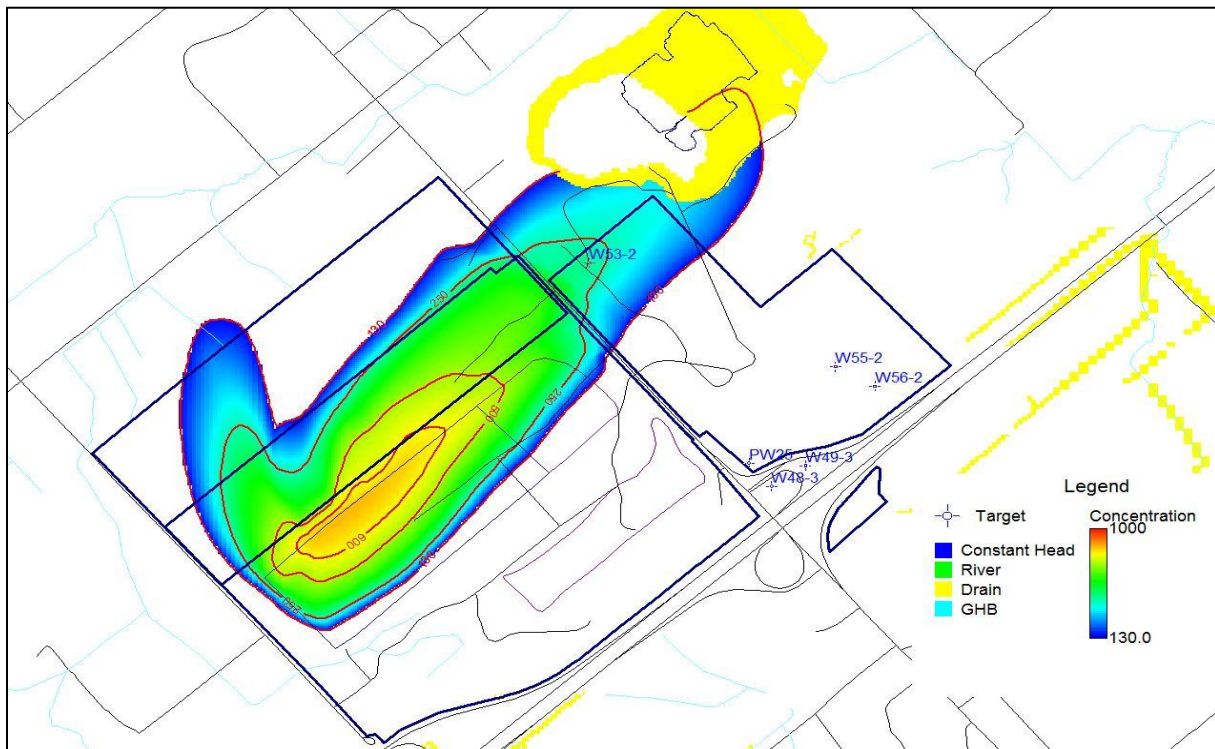


Figure 15: Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 3



Figure 16: Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2232, Layer 3



Figure 17: Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2434, Layer 3

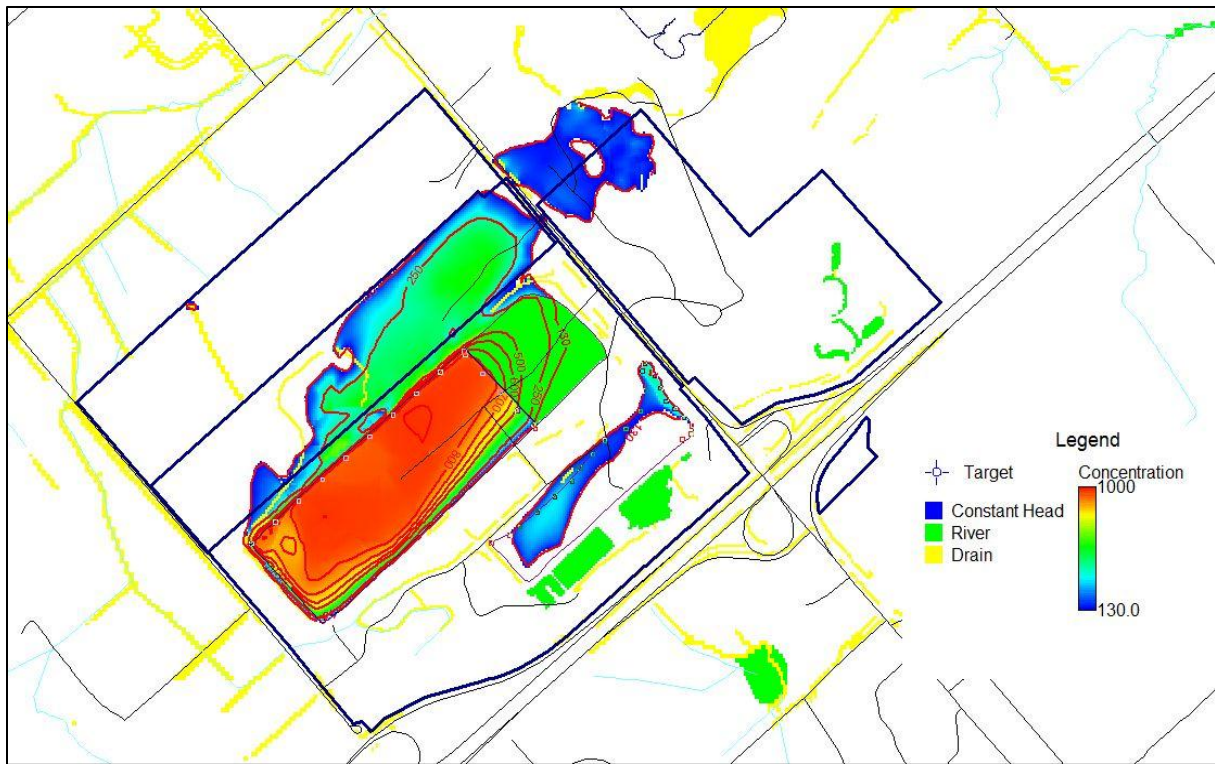


Figure 18: Maximum Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 1

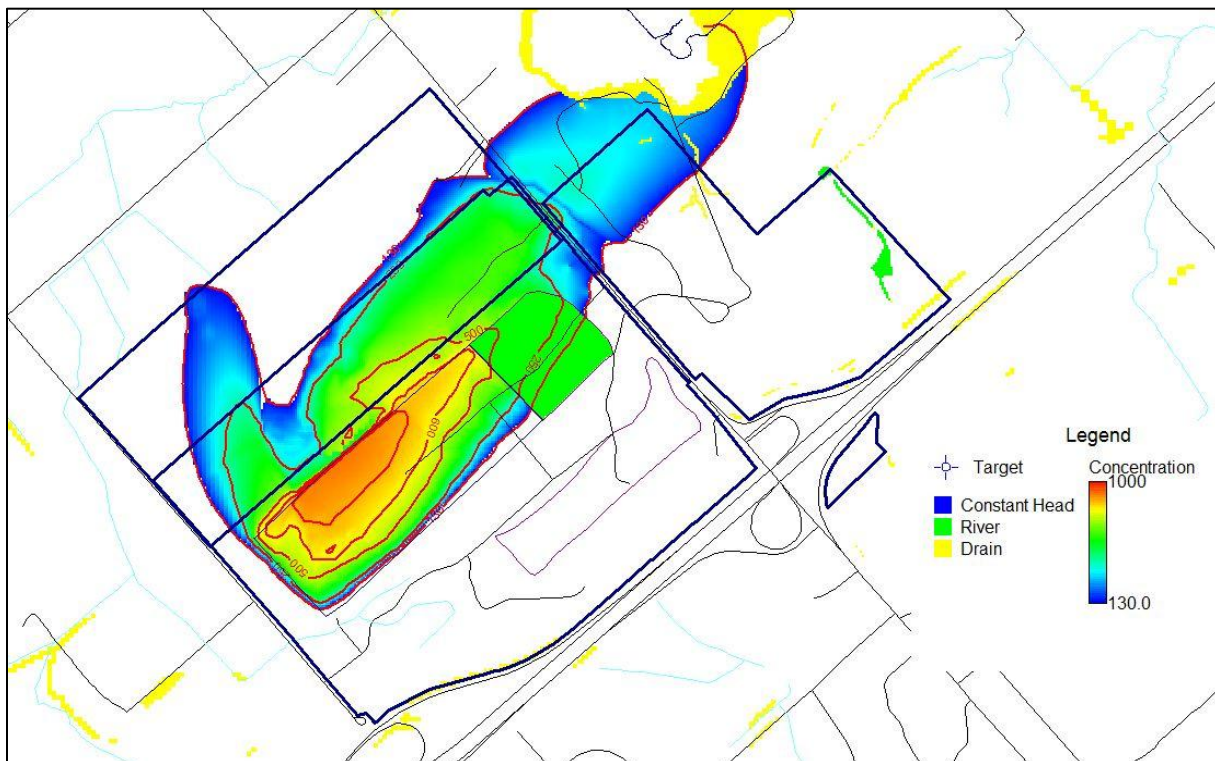


Figure 19: Maximum Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 2

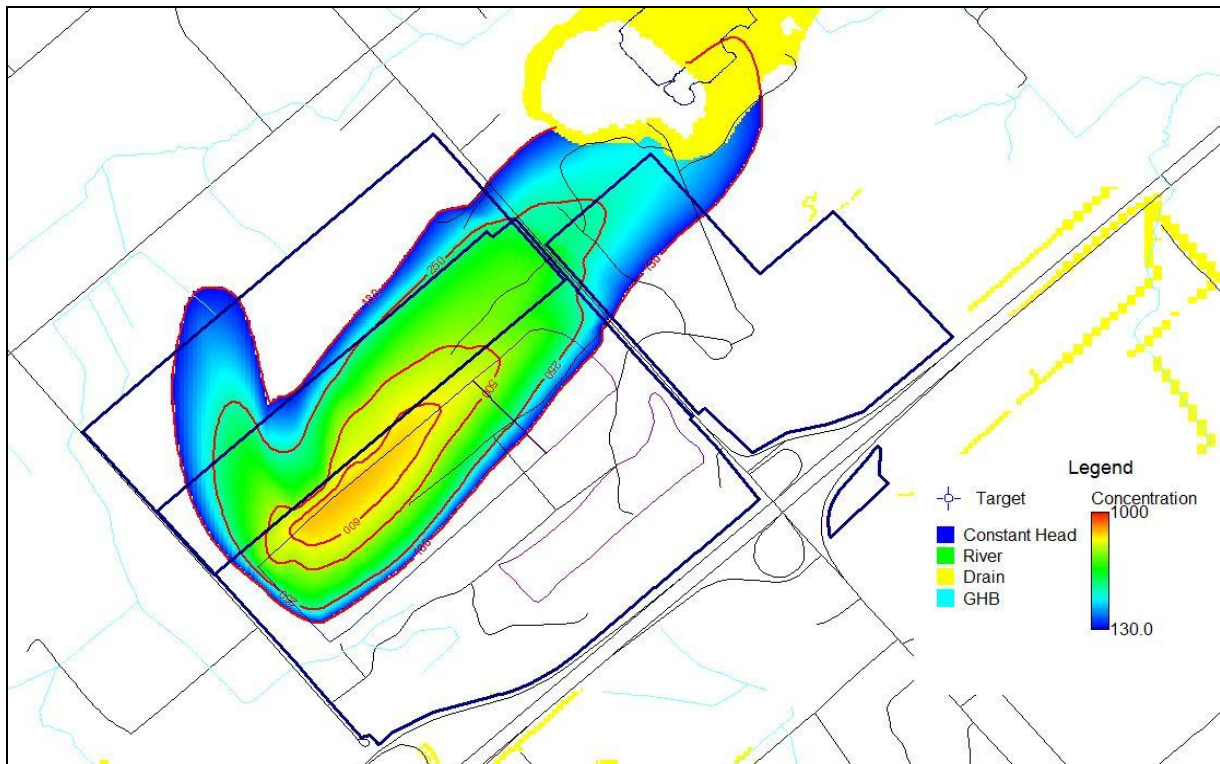


Figure 20: Maximum Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 3

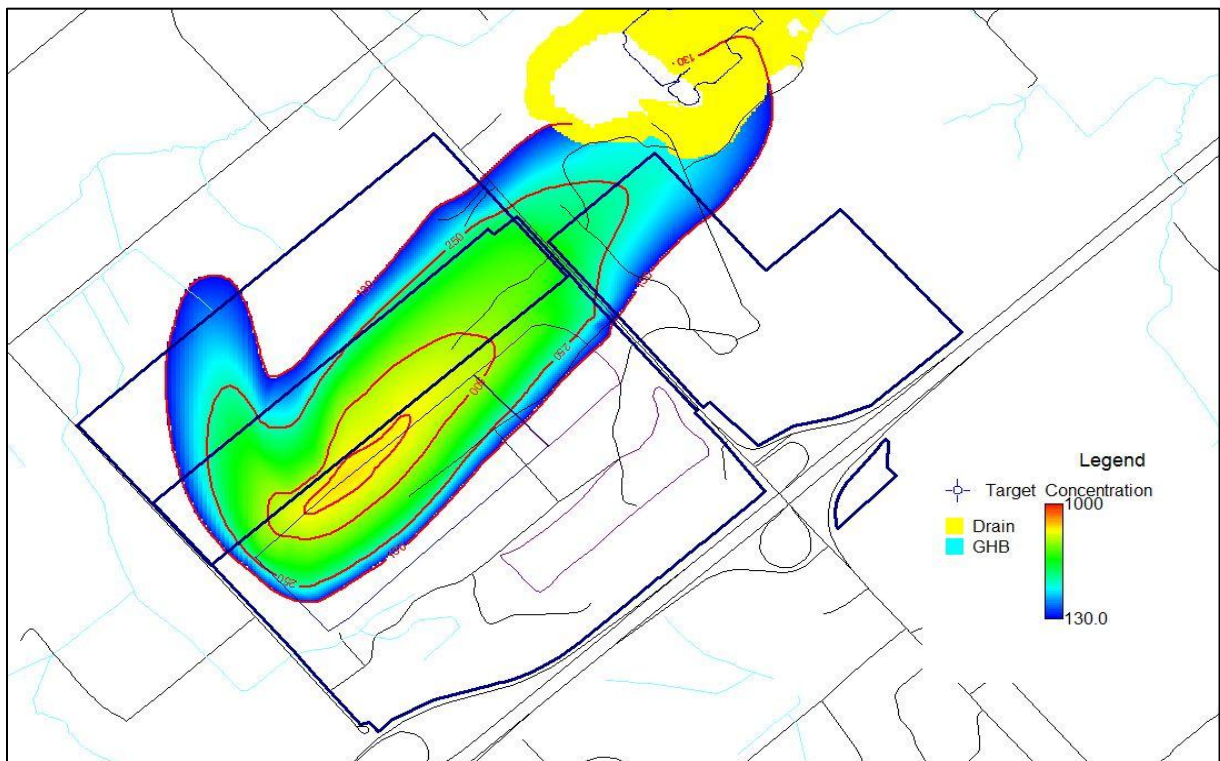


Figure 21: Maximum Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 4

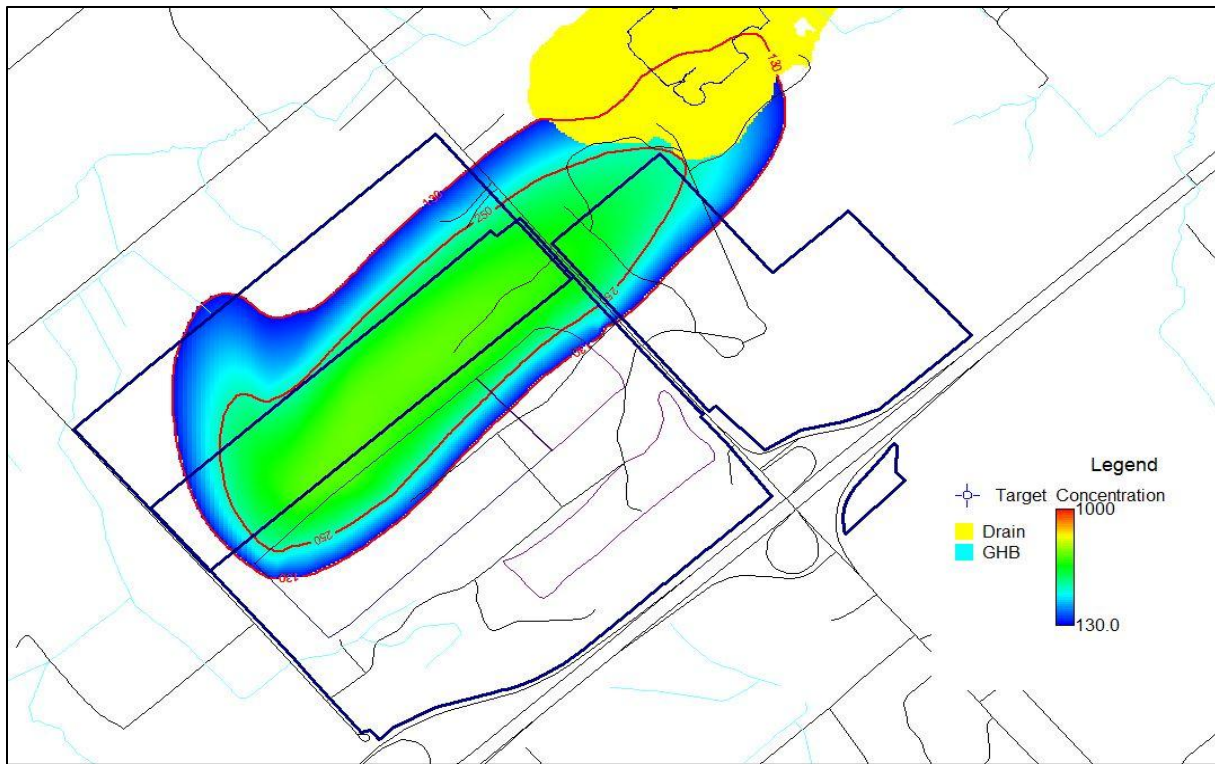


Figure 22: Maximum Simulated Concentration Plume of Baseline (Current) Conditions; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 5

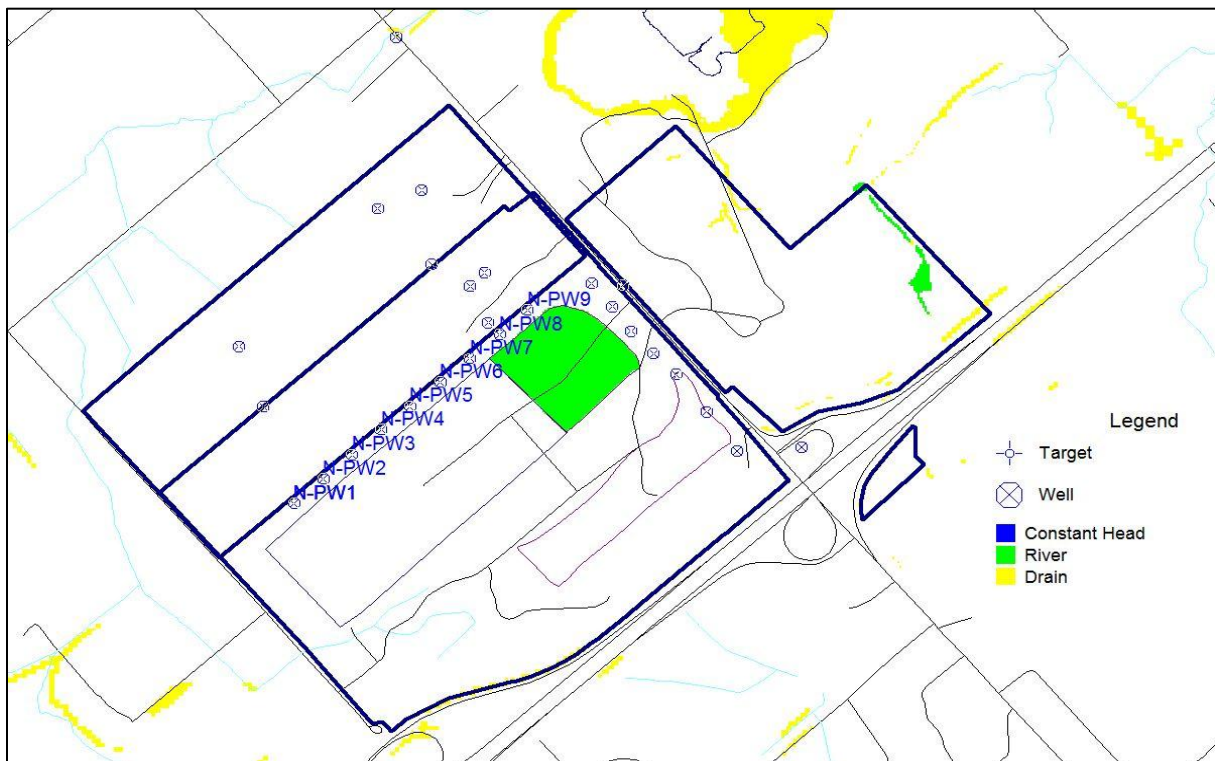


Figure 23: Conceptual Pumping Wells, North of Existing Landfill

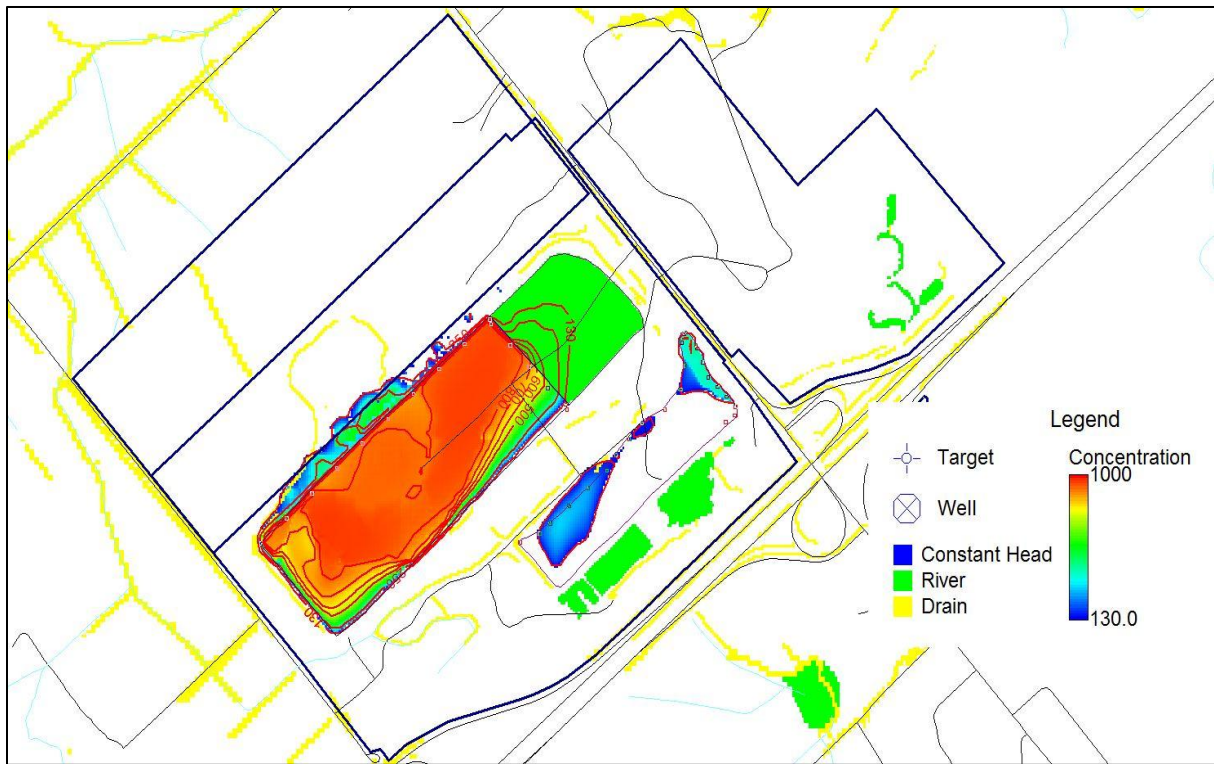


Figure 24: Maximum Simulated Concentration Plume with Mitigative Measures (no New Landfill); Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 1

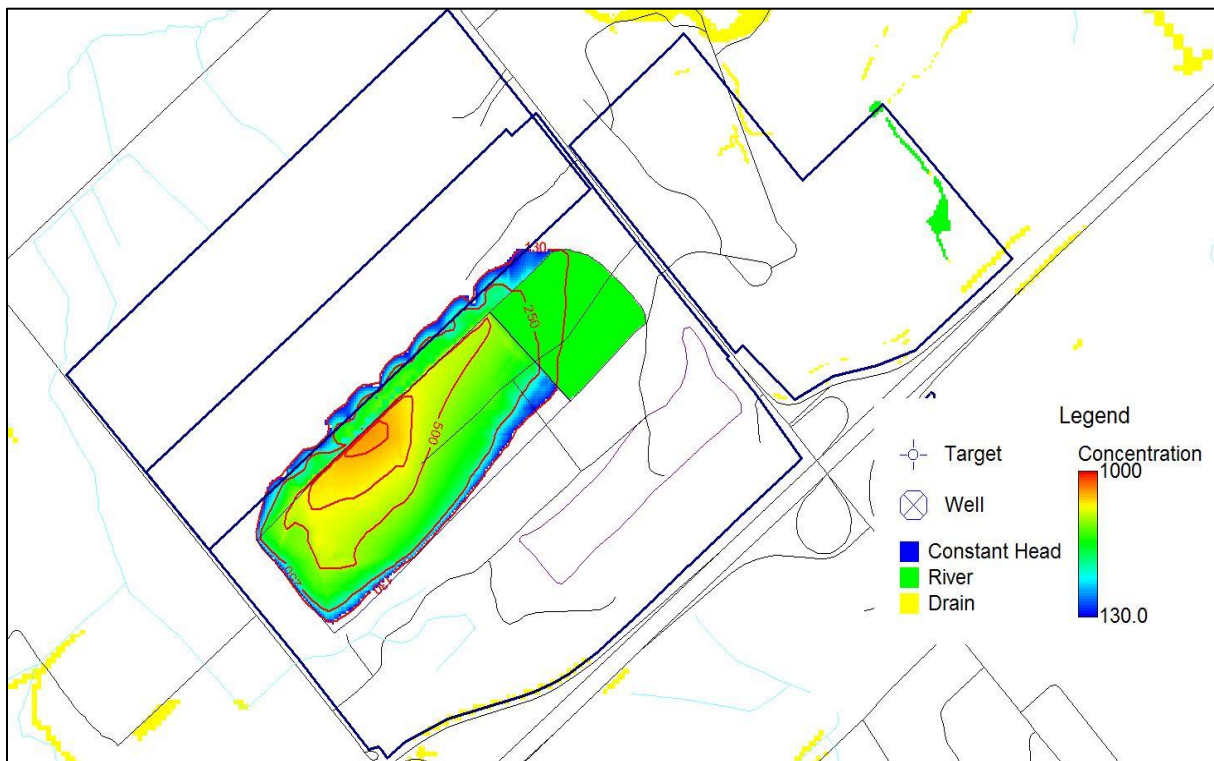


Figure 25: Maximum Simulated Concentration Plume with Mitigative Measures (no New Landfill); Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 2

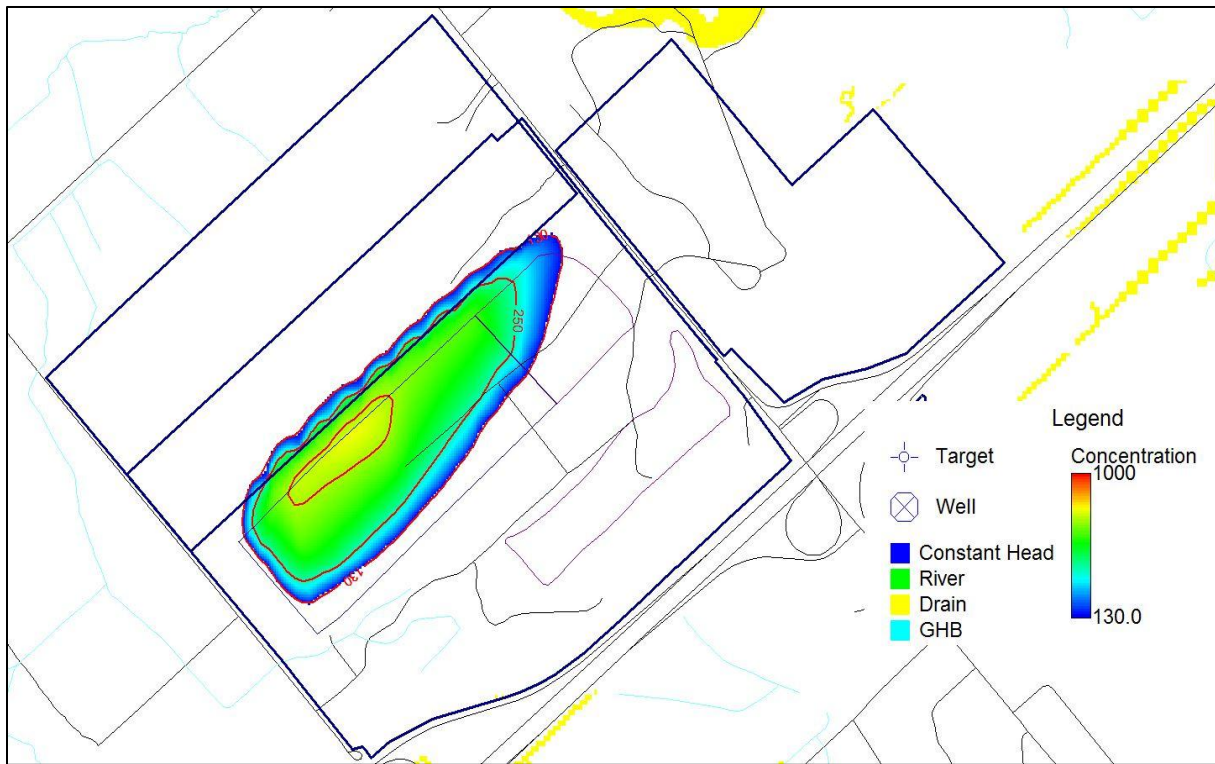


Figure 26: Maximum Simulated Concentration Plume with Mitigative Measures (no New Landfill); Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 3

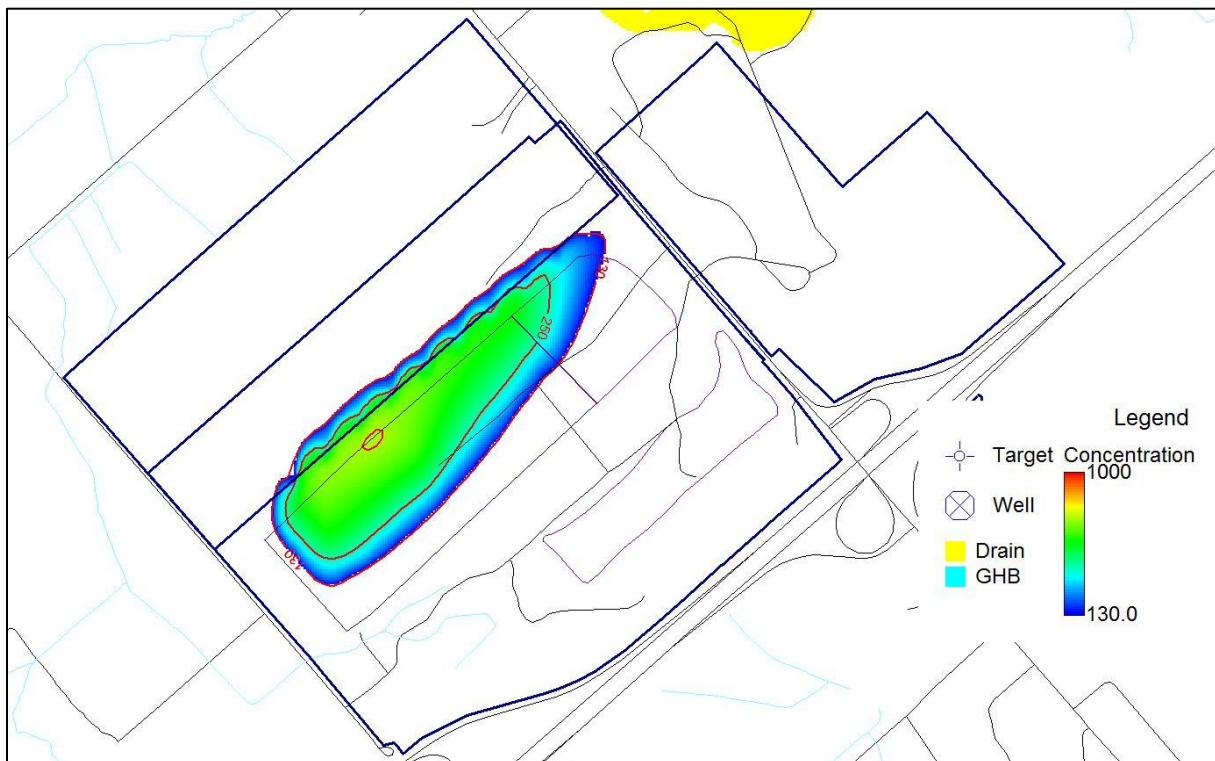


Figure 27: Maximum Simulated Concentration Plume with Mitigative Measures (no New Landfill); Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 4



Figure 28: Maximum Simulated Concentration Plume with Mitigative Measures (no New Landfill); Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 5

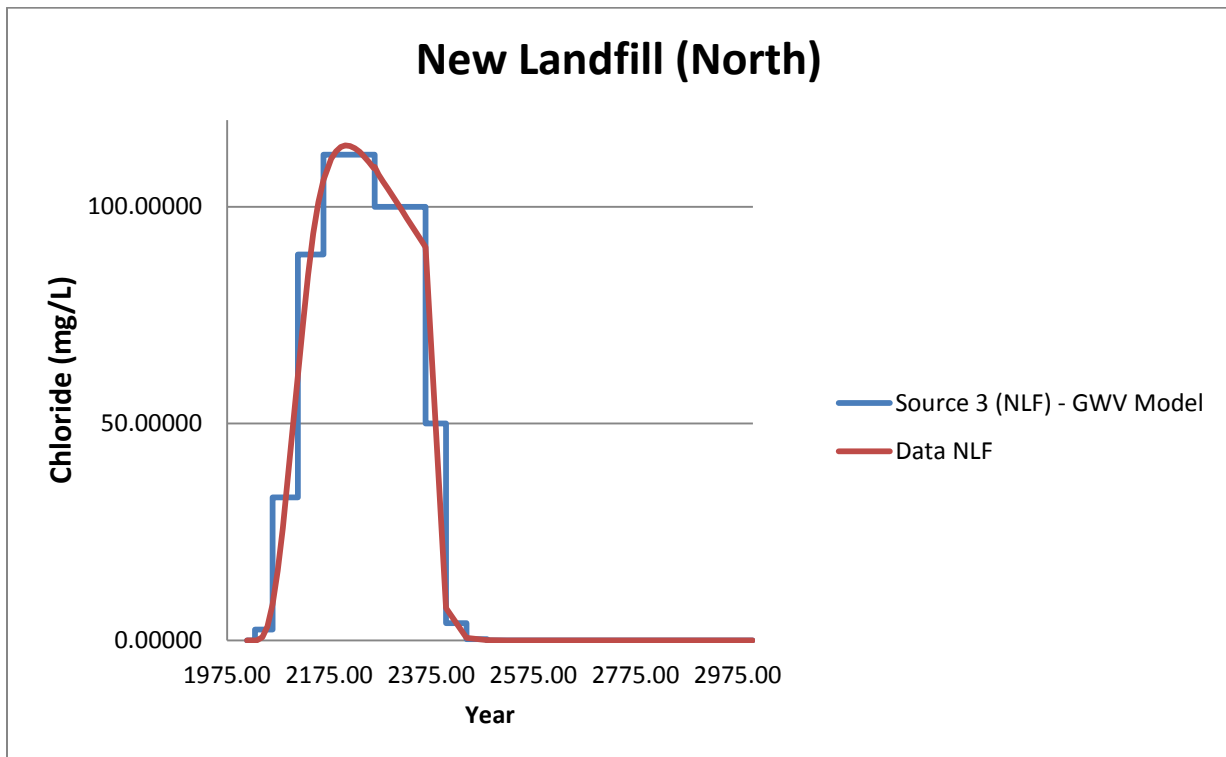


Figure 29: Chloride Source Curve for the Proposed New Landfill

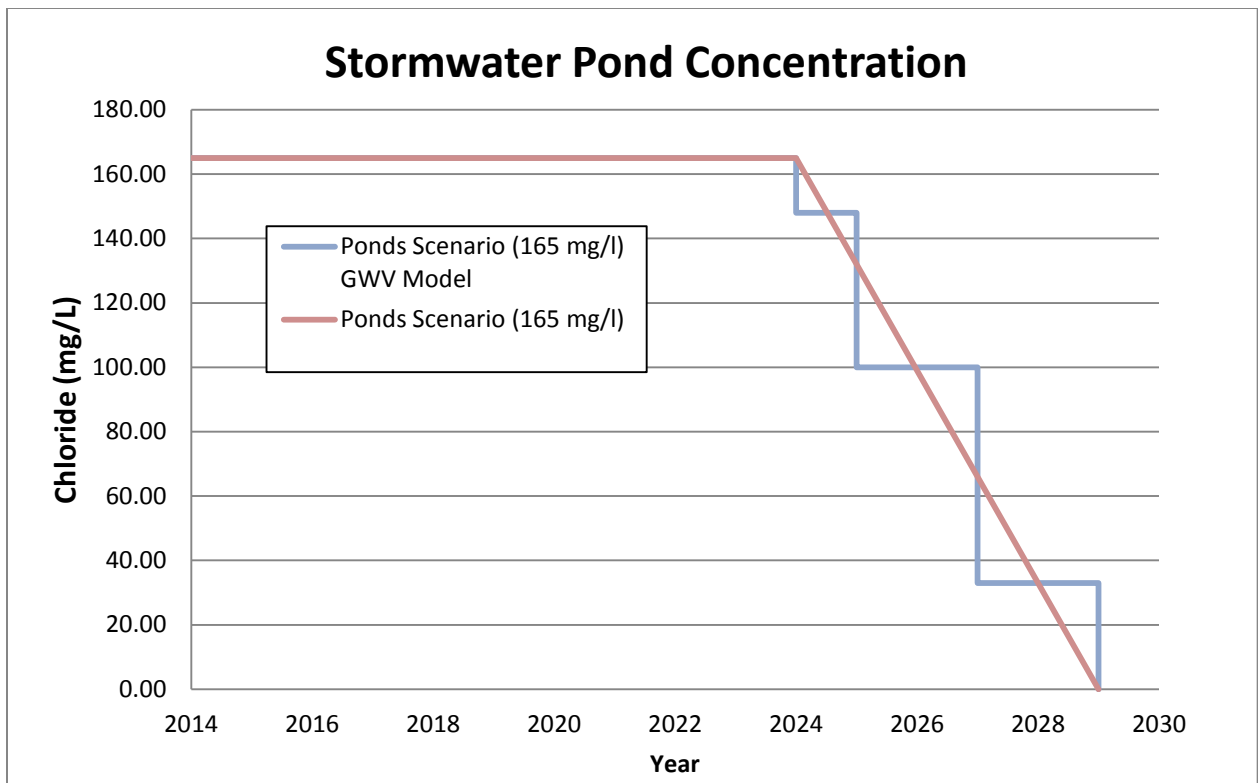


Figure 30: Chloride Source Curve for the Stormwater Management Ponds

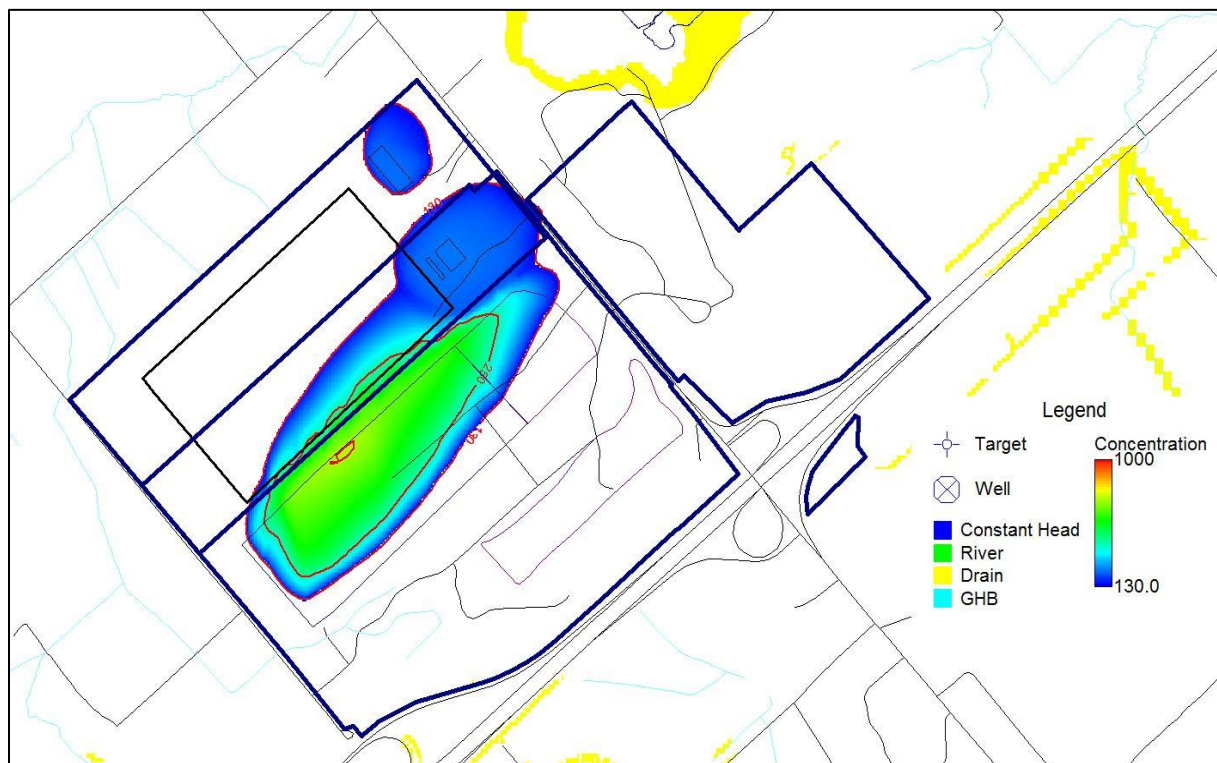


Figure 31: Maximum Simulated Concentration from Stormwater Ponds; Chloride Concentrations greater than 130 mg/L, Year 2024, Layer 3

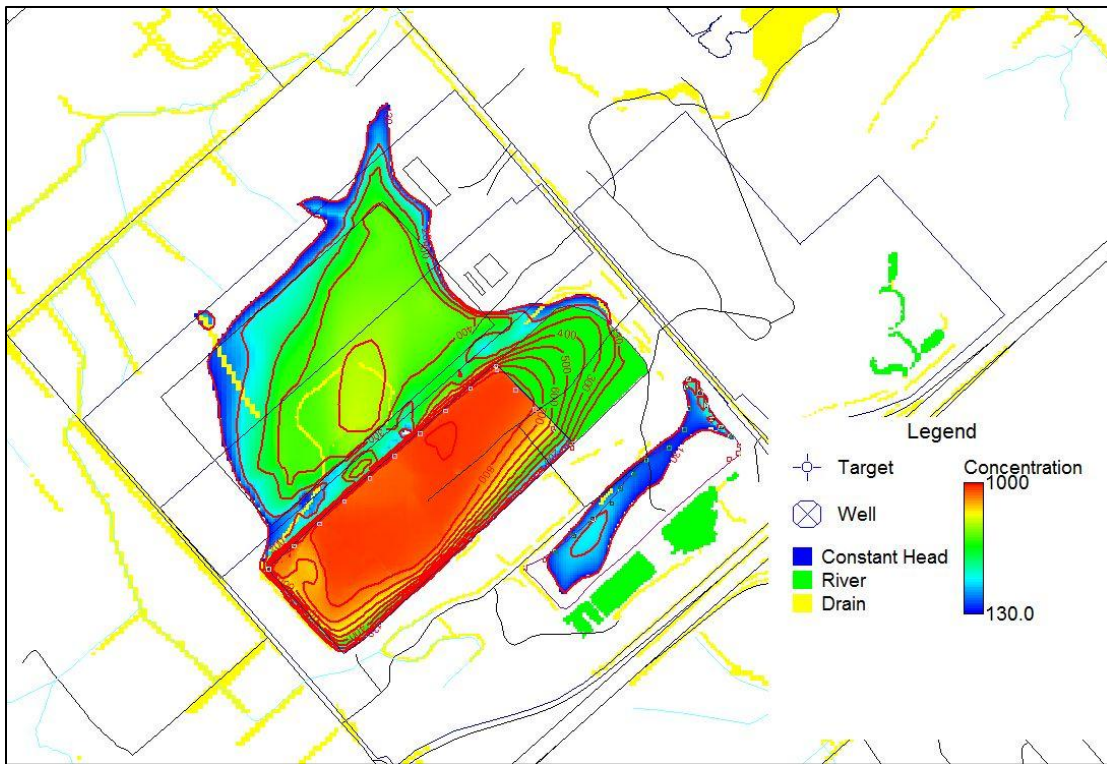


Figure 32: Maximum Simulated Concentration with New Landfill; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 1

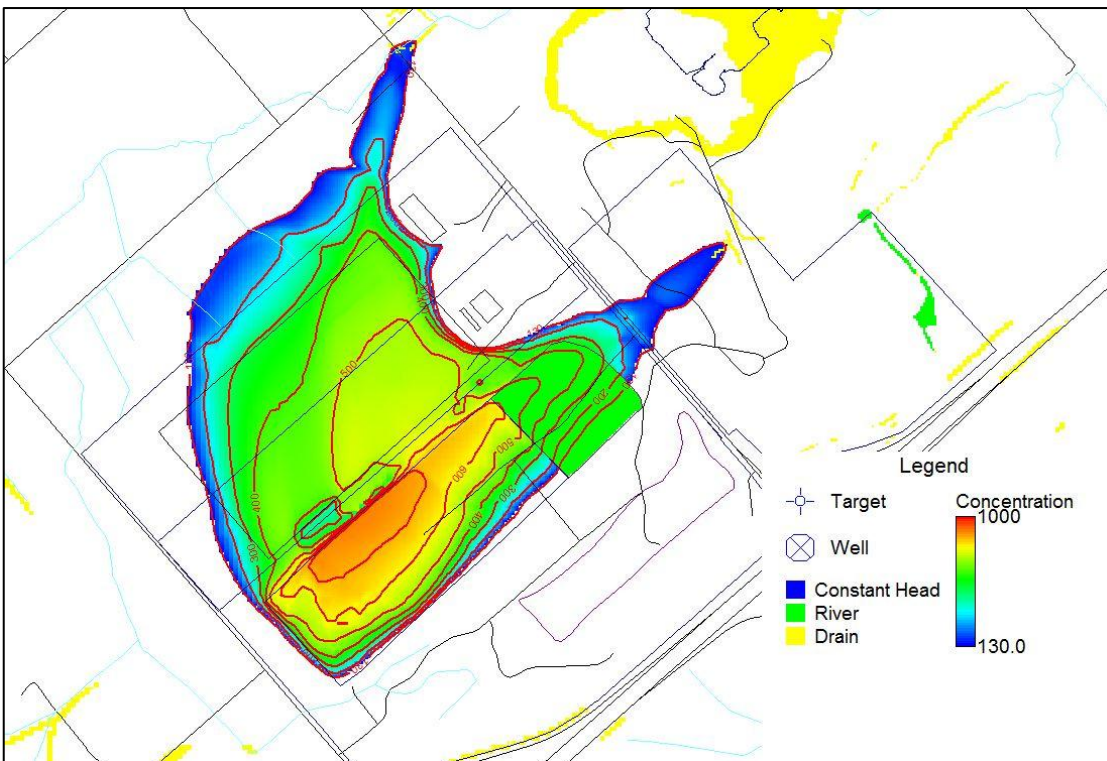


Figure 33: Maximum Simulated Concentration with New Landfill; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 2



Figure 34: Maximum Simulated Concentration with New Landfill; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 3

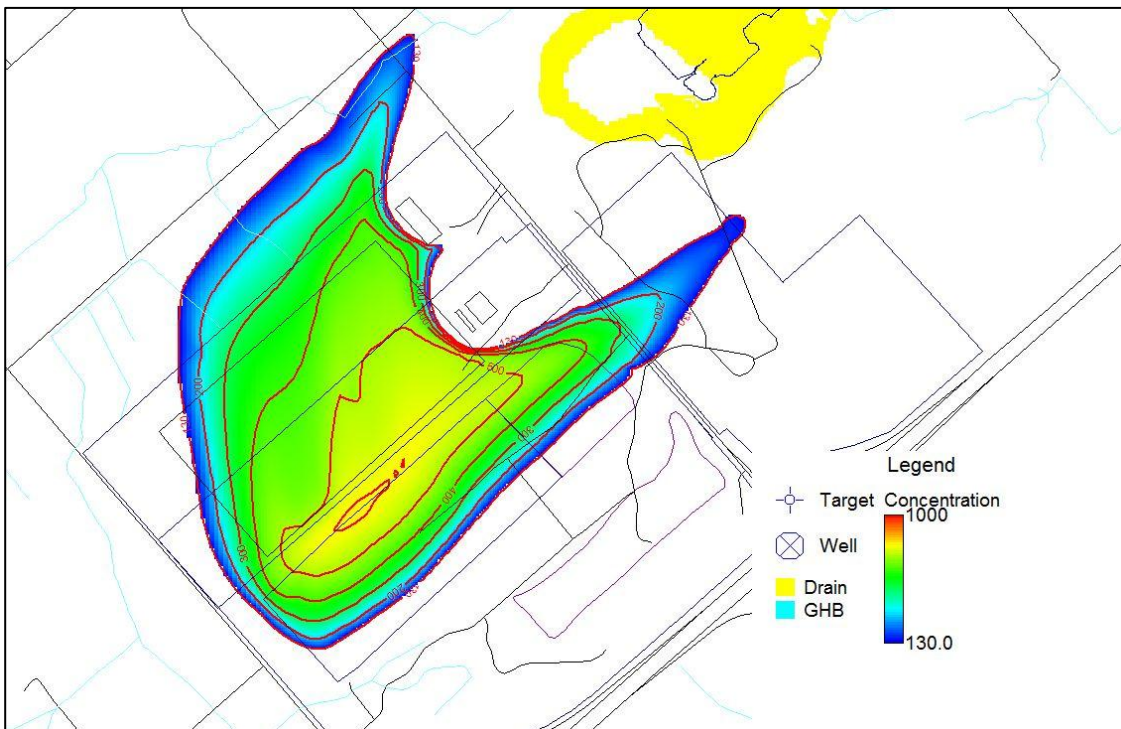


Figure 35: Maximum Simulated Concentration with New Landfill; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 4



Figure 36: Maximum Simulated Concentration with New Landfill; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 5

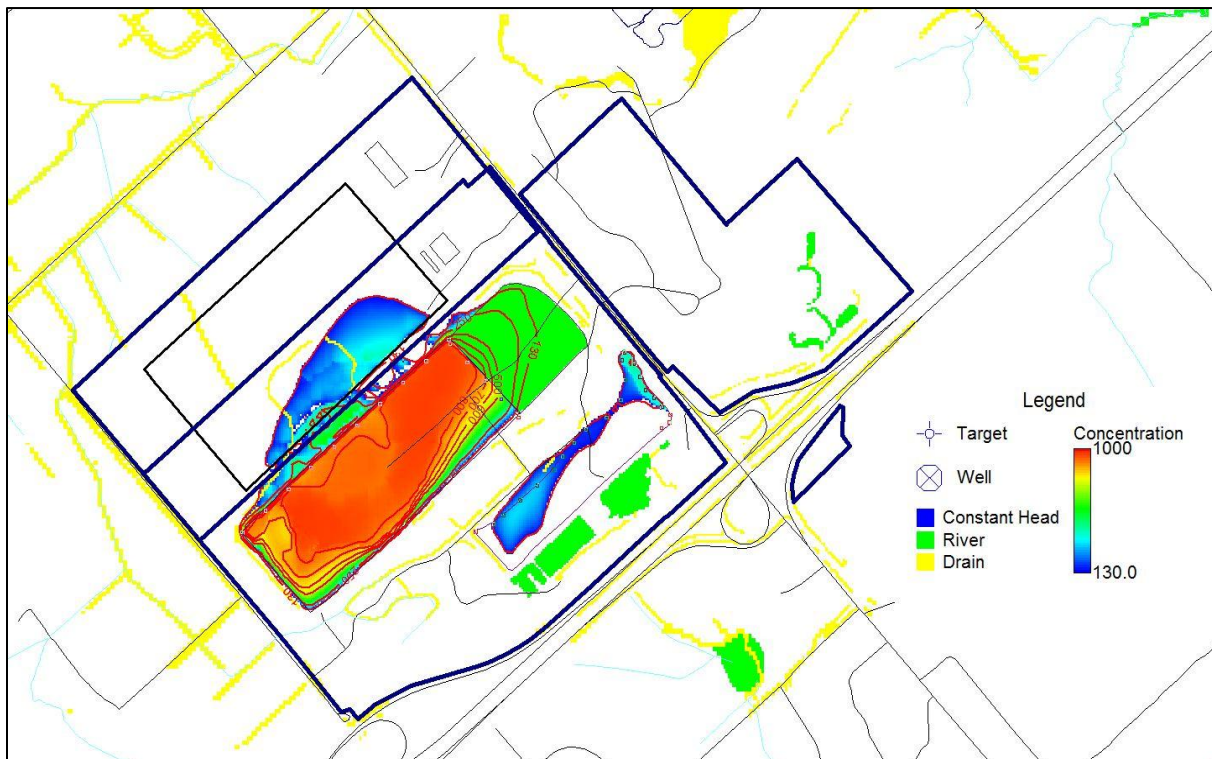


Figure 37: Maximum Simulated Concentration with New Landfill and Mitigative Measures; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 1

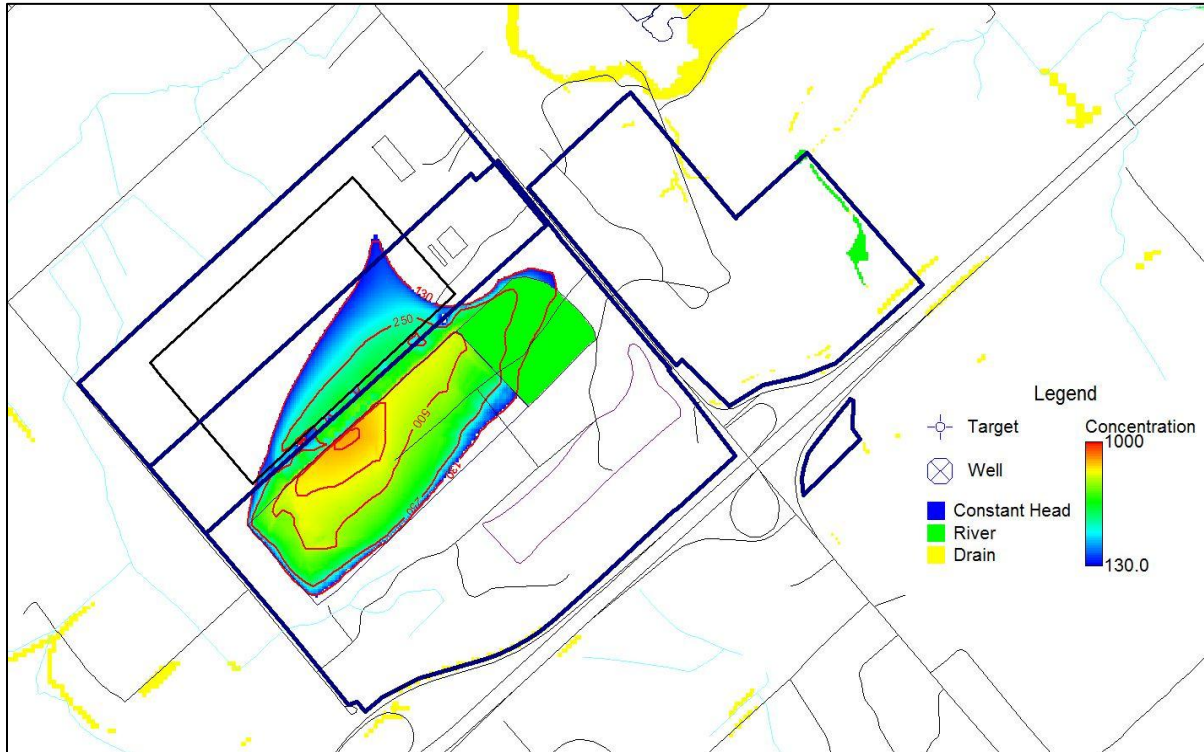


Figure 38: Maximum Simulated Concentration with New Landfill and Mitigative Measures; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 2

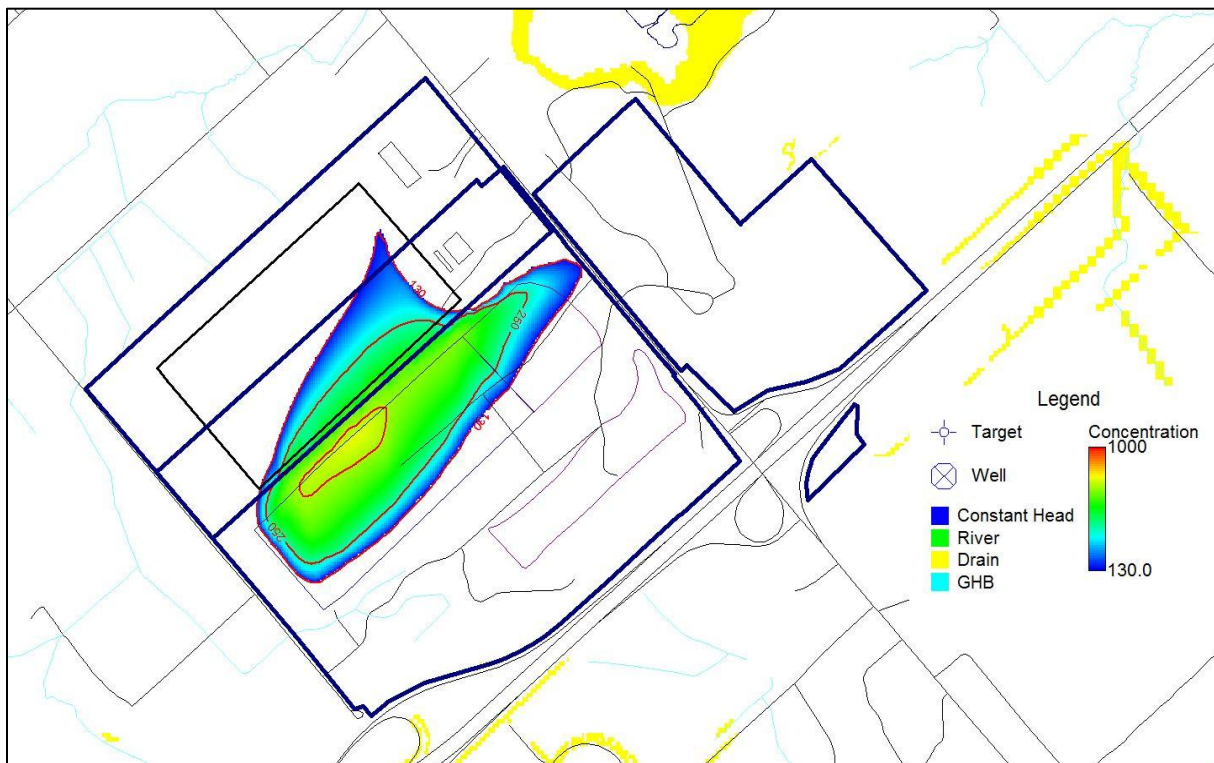


Figure 39: Maximum Simulated Concentration with New Landfill and Mitigative Measures; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 3

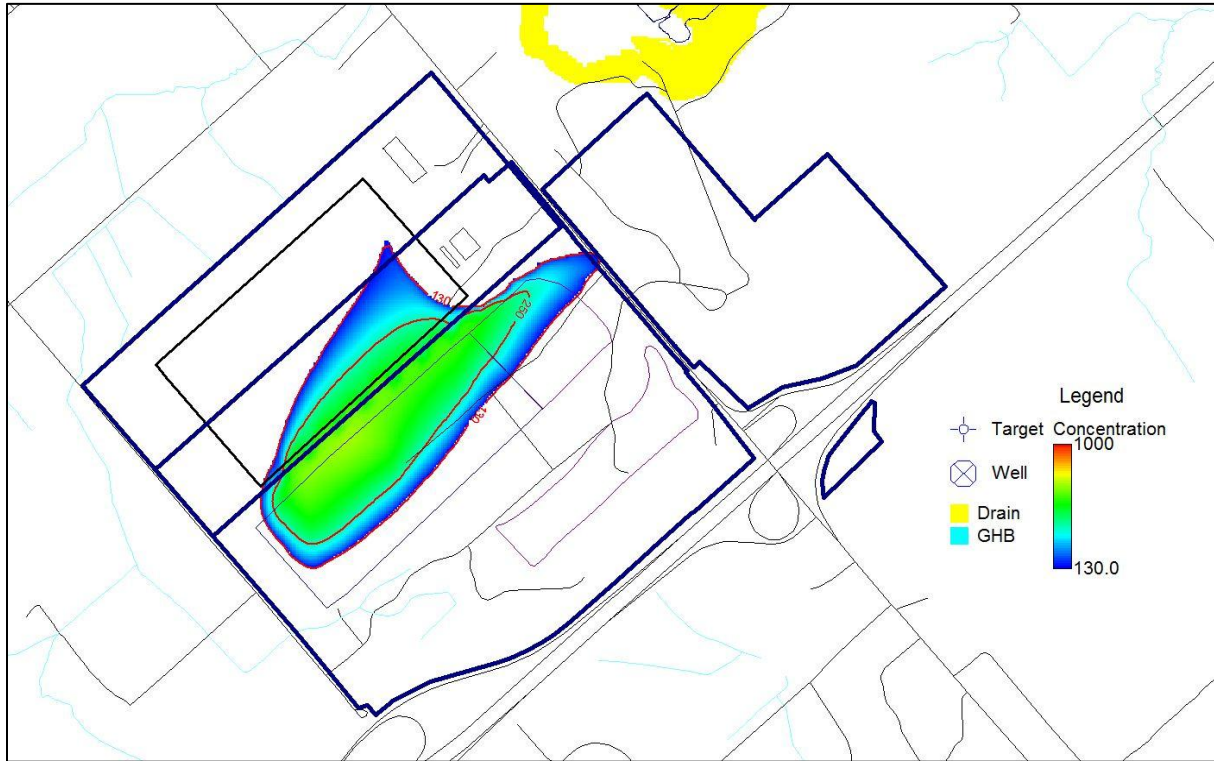


Figure 40: Maximum Simulated Concentration with New Landfill and Mitigative Measures; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 4



Figure 41: Maximum Simulated Concentration with New Landfill and Mitigative Measures; Chloride Concentrations greater than 130 mg/L, Year 2064, Layer 5

Tables



Table 1: Modelled Vertical Discretization and Layer Description

Layer	Unit	Top Elevation	Thickness
1	Overburden	Ground Surface	Varies
2	Contact Zone Overburden	2 m Above Bedrock	Varies
3	Contact Zone Bedrock	Bedrock Elevation	3 m
4	Fractured Bedrock	3 m Below Bedrock	5 m
5	Bedrock	8 m Below Bedrock	10 m

Table 2: Mass Balance of the Final Calibrated Flow Model

Overall Model Water Budget								
INFLOW (m ³ /d)				OUTFLOW (m ³ /d)				
Carp River	Recharge	River	General Head Boundaries	Carp River	Purge Wells	Drains	River	General Head Boundaries
11494.28	61096.58	6371.61	2.68	35001.85	708.53	22576.70	19478.34	782.21
Water Balance (Inflow – Outflow) = -417.52 (0.5%)								

Table 3: Calibrated Hydraulic Parameters for Each Model Layer

Layer	Description	Kx (m/s)	Ky(m/s)	Kz(m/s)	Ss	Sy	Porosity
1	Offshore Marine	5.00E-07	5.00E-07	2.50E-07	0.01	0.03	0.45
1	Alluvial	2.00E-06	2.00E-06	1.00E-07	0.01	0.05	0.40
1	Organic	5.00E-06	5.00E-06	2.50E-07	0.01	0.01	0.35
1	Bedrock Outcrops	3.11E-05	3.11E-05	5.00E-05	0.01	0.08	0.15
1	Nearshore	5.00E-05	5.00E-05	2.50E-06	0.01	0.05	0.38
1	Till	1.00E-05	1.00E-05	5.00E-07	0.01	0.10	0.30
1	Glaciofluvial	5.00E-05	5.00E-05	5.00E-05	0.01	0.30	0.36
2	Contact Zone Overburden	1.67E-05	1.67E-05	5.00E-05	0.01	0.10	0.35
3	Contact Zone Bedrock	1.07E-04	1.07E-04	5.00E-05	0.01	0.08	0.15
4	Fractured Bedrock	1.88E-05	1.88E-05	2.31E-05	0.01	0.04	0.15
5	Bedrock	1.00E-05	1.00E-05	1.16E-05	0.01	0.01	0.15

Table 4: Recharge Rates Applied to New Landfill and Stormwater Ponds

Year	Recharge m/d					
	Source 1 (Closed South Cell)	Source 2 (Current LF)	Source 3 (New LF)	Pond #1 (North)	Pond #2 (SE)	Pond #3 (SW)
1975	6.63E-04	n/a	n/a	n/a	n/a	n/a
1999	6.63E-04	6.63E-04	n/a	n/a	n/a	n/a
2005	6.63E-04	6.63E-04	n/a	n/a	n/a	n/a
2014	6.63E-04	6.63E-04	1.80E-05	3.50E-02	3.00E-02	5.00E-02
2114	6.63E-04	6.63E-04	1.99E-05	3.50E-02	3.00E-02	5.00E-02
2464	6.63E-04	6.63E-04	6.02E-04	3.50E-02	3.00E-02	5.00E-02
3004	6.63E-04	6.63E-04	6.02E-04	3.50E-02	3.00E-02	5.00E-02

Table 5: Groundwater Mounding at Stormwater Ponds

	#1	#2	#3
	North Pond	SE Pond	SW Pond
Existing Conditions (mASL)	118.73	117.85	119.25
Current Design (New Landfill and Stormwater Ponds)	119.99	121.08	121.39
Predicted Groundwater Mounding (m)	1.26	3.23	2.14

Table 6: Model Details for the Calibration of Mass Transport

	Pre-Current Landfill Period (1975-1999)	Landfilling/Post-Landfill Period (1999-2030)
Current Landfill	Does not exist	Exists; 2/3 rd unlined, 1/3 rd lined
Closed South Cell	Exists; unlined	Exists; unlined
Recharge on Landfills	242 mm/yr	242 mm/yr on unlined portion; 0 mm/yr on lined portion.
Quarries	Current Huntley Quarry does not exist but the old (smaller) quarry exists	Huntley Quarry exists
Purge wells	None	PW1 through PW10 and PW20 operating
Initial Concentration	Initial relative concentration of 1 in the closed south cell and 0 elsewhere.	Model simulated end concentration in Part 1 was applied as initial concentration in Part 2, in addition to that a recharge concentration was introduced on unlined part of current landfill.
Constant concentration	Concentration was kept constant from 1975 to 1999 over the closed south cell. A decay of the recharge concentration was introduced after 1999. This decay is represented by steps in the recharge concentration.	Concentration was kept constant from 1999 to 2015 over unlined part of current landfill. As for the pre-landfill period, a decay represented by steps was introduced to the recharge concentration.
Wash ponds	Applied as rivers cells	Applied as rivers cells

Table 7: Scenarios for Mass Transport Calibrations

Scenario	Longitudinal dispersivity (m)	Transverse dispersivity (m)	Vertical dispersivity (m)
S1	0	0	0
S2	10	1	0.1
S3	5	0.5	0.05
S4	20	2	0.2
S4 FINAL	20	2	0.2
S5	20	5	1
S6	10	10	1
S7	10	50	10

Table 8: Chloride Source Concentrations Applied to the Transport Model (in mg/L)

Stress Period	Year	Source 1 (Closed South Cell)	Source 2 (Current LF)	Source 3 (New LF)	SWM Ponds
0	1975	550	0	0	0
1	1999	310	585	0	0
2	2005	310	1000	0	0
3	2014	310	930	0.0006	165.0
4	2024	310	930	0.0006	148.0
5	2025	310	930	0.0006	100.0
6	2027	310	930	0.0006	33.0
7	2029	310	930	0.0006	0
8	2030	310	930	3	0
9	2064	80	815	33	0
10	2114	80	710	89	0
11	2164	14	610	112	0
12	2224	14	500	112	0
13	2264	14	500	100	0
14	2300	14	400	100	0
15	2364	3	400	50	0
16	2404	3	280	4	0
17	2444	0	280	0.30	0
18	2464	0	280	0.30	0
19	2484	0	280	0.00	0
20	2565	0	160	0.00	0
21	2860	0	64	0	0
22	3004	0	64	0	0