DURHAM YORK ENERGY CENTRE

2013 GROUNDWATER MONITORING REPORT

Project No. 111-26648-00-100-0414014

Prepared for:
Regional Municipality of Durham

April 2014

Distribution:
1 c Regional Municipality of Durham
1 c Regional Municipality of York
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April 29, 2014

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Subject: **Durham York Energy Centre**
2013 Groundwater Monitoring Report
Project No. 111-26648-00-100-0414014

Dear Mr. Anello:

We are pleased to forward the 2013 Groundwater Monitoring Report for the Durham York Energy Centre. This hydrogeological report presents an assessment of the natural (baseline) groundwater characteristics of the site prior to, and during, the current construction phase of the facility. Comments provided by the Region have been incorporated into the report.

The groundwater monitoring program was completed in accordance with the program described in the *Durham York Energy Centre Groundwater and Surface Water Monitoring Plan*, prepared by Stantec Consulting Ltd, dated September 14, 2011. Our report includes groundwater elevation and chemical data collected during the monitoring events between December 2011 and November 2013. Findings are summarized in the conclusions and recommendations section, and technical information is appended.

In general, the existing groundwater characteristics are reflective of natural groundwater conditions site, and the construction activity has not adversely affected the on-site groundwater quality. The monitoring program outlined in the Groundwater and Surface Water Monitoring Plan should be continued into 2014.

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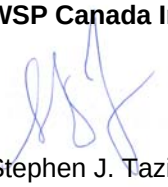
Mr. Gioseph Anello
Regional Municipality of Durham

Thank you for the opportunity to work on this study. If there are any questions, please contact us.

Yours truly,
WSP Canada Inc.



Stephen J. Taziar, P.Eng.
Senior Project Engineer

SJT:nah

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1 INTRODUCTION

1.1 BACKGROUND

The Durham York Energy Centre is an energy from municipal solid waste facility currently being constructed in the Municipality of Clarington, Ontario. The site property is located on the west side of Osborne Road, southeast of the Courtice Road and Highway 401 interchange, and north of the Courtice Water Pollution Control Plant and the CN Railway, as shown in Figure 1-1.

The water monitoring programs for the site were outlined in the *Durham York Energy Centre Groundwater and Surface Water Monitoring Plan*, prepared by Stantec Consulting Ltd, dated September 14, 2011, in accordance with Condition 20 of the Environmental Assessment (EA) for the site. To date, the groundwater monitoring component has been carried out by Genivar Inc. (now WSP Canada Inc.), and the surface water monitoring component has been carried out by Golder Associates. The Durham York Energy Centre is located upon approximately 12.1 hectares of rural land. The site layout is shown in the Site Plan, Figure 1-2.

1.2 OWNERSHIP AND KEY PERSONNEL

The owners of the site are:

The Regional Municipality of Durham
Contact: Mirka Januszkiewicz, P. Eng
Director, Management

and

The Regional Municipality of York
Contact: Laura McDowell, P.Eng.
Director, Environmental Promotion and Protection

The Site Operator during the construction phase is:

Covanta Durham York Renewable Energy L.P.
Contact: James Delaney
Resident Construction Manager
72 Osborne Road
Clarington, Ontario
L1E 2R2
Main: (905) 433-4870
Direct: (905) 433-4872
Fax: (905) 433-4889
Email: jdelaney@CovantaEnergy.com

Assistant Site Coordinator: Dave Haldenby
Email: dhaldenby@CovantaEnergy.com

The key contact person for environmental issues at the site is James Delaney, listed above.

The Certified Environmental Practitioners for the site include:

Groundwater –

WSP Canada Inc. (formerly GENIVAR Inc.)
Contact: Stephen J. Taziar, P.Eng
Senior Project Engineer
126 Don Hillock Drive, Unit 2
Aurora, Ontario
L4G 0G9
Phone: (905) 750-3080
Fax: (905) 727-0463
Email: stephen.taziar@wspgroup.com

and

Surface Water –

Golder Associates
Contact: Steve Auger, M.Sc., P.Eng, C.P.E.S.C.
Water Resources Engineer, Surface Water CEP
140 Renfrew Drive, Suite 110
Markham, Ontario
L3R 6B3
Phone: (905) 475-5591 (ext 6030)
Fax: (905) 475-5257
Email: Steve_Auger@golder.com

1.3 MOE LIAISON

As part of the ongoing activities on the subject site, the Owners (Regional Municipalities of Durham and York) and Covanta have been meeting with the Ministry of the Environment on-site, periodically, to review the status of construction, and assess potential affects to the surrounding environment.

1.4 OBJECTIVE AND SCOPE

The principal objectives of the 2013 annual water monitoring program are as follows.

- To assess the baseline on-site groundwater characteristics as part of the pre-construction and construction phases.
- To assess the effects of the construction activity on local groundwater resources.
- To assess the compliance of the groundwater quality with Ontario Drinking Water Quality Standards.
- To assess the need for remedial measures.
- To determine if changes are required for the 2014 monitoring program.

The 2013 water monitoring program involves a data collection component and an analysis and interpretation component.

1.5 METHODOLOGY

1.5.1 GROUNDWATER MONITOR INSTALLATIONS

Six groundwater monitors at four Borehole Locations were installed on the subject site between December 19 and 21, 2011, in accordance with the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan. Drilling of the boreholes was undertaken by a soils drilling rig, and installation of the groundwater monitors was supervised in the field by WSP personnel. Single monitors were installed at Borehole Locations MW1 and MW4, and nests of two groundwater monitors were installed at Borehole Locations MW2 and MW3. During the soils drilling, split spoon samples were obtained and standard penetration tests were completed. This information was recorded in a project dedicated field book by the supervising field technician. Each groundwater monitor consists of 50 mm, Schedule 40, PVC and a 100mm x 100mm steel, lockable, protective casing.

Once the groundwater monitors were completed, dedicated high density polyethylene (HDPE) tubing, connected to inertial-lift sampling systems, were installed within each monitor. The monitors were subsequently purged to remove any water that may have been added during the drilling process, remove any fine-grained material within the monitor, and to establish a hydraulic connection with the surrounding in-situ soils.

During 2013, the riser for Monitor MW4 was shortened in response to the construction of the East Stormwater Management Pond. The monitor shortening involved the removal of 2.6 metres of riser and re-installation of the steel protective casing, in accordance with O. Reg. 903. Approximately 1.5 metres of the total riser were removed in June and the additional 1.1 metres of riser were removed in July 2013. The height adjustment of the monitor will not have an influence on the monitoring objectives for this location.

In September 2013, monitors MW3A and MW3B were decommissioned due to infrastructure construction activities in the local area. The monitors were replaced in March 2014. In addition to the two replacement monitors, two additional groundwater monitors, designated MW5A and MW5B, were installed within the central portion of the property in March 2014. Monitors MW5A/5B were installed in accordance with the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan, and will be included in future groundwater sampling events. Monitors MW5A and MW5B were drilled to a depth of approximately 9 m and 6 m below grade, in accordance with the Monitoring Plan.

1.5.2 SLUG TESTS HYDRAULIC RESPONSE TESTING

Following the installation and development of the six groundwater monitors, hydraulic response testing was undertaken to provide estimates of the horizontal hydraulic conductivity of the formation material surrounding the screened interval. Rising head tests (removing water and monitoring the change in water level) were conducted at each monitoring location. An assessment of the test results provided the following hydraulic conductivities:

- MW1: 1.8×10^{-7} m/s
- MW2A: 9.0×10^{-7} m/s
- MW2B: 5.8×10^{-8} m/s
- MW3A: 1.6×10^{-8} m/s
- MW3B: 3.4×10^{-7} m/s
- MW4: 8.0×10^{-7} m/s

These hydraulic conductivities are consistent with silt and till soils, and will be used for future assessments associated with groundwater flow velocities.

1.5.3 GROUNDWATER MONITORING

The established groundwater monitoring program for the site, as outlined in the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan requires the collection of groundwater samples from the on-site monitors three times per year, in the spring, summer, and fall. The measurement of groundwater levels at the monitoring locations was completed in conjunction with the groundwater sampling events on the following dates:

- March 22, 2013
- July 12, 2013
- September 9, 2013 (MW3A and MW3B only prior to decommissioning)
- November 26, 2013 (MW1, MW2A, MW2B, and MW4)

Prior to sampling, monitors were purged of at least three volumes of standing water, or were purged dry, using the dedicated inertial lift pump in accordance with established sampling protocols for this site and with industry standards. Samples were collected directly in bottles provided by the laboratory and submitted to AGAT Laboratories in Mississauga for analysis of the inorganic and metal parameters listed below, in accordance with the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan.

- Carbonate
- Bicarbonate
- Chloride
- Sulphate
- Calcium
- Magnesium
- Potassium
- Sodium
- Boron
- Cadmium
- Cobalt
- Lead
- Mercury

Samples intended for metals analysis were filtered in the field using 0.45 micron in-line disposable filters. Groundwater samples were analysed in the field for pH, conductivity, temperature, and oxidation reduction potential.

AGAT Laboratories is accredited by the Canadian Association for Laboratory Accreditation (CALA) and the Standards Council of Canada (SCC).

1.5.4 INTERPRETATION AND REPORTING

Following collation of the database, a detailed analysis and interpretation of the data was completed. This component included the following items.

- Preparation of time-concentration graphs
- Statistical assessment
- Interpretation of short-term surface water quality patterns and trends
- Groundwater quality compliance with Ontario Drinking Water Quality Standards
- Consideration of future monitoring

Results of the 2013 groundwater monitoring program with conclusions and recommendations are presented in this report.

2 PHYSICAL SETTING

The geologic setting has previously been described in previous reports, including the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan, prepared by Stantec Consulting Ltd. The Durham York Energy Centre is situated in the physiographic region of the Iroquois Plain, as described by Chapman & Putnam (1984). In the vicinity of the subject site, this region is comprised of silty lacustrine deposits and tills. The Stantec report indicates that the Durham York Energy Centre is underlain by Newmarket Till, which is a dense till comprised of clayey silt and sand till. The layer is estimated to be between 25 and 30 m deep, according to various references in the Stantec report.

The surficial soils on-site, as described in the borehole logs, Item A-3, Appendix A, are comparable to the soils described above. As shown in the borehole logs, the shallow soils on-site, to a depth of approximately 10 metres, include layers of sandy silt till, silt till, clayey silt, and silty sand. The varying thicknesses of the units generally range between 0.2 m and 4.5 m within the boreholes drilled in December 2011.

An interpretation of shallow groundwater flow direction is presented in Figure 1-2, based on the November 2013 water level elevations. As shown in the figure, shallow groundwater flow is in a general southwest direction.

It is noted that the groundwater elevations within the southeast portion of the site decreased during the November 2012 monitoring event, compared to the March 2012 event, in response to the construction of the East Stormwater Management Pond. This lowering of the water level elevation was exhibited at monitor MW4, which decreased approximately 1.8 metres between March and November 2013. Water level elevations within Monitor MW4 since the November 2012 event are similar to, but slightly higher than, the base elevation of the East Stormwater Management Pond. Future reports will include a reference to water level elevations within the pond, once water levels have stabilized. Pond discharge is currently pumped during the construction stage, instead of flowing at a fixed height.

The decrease in water levels adjacent to the stormwater management ponds is not unexpected, as this aspect was predicted in Section 2.2 of the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan. It is noted, however, that the localized influence of the stormwater

management ponds on the shallow groundwater flow regime will not have an adverse influence on the shallow groundwater flow patterns for the areas around the site.

As shown in Figure A-1, Appendix A, the groundwater elevation at monitor MW1 noticeably decreased during the November 2013 sampling event. The decrease in water level elevation is attributed to excavation activities to the west of the subject property for the installation of underground infrastructure. Continued monitoring will further assess the influence of the underground services, at this location.

Groundwater levels within monitoring nests MW2 and MW3, as shown in Figures A-2 and A-3, indicate that the slight vertical hydraulic gradients are generally downwards, on-site.

3 MONITORING RESULTS

3.1 QUALITY ASSURANCE/QUALITY CONTROL

Duplicate groundwater samples were collected during the sampling events in 2013 as part of the QA/QC program. A summary of the results is provided in Table B-3, Appendix B, along with the relative percent differences (RPD). It is noted that the acceptable RPD guideline of 20% is only applicable to parameter concentrations that are greater than 5 times the limit of quantitation (LOQ). Results for the duplicate sample were within the 20% guideline for the duplicates.

Based on the results from the QA/QC program, the RPD for the duplicate sample parameters, as shown in Table B-3, were below the 20% guideline. These results indicate that the laboratory values can be interpreted with confidence.

3.2 GROUNDWATER QUALITY

Based on the configuration of the groundwater flow system, Borehole Locations MW1 and MW2 are considered to be upgradient of the on-site buildings, and represent the background water quality for the site. Borehole Locations MW3 and MW4 are downgradient or cross-gradient from the facility buildings within the property boundary, and provide monitoring locations for assessment of potential future influences from on-site activities.

3.2.1 FIELD CHEMICAL RESULTS

A comparison of field and laboratory values indicates that the field pH and conductivity measurements were generally similar to the laboratory results. Any differences between field and laboratory values are attributed primarily to differences in the testing environment and analytical equipment.

3.2.2 CONCENTRATION TRENDS

The groundwater laboratory analytical results are summarized in Table B-2, Appendix B. The time-concentration graphs for chloride, sodium, sulphate, calcium, magnesium, potassium, boron, and bicarbonate are provided in Figures B-1 to B-8, Appendix B. As shown in these figures, parameter concentrations for the groundwater monitors are generally constant over the short term, between December 2011 and November 2013, although the following patterns are noted.

- Within the nested monitors at Borehole Location MW2, concentrations for chloride, sodium, sulphate, calcium, magnesium, potassium and bicarbonate are generally higher within the shallow monitor, MW2B, compared to the deeper monitor MW2A; whereas boron concentrations were slightly higher at the deeper monitor compared to the shallow monitor, at this location.
- Within the nested monitors at Borehole Location MW3, concentrations for chloride, sodium, and boron are higher within the deeper monitor, MW3A, compared to the shallow monitor MW3B; whereas calcium, magnesium, and bicarbonate concentrations were higher within the shallow monitor compared to the deeper monitor, at this location.
- Concentrations for chloride, magnesium, potassium, and bicarbonate vary over a larger range at Monitor MW4, compared to the other groundwater monitors installed on-site.

The variations in the groundwater chemistry between the groundwater monitoring locations, and at the two nested monitoring locations, is attributed to various factors including soil type that the monitors are screened in, off-site (upgradient) influences, and previous land uses at the site. Since groundwater movement through the various silty till soils will be relative slow, compared to a sandy soil, historical influences on the local groundwater quality from previous land uses on-site, and upgradient of the site, will be reflected in the groundwater quality that has been assessed, to date.

The chemical data collected between December 2011 and November 2013 `will provide an initial baseline for future comparison of possible groundwater variances. The patterns listed above only provide an initial summary of early noticeable patterns at the specific sampling locations and do not indicate an adverse influence on the local shallow groundwater quality. It is noted that groundwater characteristics will vary between sampling events, and the short term trends listed above are not an indication or a prediction of the future trend for parameter concentrations at this site.

3.2.3 WATER QUALITY COMPLIANCE/REGULATORY CRITERIA

The groundwater quality data indicate that concentrations satisfy the Ontario Drinking Water Quality Standards, as part of Ontario Regulation 169/03. These Standards are associated with health related parameters and are not associated with aesthetic objectives or operational guidelines.

As shown in Figure B-2, sodium concentrations generally ranged between 8 mg/L and 36 mg/L at the groundwater monitoring locations, although sodium concentrations at monitor MW3A ranged between 40 mg/L and 50 mg/L. These sodium concentrations satisfy the aesthetic objective for drinking water of 200 mg/L. As indicated in the Technical Support Document for the Ontario Drinking Water Standards, Objectives, and Guidelines, although the local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L, so that information can be communicated to local physicians for their use with patients on sodium restricted diets, the actual aesthetic objective for sodium is 200 mg/L. Although the laboratory certificates of analysis include the sodium concentrations of 20 and 200 mg/L for comparison, as shown in Table B-4, Appendix B, these values are comparison guidelines and are not drinking water Standards. It is noted that there are no groundwater users downgradient of the Durham York Energy Centre.

The parameter concentrations exhibited at the on-site groundwater monitors are considered to be representative of natural water quality conditions, or are associated with upgradient land uses, in place prior to the construction activities, and are not attributed to the on-site activities.

3.2.4 CONTINGENCY MEASURES

In accordance with Condition 17 of the EA for the site, a Spills Action plan is being developed for the facility by Covanta, and will be completed prior to the receipt of waste. The Spills Action plan will

outline the actions to be taken if on-site spills require groundwater sampling. The plan will also outline a program to ensure good coordinated communication between the Ministry, the Owners, and their consultants.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

The following conclusions are based on the findings presented in this report.

- The local shallow groundwater flow is in a southwesterly direction, towards Lake Ontario.
- Shallow groundwater elevations within the southeast portion of the site have lowered due to the construction of the East Stormwater Management Pond, and the on-site shallow groundwater flow will continue to be influenced by the presence of the stormwater management pond, but the shallow groundwater flow remains in a southwesterly direction. This groundwater response was predicted in the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan, and the localized influence from the stormwater management ponds is not expected to have an adverse influence on the shallow groundwater flow patterns in areas surrounding the site.
- Groundwater quality at each monitoring location is influenced by various factors including the soil type that the monitor is screened in, and historical land uses at the site.
- Groundwater quality within the groundwater monitors satisfies the Ontario Drinking Water Quality Standards for the parameters analysed.
- The construction activities have not had an adverse influence on the shallow groundwater quality.

4.2 RECOMMENDATIONS

We respectfully submit the following recommendations based on the study findings for your consideration.

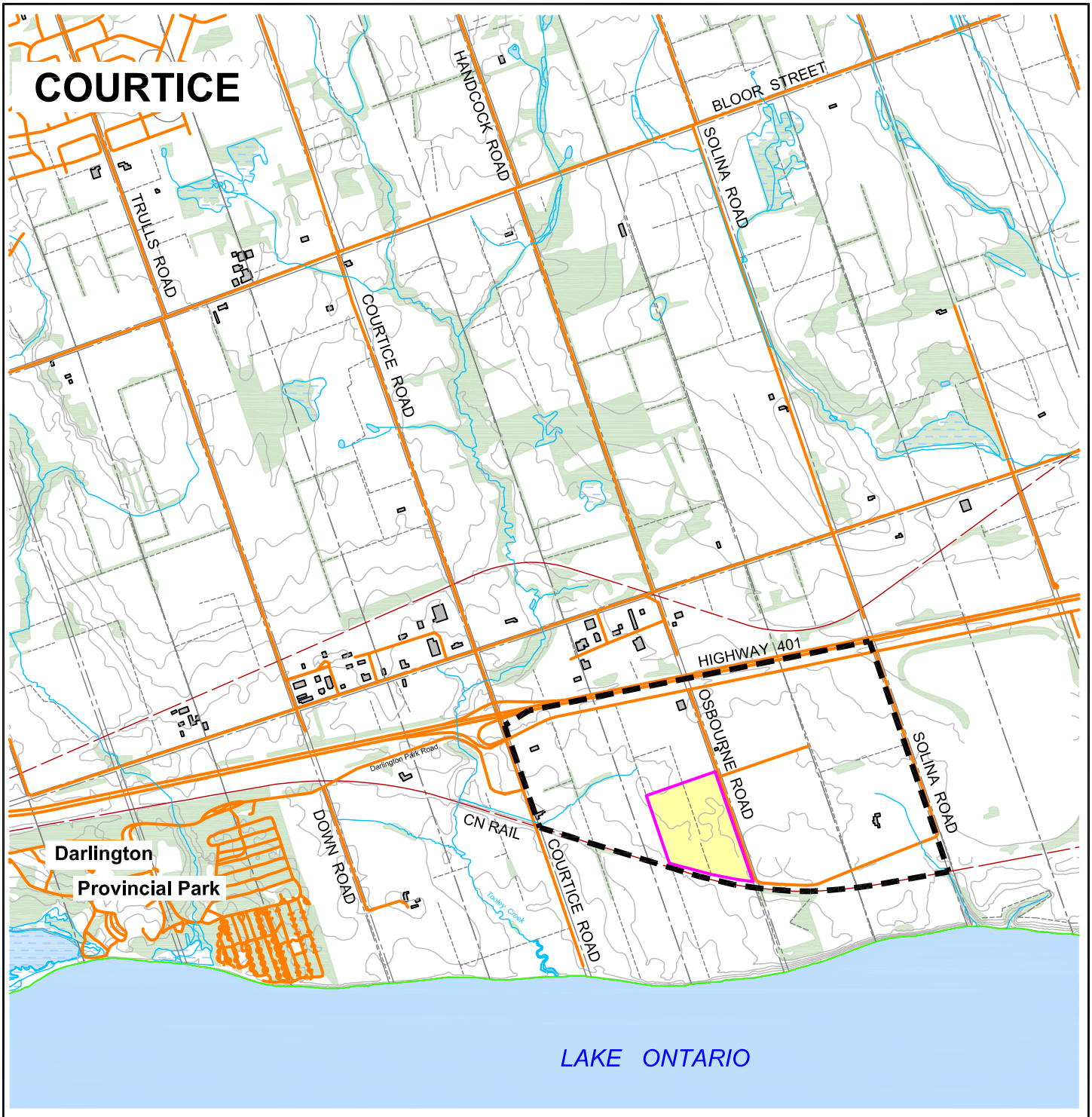
- Pursuant to the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan, the current groundwater monitoring program should be continued into 2014.
- Proposed Borehole Location MW5 should be installed within the central portion of the site once the construction activities have been completed, in accordance with the Durham York Energy Centre Groundwater and Surface Water Monitoring Plan.
- No remedial measures, attributed to groundwater quality, are required at the present time.

Report Respectfully Submitted
WSP Canada Inc.

Jordan J. Healey, C.Tech.
Environmental Technician

Stephen J. Taziar, P.Eng.
Senior Project Engineer

Figures



LEGEND

DURHAM YORK ENERGY CENTRE

CLARINGTON ENERGY PARK

250 0 250 metres

MAP SOURCE:
OBM 1:10000 BASE MAPPING, NAD 84, ZONE 17 DATUM.

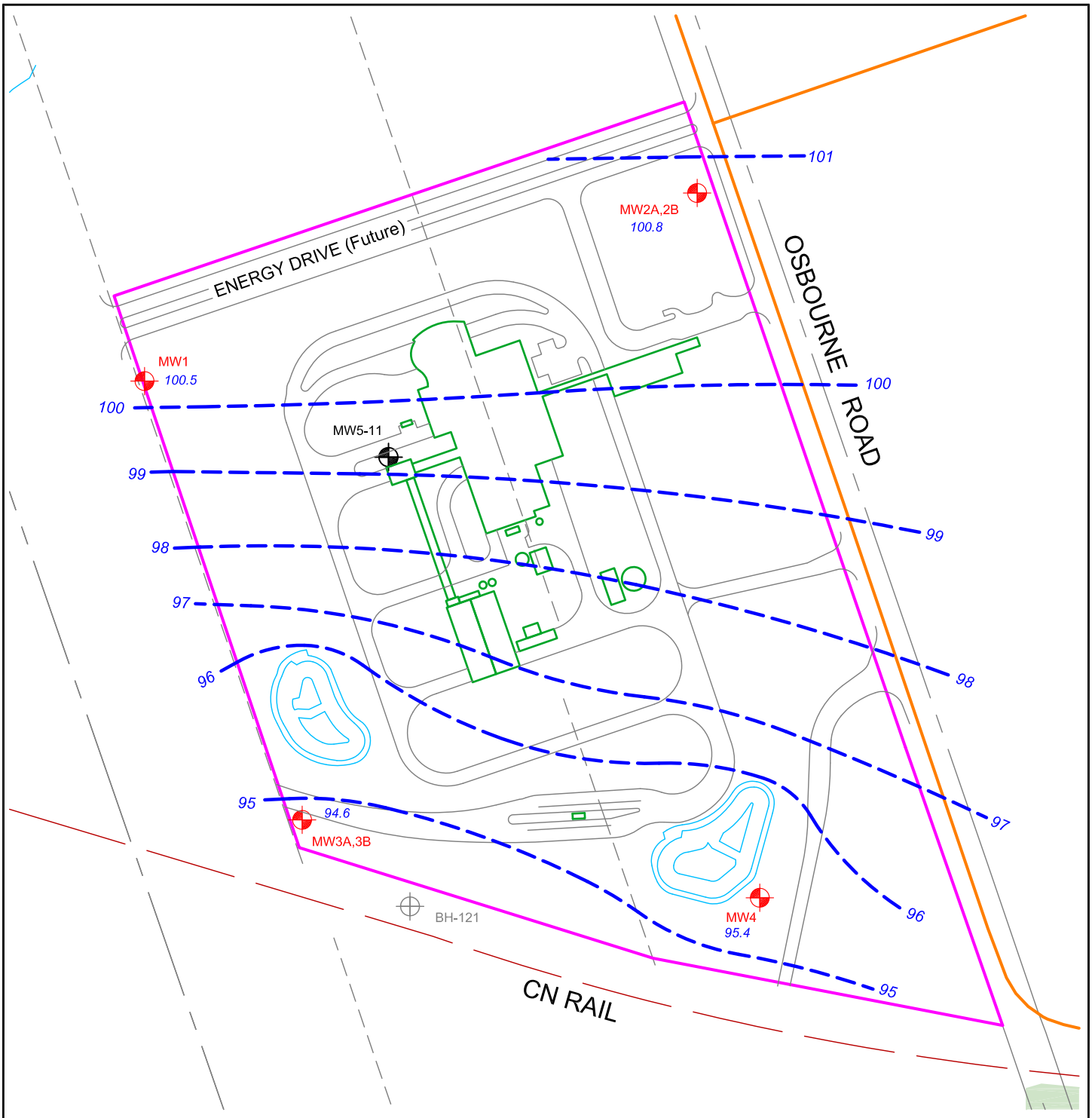
LOCATION MAP

2013 GROUNDWATER MONITORING PROGRAM
DURHAM YORK ENERGY CENTRE
For Regional Municipalities of Durham and York

DATE: MARCH 2014	SCALE: 1:25000
PROJECT: 111-26648-00 100	REF. NO.: 111-26648-00 100-4 F1_1-LM

WSP

FIGURE 1-1



LEGEND

- DURHAM YORK ENERGY CENTRE
- MW4 (95.4) — GROUNDWATER MONITORING LOCATION, DESIGNATION AND SHALLOW WATER ELEVATION, MARCH 2013 (m assumed site datum)
- 95 — SHALLOW GROUND WATER CONTOURS (m assumed site datum)
- MW05-11 — PROPOSED GROUNDWATER MONITORING LOCATION AND DESIGNATION (UPON COMPLETION OF CONSTRUCTION)
- BH-121 — MONITOR ASSUMED DESTROYED

30 0 30 metres

MAP SOURCE: OBM 1:10000 BASE MAPPING, NAD 84, ZONE 17 DATUM.

SITE PLAN

2013 GROUNDWATER MONITORING PROGRAM
DURHAM YORK ENERGY CENTRE
For Regional Municipalities of Durham and York

DATE: MARCH 2014	SCALE: 1:3000
PROJECT: 111-26648-00 100	REF. NO.: 111-26648-00 100-4 F1_2-SP

WSP

FIGURE 1-2

Appendices

Appendix A

GROUNDWATER REGIME

TABLE A-1
GROUNDWATER MONITOR DETAILS
DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

MONITOR				T.O.P. ELEVATION (mSD)	GROUND ELEVATION (mSD)	SCREENED INTERVAL (mSD)	FILTER PACK (mSD)	BENTONITE SEAL (mSD)	SURFACE SEAL (mSD)
LOCATION	DESIGNATION	TYPE	DIAMETER (mm)						
MW1	**1**	S	51	102.32	101.29	95.19 - 93.67	95.50 - 93.67	101.29 - 95.50	
MW2	**2B**	S	51	103.08	102.01	97.46 - 95.94	97.77 - 95.94	102.01 - 97.77	
	2A	P	51	103.03	102.01	94.39 - 92.87	94.69 - 92.82	102.01 - 94.69	
MW3	**3B**	S	51	96.31	95.28	90.76 - 89.23	91.06 - 89.23	95.28 - 91.06	
	3A	P	51	96.22	95.17	87.63 - 86.10	87.93 - 86.10	93.95 - 87.93	95.17 - 93.95
MW4	**4**	S	51	98.27	97.17	95.25 - 93.72	95.55 - 93.72	97.17 - 95.55	

NOTES: 1) mSD - metres Site Datum
2) T.O.P. - Top Of Pipe - used as the measuring point for water levels.
3) P - Piezometer
S - Standpipe
3) Top of Pipe Elevation for Monitor 4A reflects elevation as of March 2013.

TABLE A-2
GROUNDWATER ELEVATIONS
DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

DATE	MW1	MW2A	MW2B	MW3A	MW3B	MW4
T.O.P. Elev. -->	102.32	103.03	103.08	96.22	96.31	98.27
28-Dec-11	100.62	100.18	99.98	* 89.20	94.50	97.17
14-Mar-12	100.58	100.53	100.75	94.34	94.51	97.18
21-Jun-12	99.76	100.06	100.22	94.26	94.11	96.51
05-Nov-12	100.47	100.24	101.00	94.56	94.91	95.39
22-Mar-13	100.50	100.22	100.79	94.50	94.59	95.44
12-Jul-13	100.01	100.07	100.42	94.94	94.14	95.32
09-Sep-13				94.33	94.22	
26-Nov-13	97.72	100.01	100.41			95.30

NOTES: 1) All elevations are in mASD (metres above Site Datum).
2) T.O.P. - Top Of Pipe
3) * - Indicates water level elevation is not representative of groundwater characteristics and is excluded from interpretation.

FIGURE A-1
GROUND WATER HYDROGRAPH
UPGRADIENT MONITORS : Borehole 1

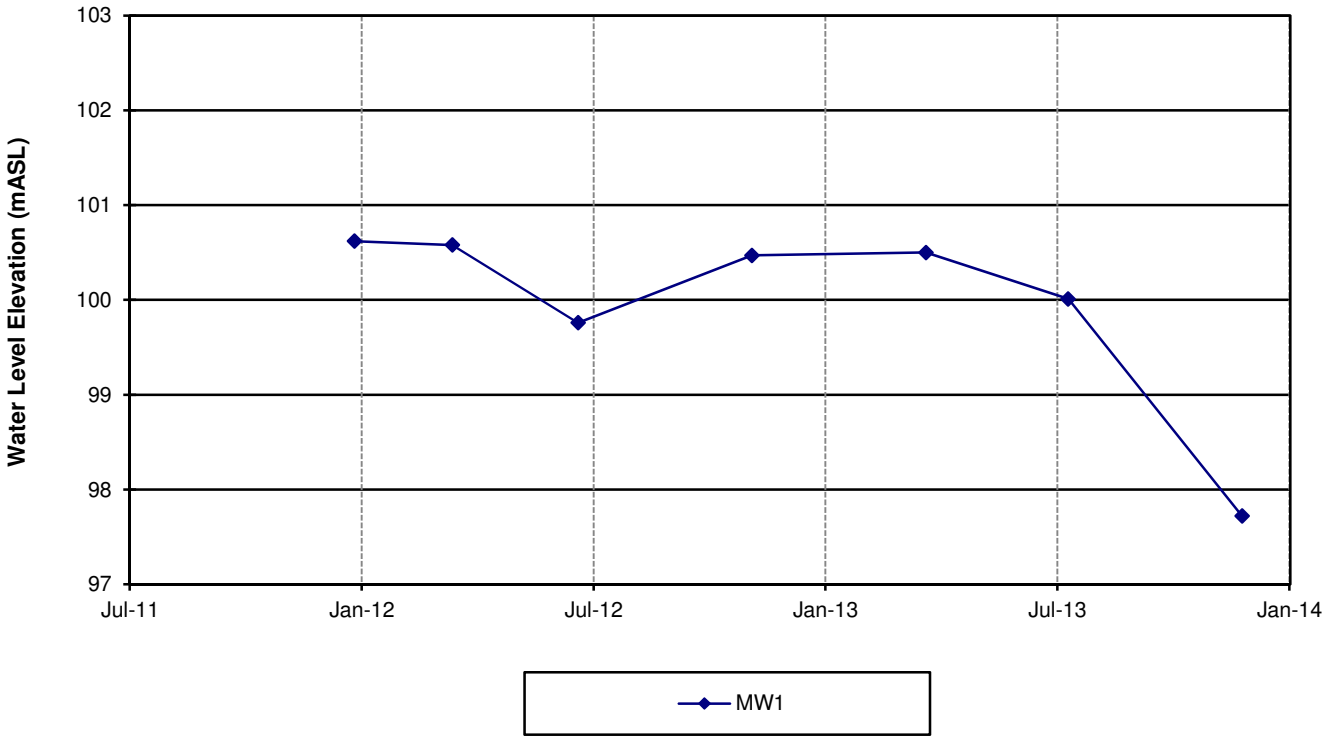


FIGURE A-2
GROUND WATER HYDROGRAPH
UPGRADIENT MONITORS : Borehole 2

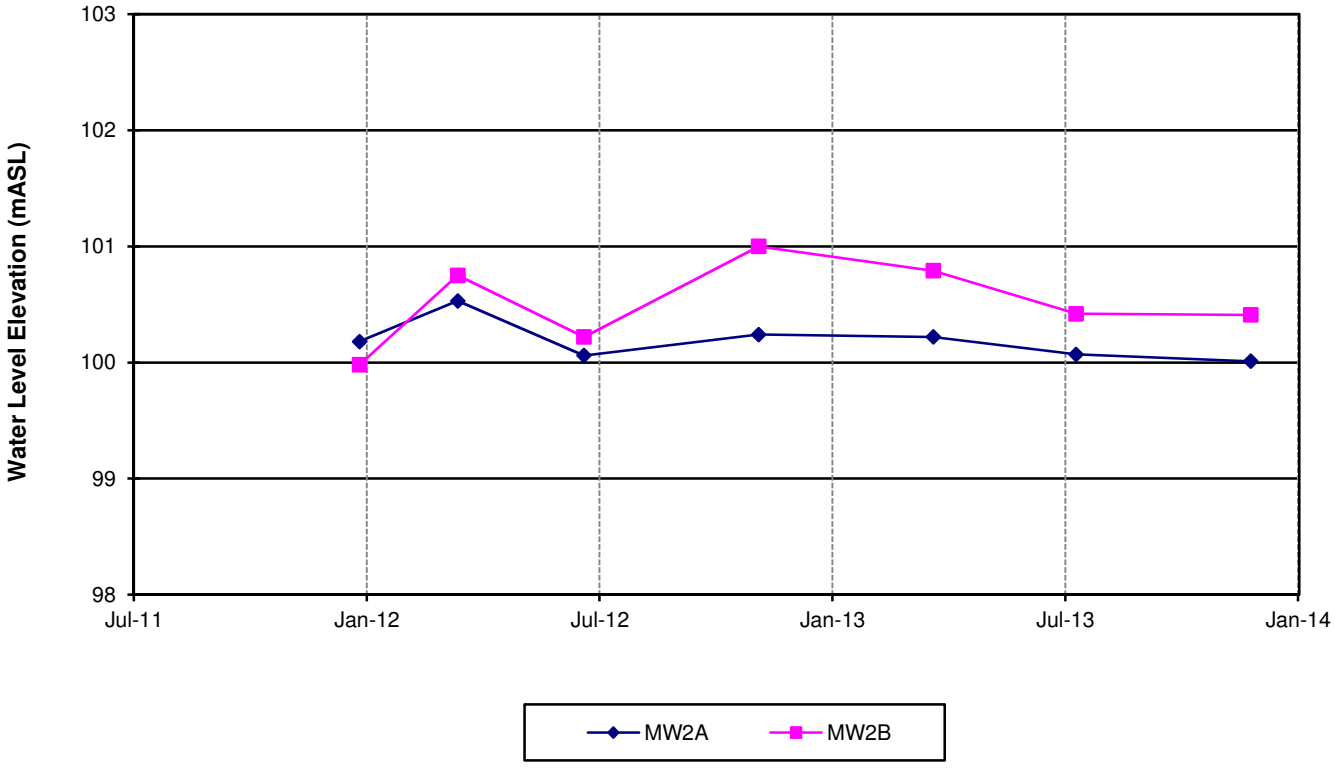


FIGURE A-3
GROUND WATER HYDROGRAPH
DOWNGRADIENT MONITORS : Borehole 3

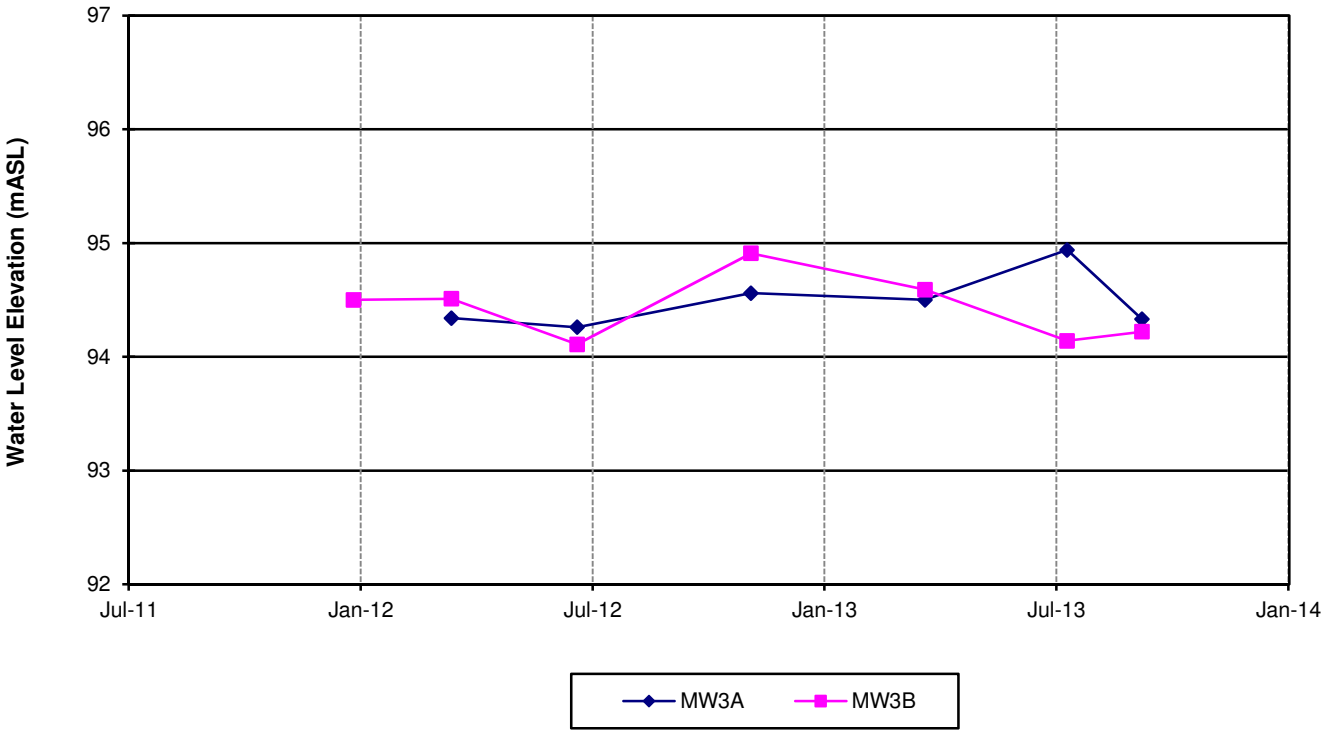
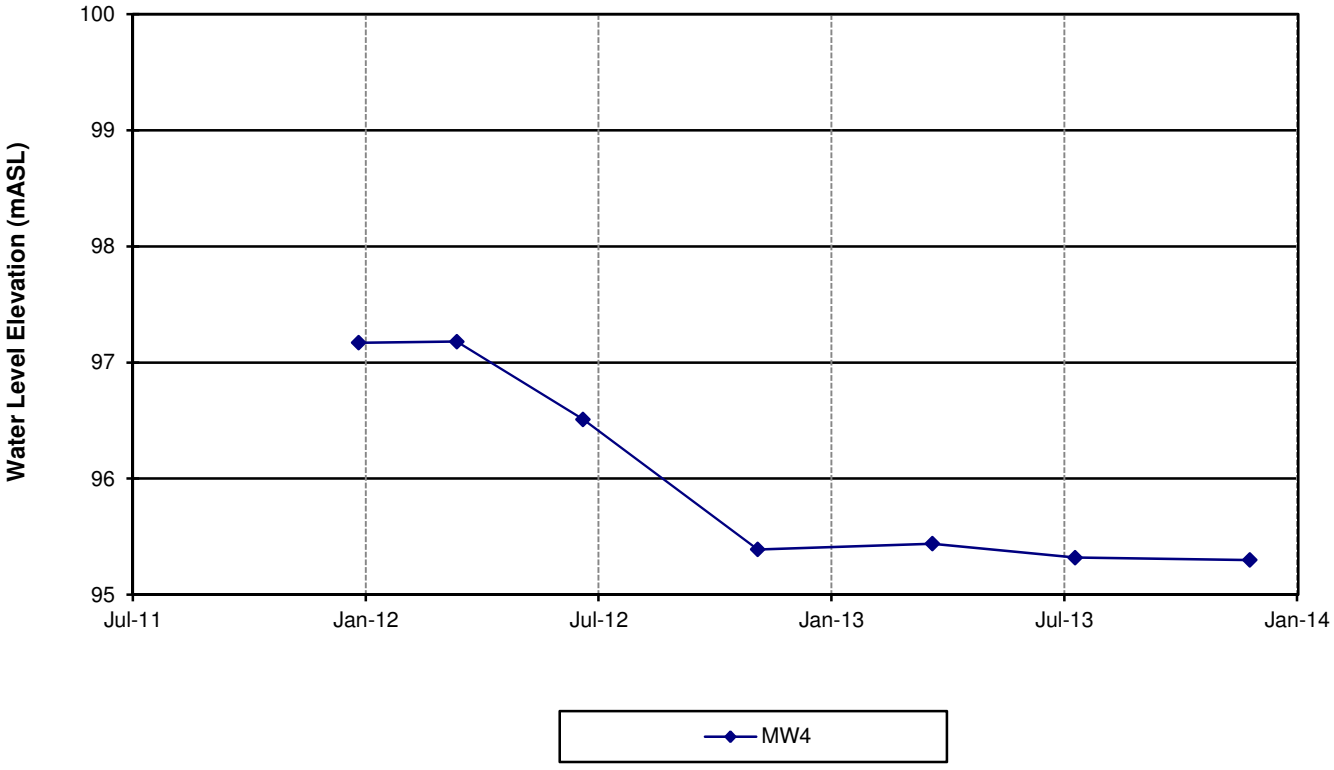


FIGURE A-4
GROUND WATER HYDROGRAPH
DOWNGRADIENT MONITORS : Borehole 4



BOREHOLE NO. MW1

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00

CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 20, 2011

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT

GROUND ELEVATION: 101.3 m (Assumed Datum)
REVIEWER: SJT

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 680337
Northing: 4860451

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.3	TOPSOIL: BROWN TO DARK BROWN, SANDY SILT, LOOSE.			SS1	6		29				FROZEN TO 38 mm
	SANDY SILT TILL: LIGHT GREY BECOMING BROWNISH GREY AT 4.6 m, SANDY SILT, SOME MEDIUM TO COARSE GRAVEL, TRACE CLAY, TRACE FINE GRAVEL BETWEEN 4.6 m AND 4.9 m, MOIST, VERY DENSE.			SS2	24		100				
1.0				SS3	51		100		51		
2.0				SS4	84		100		84		
3.0				SS5	105		100		105		
4.0				SS6	99		100		99		
5.0				SS7	97		100		97		
5.3	SANDY SILT TILL: GREY, SANDY SILT, TRACE TO SOME CLAY, TRACE FINE TO MEDIUM GRAVEL, MOIST, COMPACT.			SS8	34		96				
6.0				SS9	25		92				
7.0				SS10	43		88		43		
8.0				SS11	21		83				
8.2	BOREHOLE TERMINATED AT 8.2 m IN SANDY SILT TILL.										
9.0											
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

BOREHOLE NO. MW2A

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00
CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 20, 2011
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT
GROUND ELEVATION: 102.0 m (Assumed Datum)
REVIEWER: SJT

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 680628
Northing: 4860550

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, SILT, SOME CLAY, MOIST.										
	CLAYEY SILT: LIGHT GREY, TRACE FINE TO MEDIUM GRAVEL, DTPL TO APL, VERY STIFF.			SS1	6		50				
1.0				SS2	19		100				
2.0				SS3	22		100				
				SS4	17		100				
3.0											
3.0	SILT TILL: LIGHT GREY BECOMING GREY AT 3.8 m, CLAYEY SILT SOME FINE SAND TO SILT, SOME CLAY, SOME FINE SAND, SOME TO TRACE FINE TO MEDIUM GRAVEL, MOIST, COMPACT.			SS5	17		100				
4.0				SS6	18		100				
				SS7	16		100				
5.0				SS8	13		100				
6.0				SS9	9		100				
6.9											
7.0	CLAYEY SILT: GREY, TRACE FINE TO MEDIUM GRAVEL, WTPL, STIFF.			SS10	12		100				
8.0				SS11	78		96		78		
8.4				SS12							REFUSAL OF SPOON AT 8.4 m
	SILT TILL: GREY, SOME FINE SAND, SOME CLAY, SOME MEDIUM TO COARSE GRAVEL, MOIST TO WET, DENSE.										
9.0				SS13	79		100		79		
9.2	BOREHOLE TERMINATED AT 9.2 m IN SILT TILL.										SS12 N VALUE: 29 FOR 150 mm, 50 FOR 50 mm
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

BOREHOLE NO. MW2B

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00
CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 21, 2011
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT
GROUND ELEVATION: 102.0 m (Assumed Datum)
REVIEWER: SJT

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 680631
Northing: 4860550

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, SILT, SOME CLAY, MOIST.										GEOLOGIC DETAILS AND N VALUES ARE FROM BOREHOLE MW2A.
	CLAYEY SILT: LIGHT GREY, TRACE FINE TO MEDIUM GRAVEL, DTPL TO APL, VERY STIFF.			SS1	6		50				
1.0				SS2	19		100				
2.0				SS3	22		100				
3.0				SS4	17		100				
3.0	SILT TILL: LIGHT GREY BECOMING GREY AT 3.8 m, CLAYEY SILT SOME FINE SAND TO SILT, SOME CLAY, SOME FINE SAND, SOME TO TRACE FINE TO MEDIUM GRAVEL, MOIST, COMPACT.			SS5	17		100				
4.0				SS6	18		100				
5.0				SS7	16		100				
6.0				SS8	13		100				
6.1	BOREHOLE TERMINATED AT 6.1 m IN SILT TILL.										
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

BOREHOLE NO. MW3A

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00
CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 19, 2011
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT
GROUND ELEVATION: 95.2 m (Assumed Datum)
REVIEWER: SJT

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 680420
Northing: 4860220

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, SANDY SILT, TRACE CLAY, MOIST, LOOSE.			SS1	6		38				FROZEN TO 90 mm
	SANDY SILT TILL: LIGHT BROWN TO BROWN, FINE SAND AND SILT, SOME CLAY, TO SANDY SILT, SOME CLAY, TRACE TO SOME GRAVEL, MOIST, COMPACT.			SS2	6		75				
1.0											
				SS3	33		92				
2.0											
2.1	SILTY SAND: LIGHT BROWN, TRACE CLAY, SATURATED, COMPACT.										
2.3	SANDY SILT TILL: BROWN BECOMING GREY AT 3.3 m, FINE SAND AND SILT, SOME CLAY, TO SANDY SILT, SOME CLAY, MOIST, LOOSE TO COMPACT.			SS4	43		88				
3.0											
3.3	CLAYEY SILT: GREY, SILTY CLAY TO CLAYEY SILT, TRACE TO SOME GRAVEL, WTPL, SOFT TO FIRM.			SS5	12		100				
4.0				SS6	13		100				
5.0				SS7	5		100				
5.3	SANDY SILT TILL: GREY, SILT AND SAND SOME CLAY, TO SANDY SILT, SOME GRAVEL, TRACE TO SOME CLAY, WET, LOOSE TO COMPACT.			SS8	10		96				
6.0				SS9	15		83				
7.0				SS10	8		54				
8.0				SS11	8		83				
				SS12	13		79				
9.0											
				SS13	13		75				
9.8	BOREHOLE TERMINATED AT 9.8 m IN SANDY SILT TILL.										
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

BOREHOLE NO. MW3B

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00
CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 19, 2011
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT
GROUND ELEVATION: 95.3 m (Assumed Datum)
REVIEWER: SJT

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 680421
Northing: 4860220

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, SANDY SILT, TRACE CLAY, MOIST, LOOSE.			SS1	6		38				GEOLOGIC DETAILS AND N VALUES ARE FROM BOREHOLE MW3A.
	SANDY SILT TILL: LIGHT BROWN TO BROWN, FINE SAND AND SILT, SOME CLAY, TO SANDY SILT, SOME CLAY, TRACE TO SOME GRAVEL, MOIST, COMPACT.			SS2	6		75				
1.0											
				SS3	33		92				
2.0											
2.1	SILTY SAND: LIGHT BROWN, TRACE CLAY, SATURATED, COMPACT.										
2.3	SANDY SILT TILL: BROWN BECOMING GREY AT 3.3 m, FINE SAND AND SILT, SOME CLAY, TO SANDY SILT, SOME CLAY, MOIST, LOOSE TO COMPACT.			SS4	43		88		43		
3.0											
3.3	CLAYEY SILT: GREY, SILTY CLAY TO CLAYEY SILT, TRACE TO SOME GRAVEL, WTPL, SOFT TO FIRM.			SS5	12		100				
4.0				SS6	13		100				
5.0				SS7	5		100				
5.3	SANDY SILT TILL: GREY, SILT AND SAND SOME CLAY, TO SANDY SILT, SOME GRAVEL, TRACE TO SOME CLAY, WET, LOOSE TO COMPACT.			SS8	10		96				
6.0											
6.0	BOREHOLE TERMINATED AT 6.0 m IN SANDY SILT TILL.										
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

BOREHOLE NO. MW4

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00
CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 21, 2011
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT
GROUND ELEVATION: 99.8 m (Assumed Datum)
REVIEWER: SJT

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 680661
Northing: 4860179

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, SANDY SILT, MOIST, LOOSE.										
	SILT AND SAND TILL: DARK BROWN, SANDY SILT TO SILT AND SAND, SOME GRAVEL, TRACE CLAY, MOIST, COMPACT.			SS1	26		38				
1.0				SS2	27		85				
1.5	SANDY SILT: DARK GREY TO LIGHT GREY, SOME TO TRACE CLAY, TRACE FINE TO MEDIUM GRAVEL, MOIST, COMPACT.			SS3	19		100				
2.0											
2.3	SANDY SILT TILL: GREY BECOMING DARK GREY AT 4.6 m, SOME GRAVEL, SOME TO TRACE CLAY, MOIST BECOMING MOIST TO WET AT 6.1 m, VERY DENSE.			SS4	69		100		69		
3.0				SS5	67		100		67		SS5 N VALUE: 67 FOR 150 mm
4.0				SS6	70		100		70		SS6 N VALUE: 70 FOR 150 mm
5.0				SS7	95		100		95		SS7 N VALUE: 45 FOR 150 mm, 50 FOR 25 mm
6.0				SS8	89		100		89		SS8 N VALUE: 39 FOR 150 mm, 50 FOR 125 mm
6.4	BOREHOLE TERMINATED AT 6.4 m IN SANDY SILT TILL.			SS9	105		100		105		SS9 N VALUE: 55 FOR 150 mm, 50 FOR 125 mm
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

Appendix B

GROUNDWATER CHEMISTRY

TABLE B-1
GROUNDWATER FIELD CHEMICAL RESULTS
DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

MONITORING LOCATION	EVENT	Temperature (℃)	pH (as units)	Conductivity (µS/cm)	Turbidity (NTU)	ORP (mV)
MW1	Mar-13	6.3	7.5	679	>1000	56
	Jul -13	15.0	7.5	562	>1000	-31
	Nov-13	10.5	7.9	679	472	84
MW2A	Mar-13	6.8	7.8	404	>1000	10
	Jul -13	11.3	7.6	309	>1000	-52
	Nov-13	10.0	8.3	396	>1000	84
MW2B	Mar-13	5.5	7.6	620	>1000	-39
	Jul -13	11.6	7.7	584	>1000	-44
	Nov-13	10.6	7.9	610	460	87
MW3A	Mar-13	7.9	7.6	465	465	39
	Jul-13	15.9	7.7	294	>1000	120
	Sep-13	11.0	8.0	366	864	87
MW3B	Mar-13	7.0	7.5	699	487	43
	Jul-13	12.0	7.4	412	>1000	33
	Sep-13	11.6	7.7	513	>1000	99
MW4	Mar-13	3.1	7.6	670	463	-18
	Jul -13	16.9	7.4	667	267	-96
	Nov-13	9.9	7.9	986	326	114

NOTE: ORP - Oxidation Reduction Potential

TABLE B-2
GROUNDWATER CHEMICAL RESULTS
DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

PARAMETER	UNIT	ODWQS [1]	MW1							MW2A						
			Dec-11	Mar-12	Jun-12	Nov-12	Mar-13	Jul-13	Nov-13	Dec-11	Mar-12	Jun-12	Nov-12	Mar-13	Jul-13	Nov-13
Bicarbonate	mg/L		240	244	243	214	226	228	241	221	215	195	168	188	190	206
Carbonate	mg/L		<5	<5	<5	6	<5	<5	<5	<5	<5	<5	7	<5	<5	<5
Chloride	mg/L	250	14.9	15.0	13.5	15.3	14.8	14.6	13.4	4.7	3.2	1.8	4.0	1.9	2.7	2.5
Sulphate	mg/L	500	152	153	131	147	127	129	132	72.9	45.7	21.2	28.8	15.6	18.9	21.8
Calcium	mg/L		83.0	68.8	67.7	73.9	73.8	65.3	65.5	48.3	27.3	18.4	19.5	17.9	15.4	16.5
Magnesium	mg/L		46.2	44.4	45.5	50.1	53.2	46.0	43.6	32.0	31.3	32.2	35.5	37.5	32.3	30.6
Potassium	mg/L		2.99	2.99	3.10	3.55	3.28	2.71	2.98	2.31	2.20	1.62	1.80	1.75	1.34	1.51
Sodium	mg/L	200	10.3	8.3	8.1	8.5	10.2	8.6	10.0	23.5	16.8	14.6	17.3	17.6	15.2	18.7
Boron	mg/L	5 *	0.019	0.015	0.014	0.016	0.012	0.023	0.015	0.088	0.081	0.090	0.097	0.096	0.106	0.104
Cadmium	mg/L	0.005 *	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L		0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 *	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 *	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards, Objectives, and Guidelines (2006).

2) * - Indicates health related drinking water standard.

TABLE B-2
GROUNDWATER CHEMICAL RESULTS
DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

PARAMETER	UNIT	ODWQS [1]	MW2B							MW3A						
			Dec-11	Mar-12	Jun-12	Nov-12	Mar-13	Jul-13	Nov-13	Dec-11	Mar-12	Jun-12	Nov-12	Mar-13	Jul-13	Sep-13
Bicarbonate	mg/L		235	244	252	220	242	241	248	181	153	147	130	124	121	151
Carbonate	mg/L		<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250	13.5	11.7	11.8	12.6	14.2	15.2	14.3	22.7	24.6	24.4	26.3	25.1	23.8	26.2
Sulphate	mg/L	500	98.8	120	93.6	99.4	84.9	82.2	77.3	125	78.7	50.7	44.0	29.3	23.0	20.3
Calcium	mg/L		58.7	49.7	45.6	48.1	46.2	40.8	39.4	76.9	43.8	34.3	27.9	26.4	22.5	24.4
Magnesium	mg/L		34.8	42.3	44.2	49.5	54.5	46.8	44.2	11.5	9.92	9.13	8.95	8.76	6.68	6.91
Potassium	mg/L		1.09	1.67	1.81	2.20	2.23	1.82	2.03	1.79	1.79	1.33	1.86	1.25	1.09	2.94
Sodium	mg/L	200	29.1	24.0	20.7	20.4	21.9	18.5	19.3	47.5	45.3	43.0	46.0	49.6	40.8	44.7
Boron	mg/L	5 *	0.076	0.077	0.078	0.087	0.082	0.086	0.083	0.129	0.164	0.171	0.182	0.175	0.172	0.169
Cadmium	mg/L	0.005 *	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L		0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 *	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 *	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

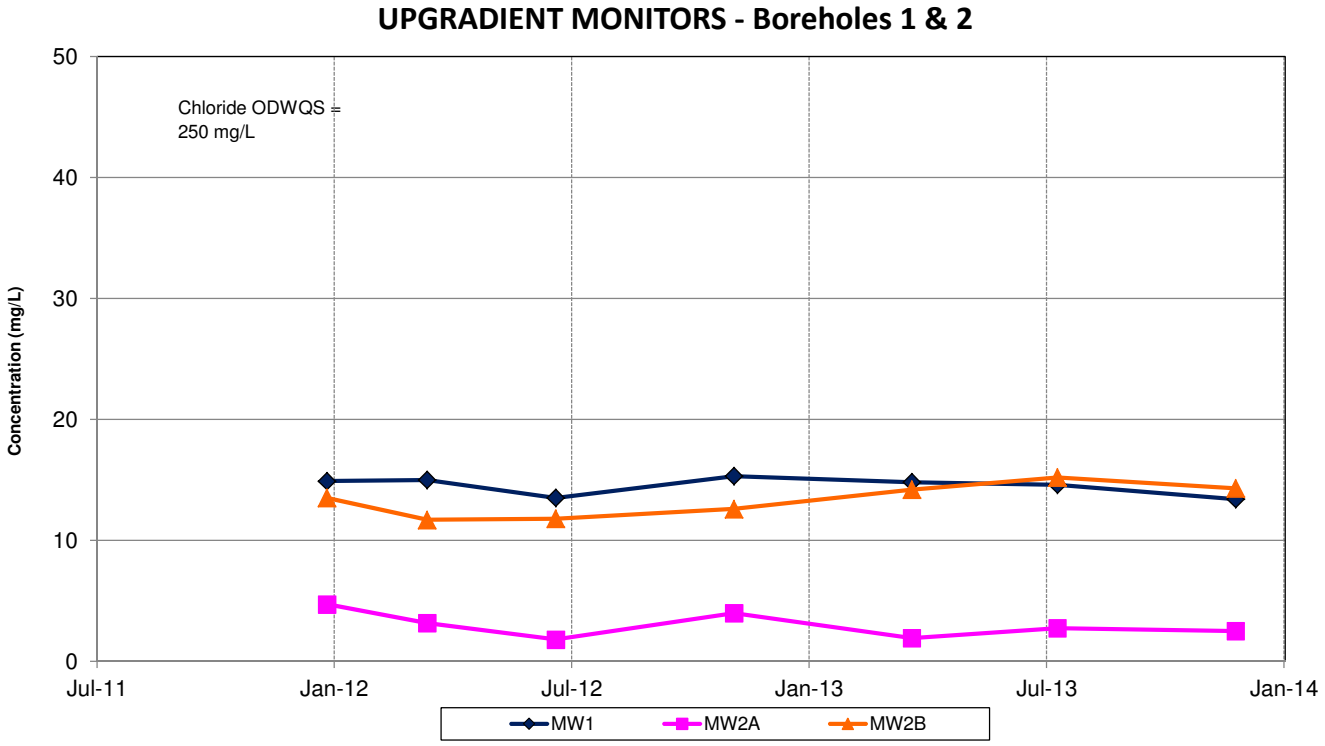
NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards, Objectives, and Guidelines (2006).
2) * - Indicates health related drinking water standard.

TABLE B-2
GROUNDWATER CHEMICAL RESULTS
DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

PARAMETER	UNIT	ODWQS [1]	MW3B							MW4		
			Dec-11	Mar-12	Jun-12	Nov-12	Mar-13	Jul-13	Sep-13	Mar-13	Jul-13	Nov-13
Bicarbonate	mg/L		247	212	211	186	213	202	235	330	448	496
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250	10.8	10.2	10.7	12.5	15.6	13.9	18.8	8.2	7.5	6.8
Sulphate	mg/L	500	102	58.6	52.4	45.8	33.9	39.9	43.4	38.5	62.6	62.6
Calcium	mg/L		78.4	49.7	47.9	49.3	55.5	46.8	61.4	42.2	44.7	39.0
Magnesium	mg/L		22.4	19.9	20.2	21.7	26.4	21.2	25.1	68.8	83.6	83.9
Potassium	mg/L		2.00	1.42	1.55	1.99	1.59	1.38	2.39	2.81	3.55	3.61
Sodium	mg/L	200	35.5	25.5	25.7	26.2	26.4	24.1	27.1	23.7	28.6	35.8
Boron	mg/L	5 *	0.071	0.079	0.088	0.092	0.073	0.095	0.082	0.038	0.064	0.066
Cadmium	mg/L	0.005 *	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 *	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 *	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards, Objectives, and Guidelines (2006).
2) * - Indicates health related drinking water standard.

FIGURE B-1
GROUNDWATER TIME CONCENTRATION GRAPHS - CHLORIDE



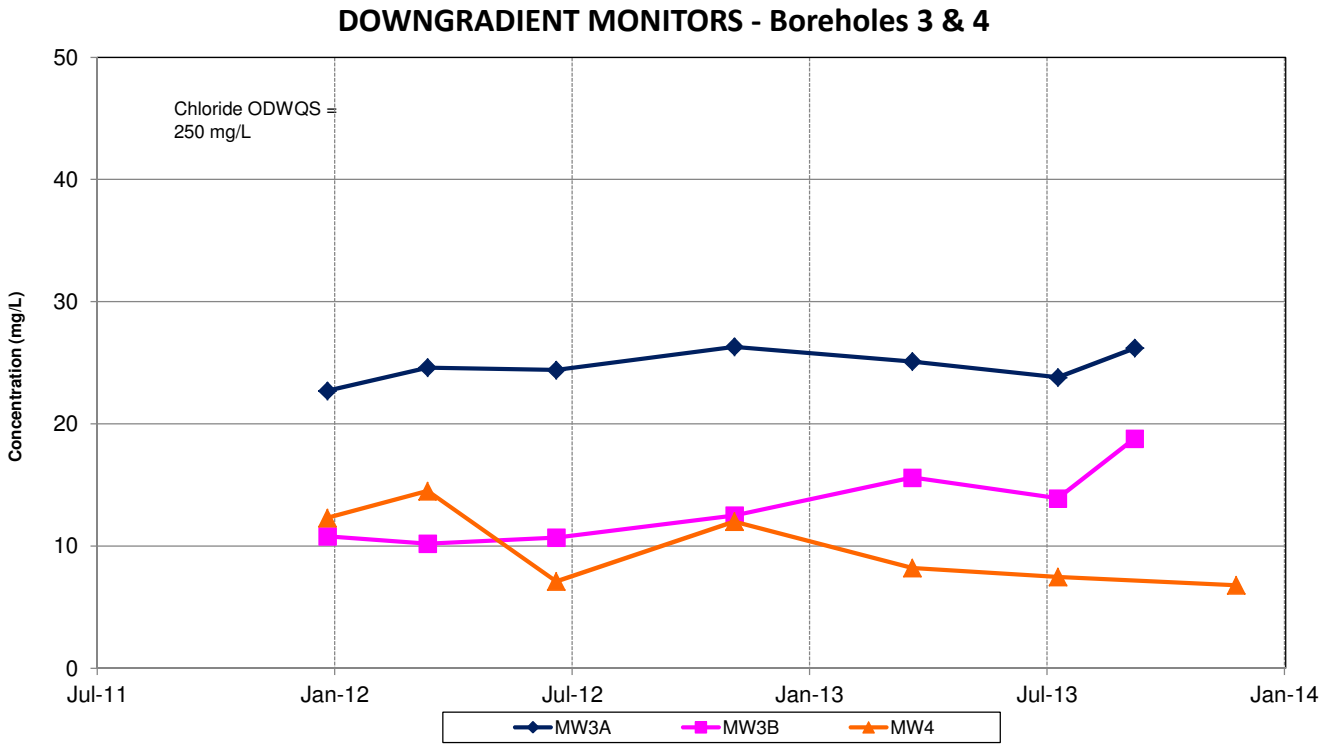
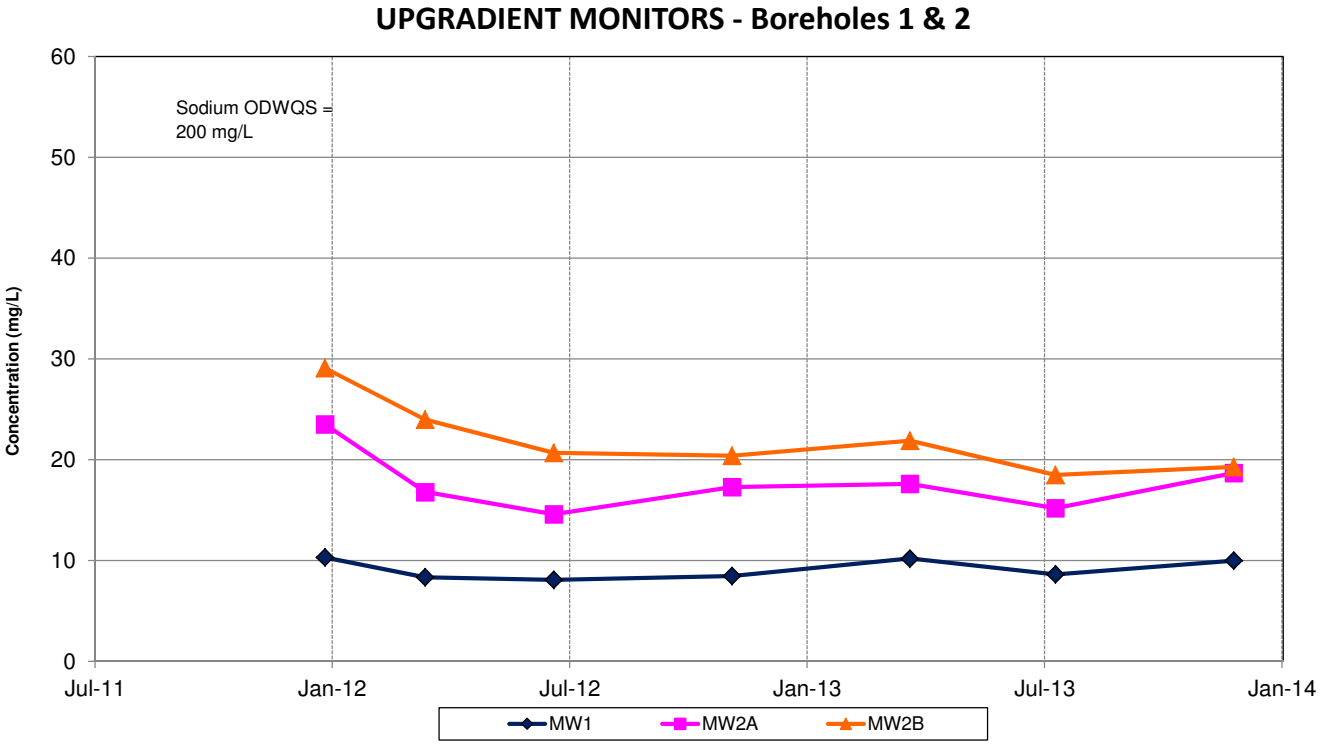


FIGURE B-2
GROUNDWATER TIME CONCENTRATION GRAPHS - SODIUM



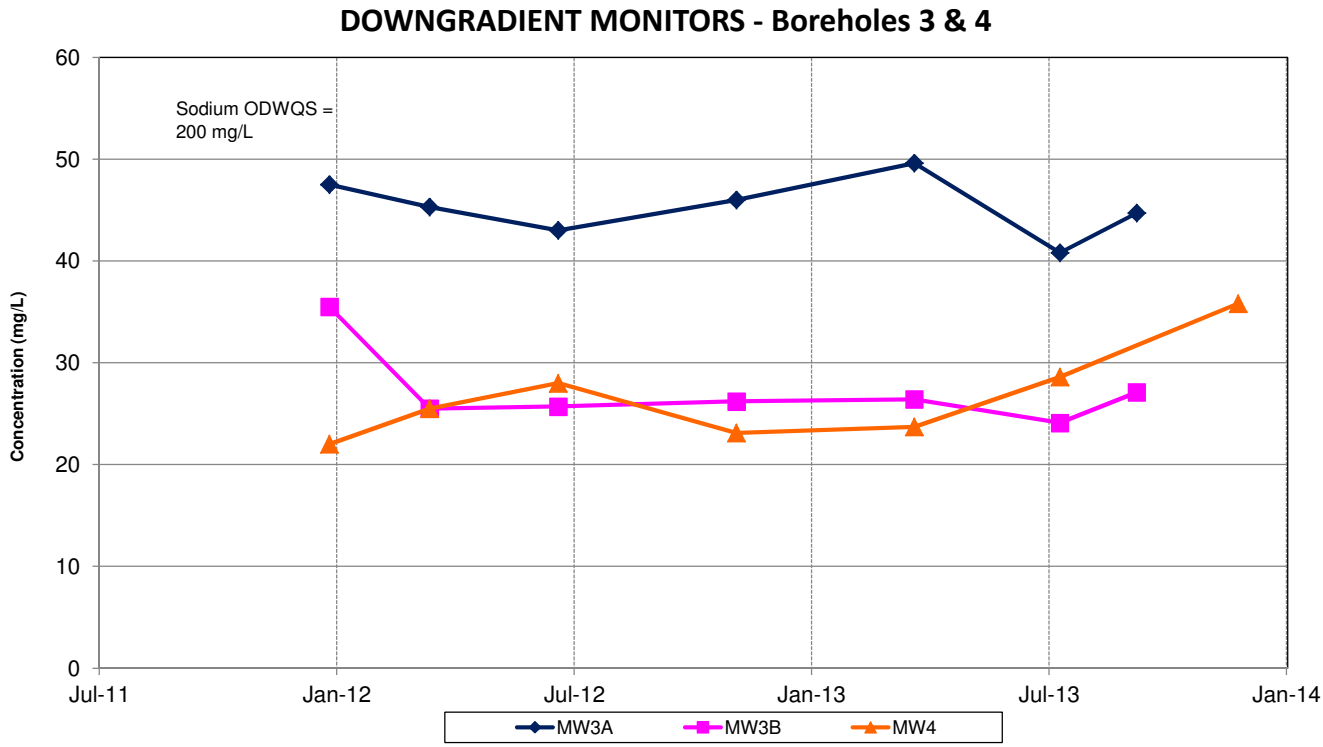
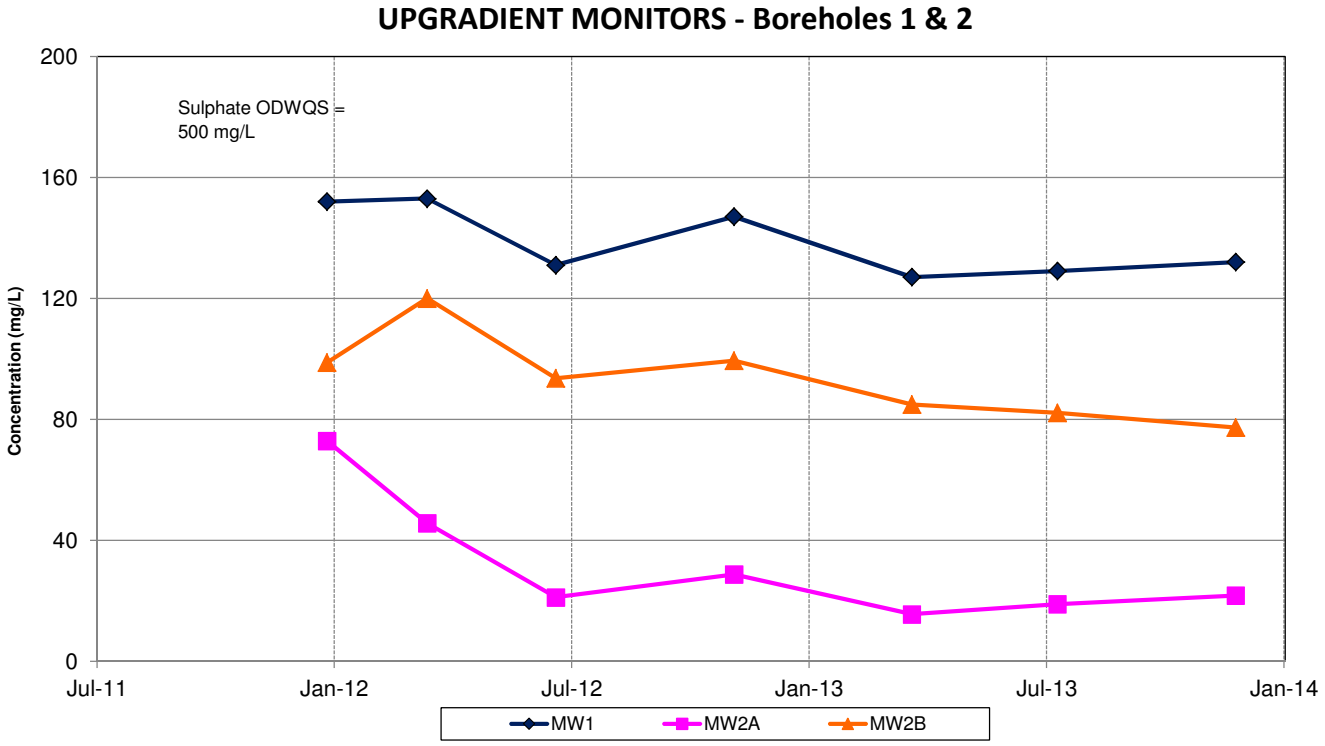


FIGURE B-3
GROUNDWATER TIME CONCENTRATION GRAPHS - SULPHATE



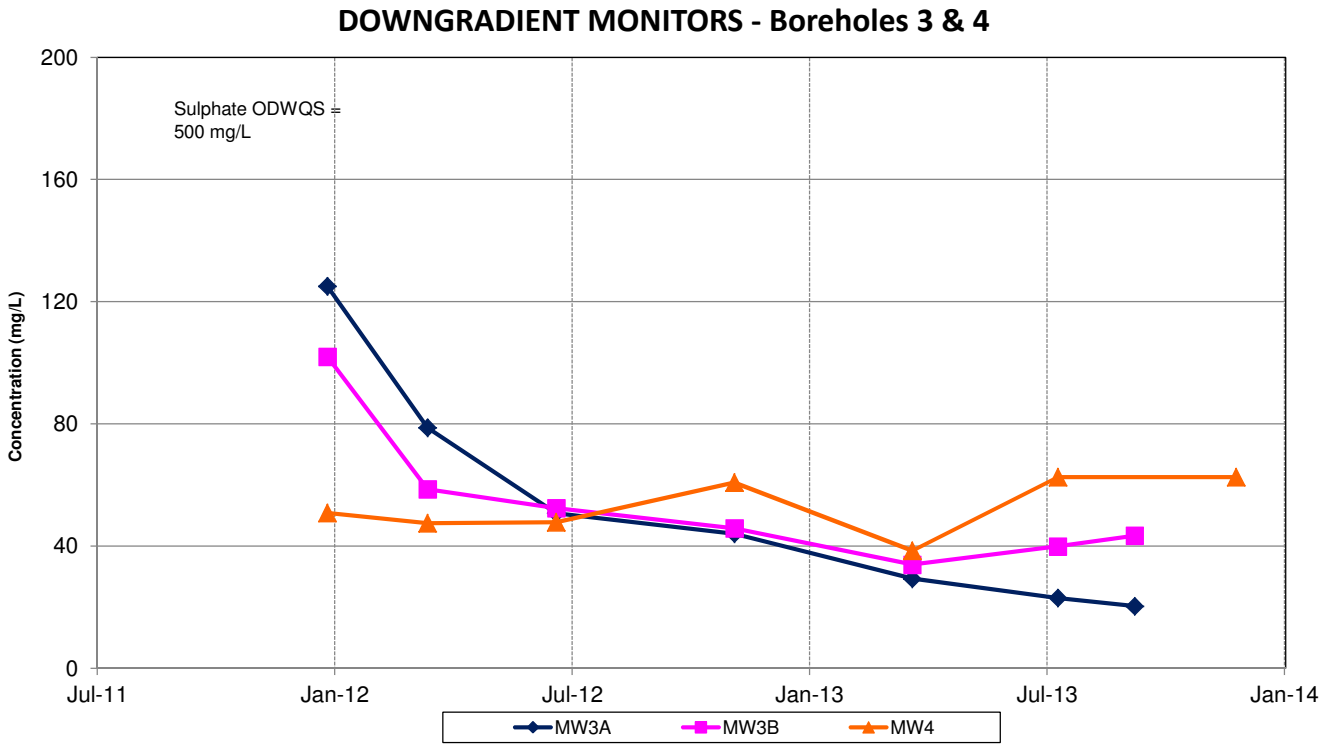
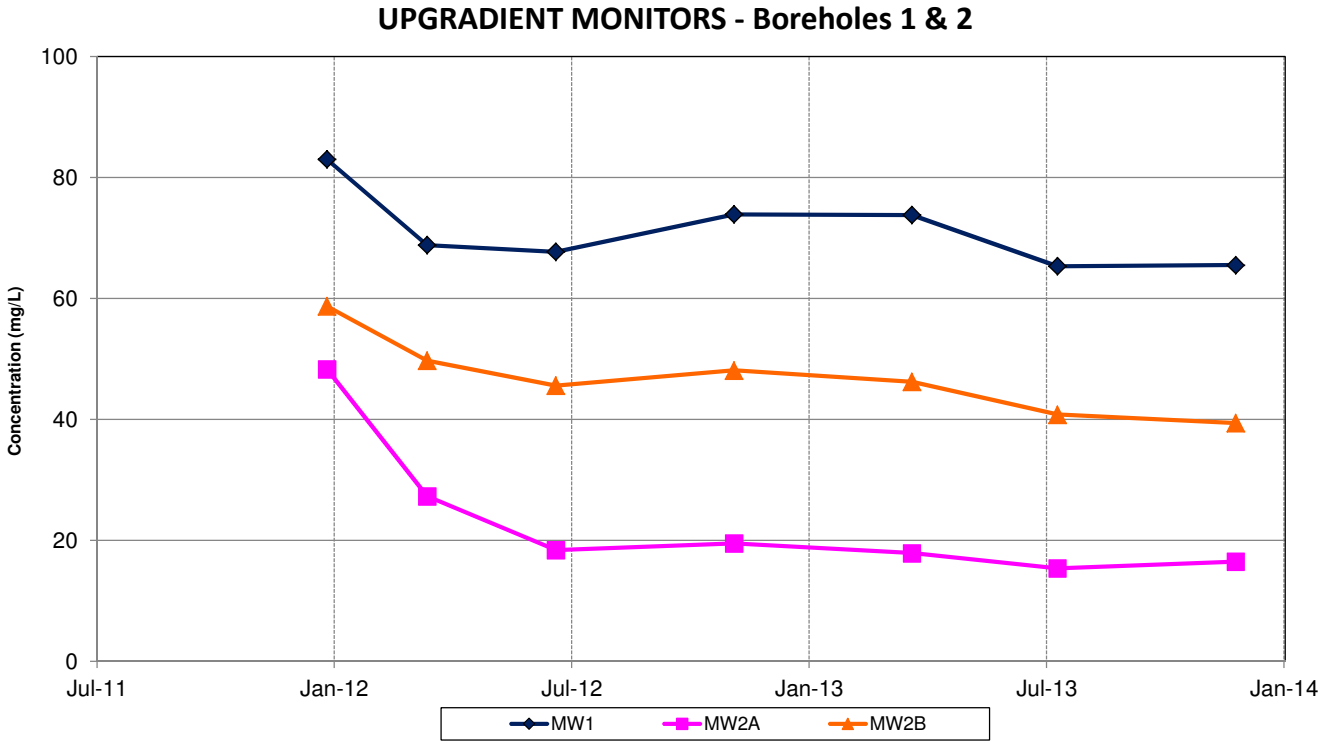


FIGURE B-4
GROUNDWATER TIME CONCENTRATION GRAPHS - CALCIUM



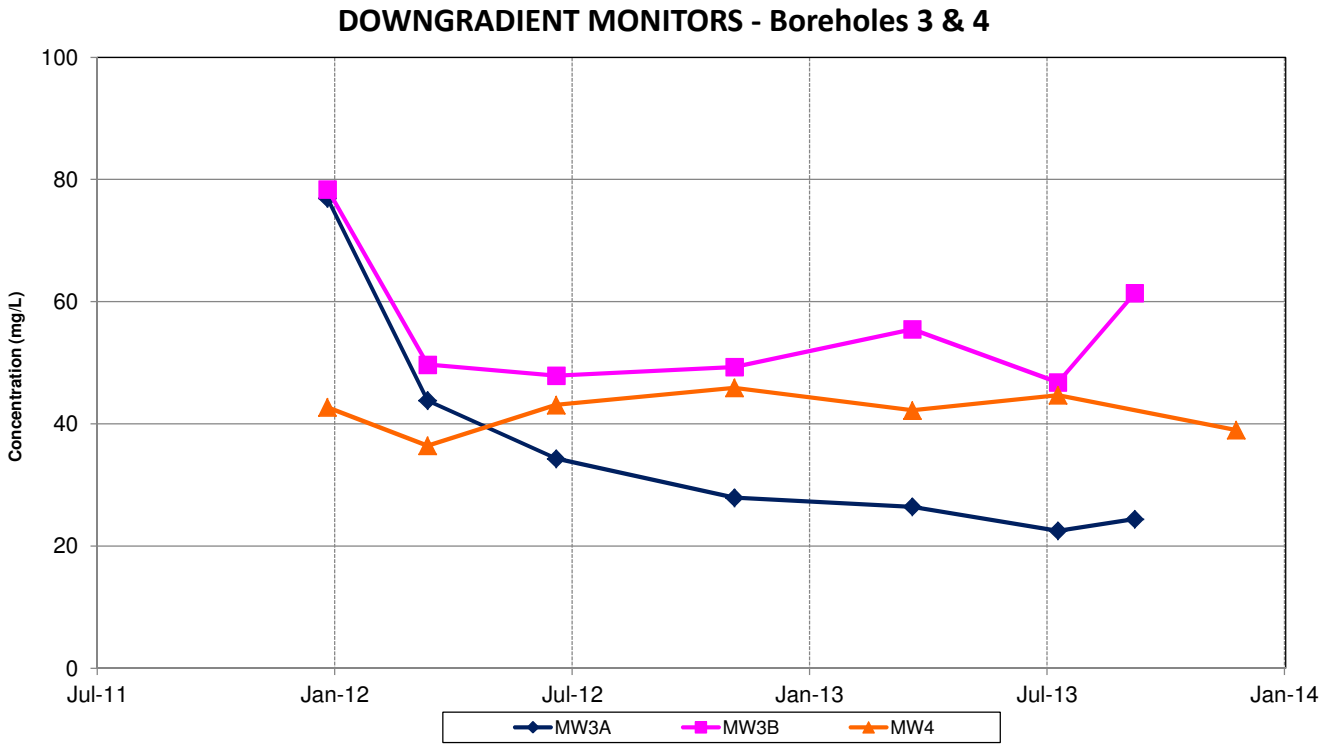
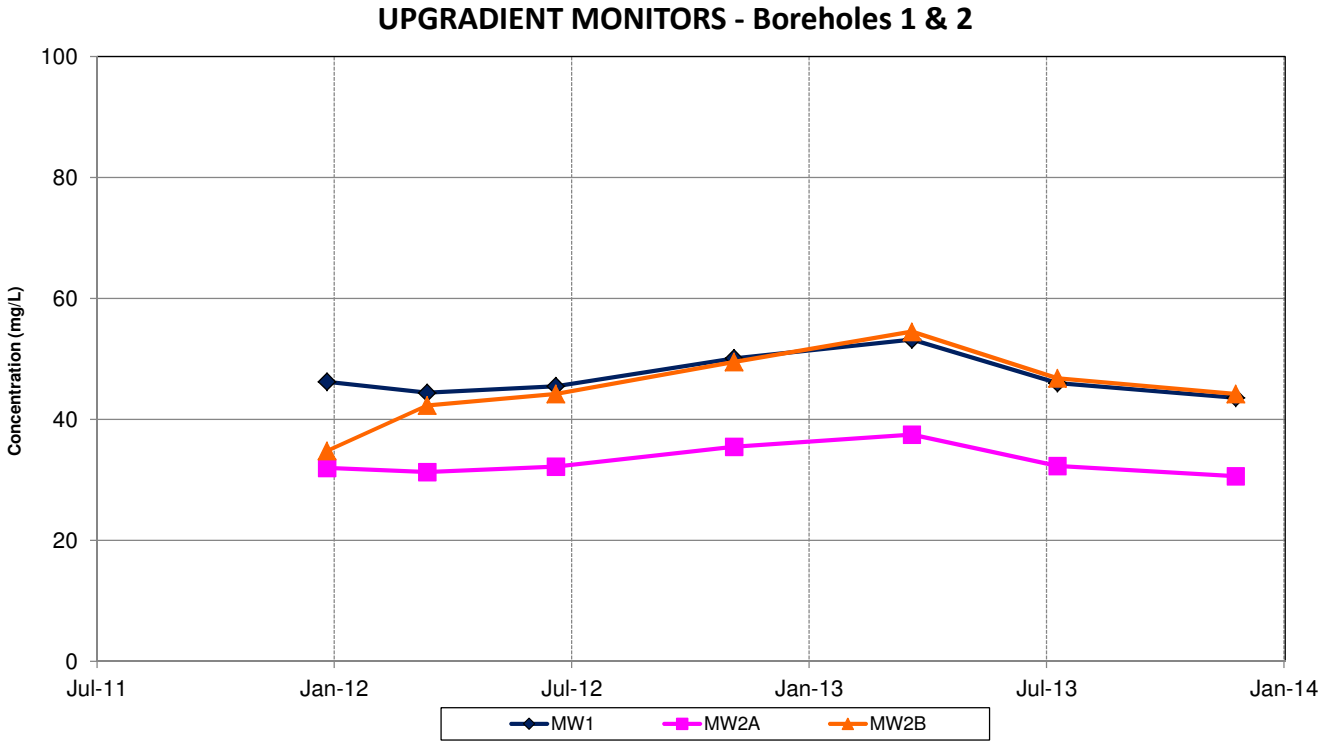


FIGURE B-5
GROUNDWATER TIME CONCENTRATION GRAPHS - MAGNESIUM



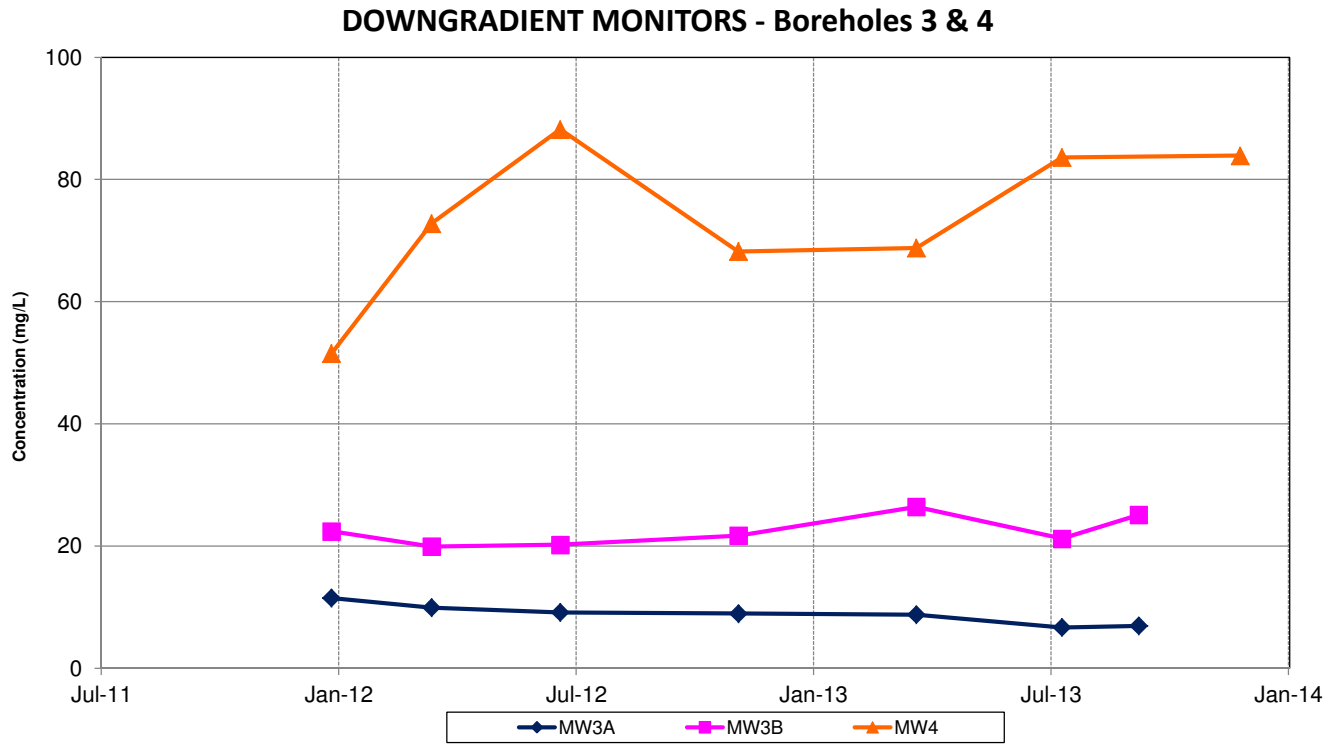
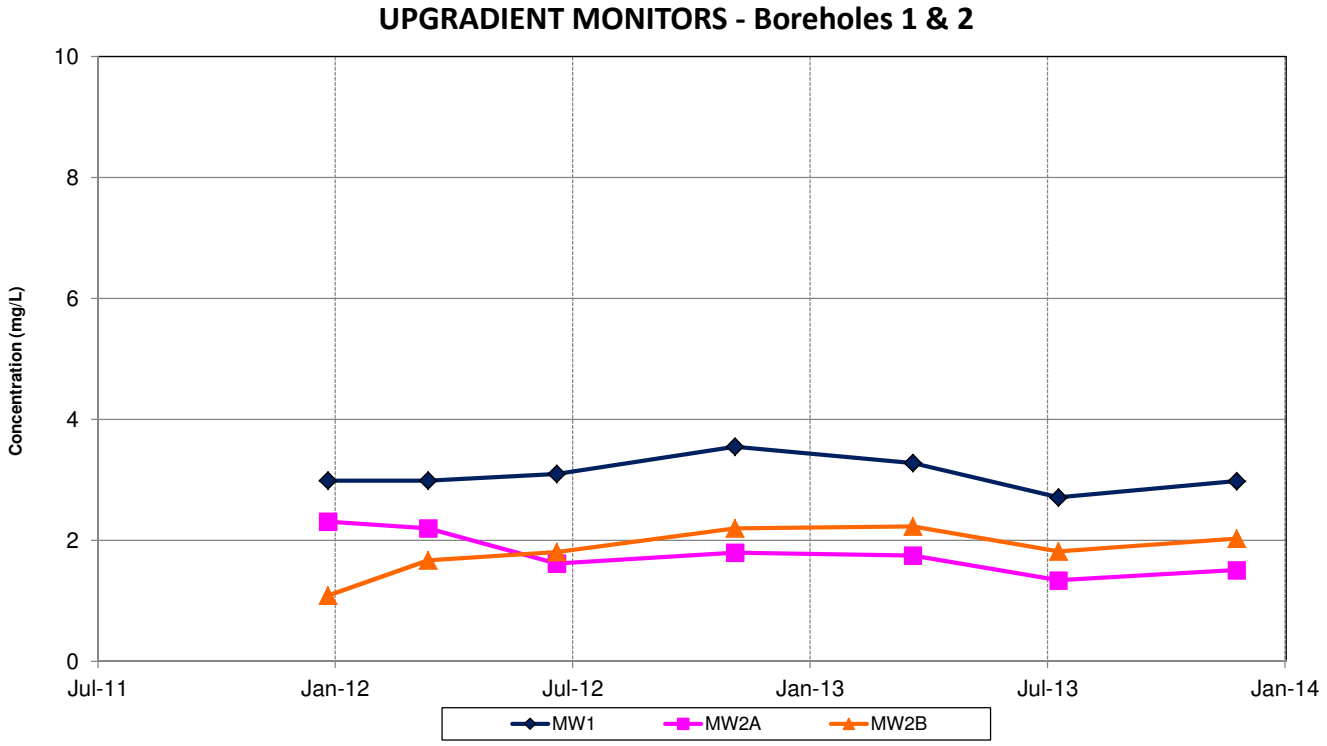


FIGURE B-6
GROUNDWATER TIME CONCENTRATION GRAPHS - POTASSIUM



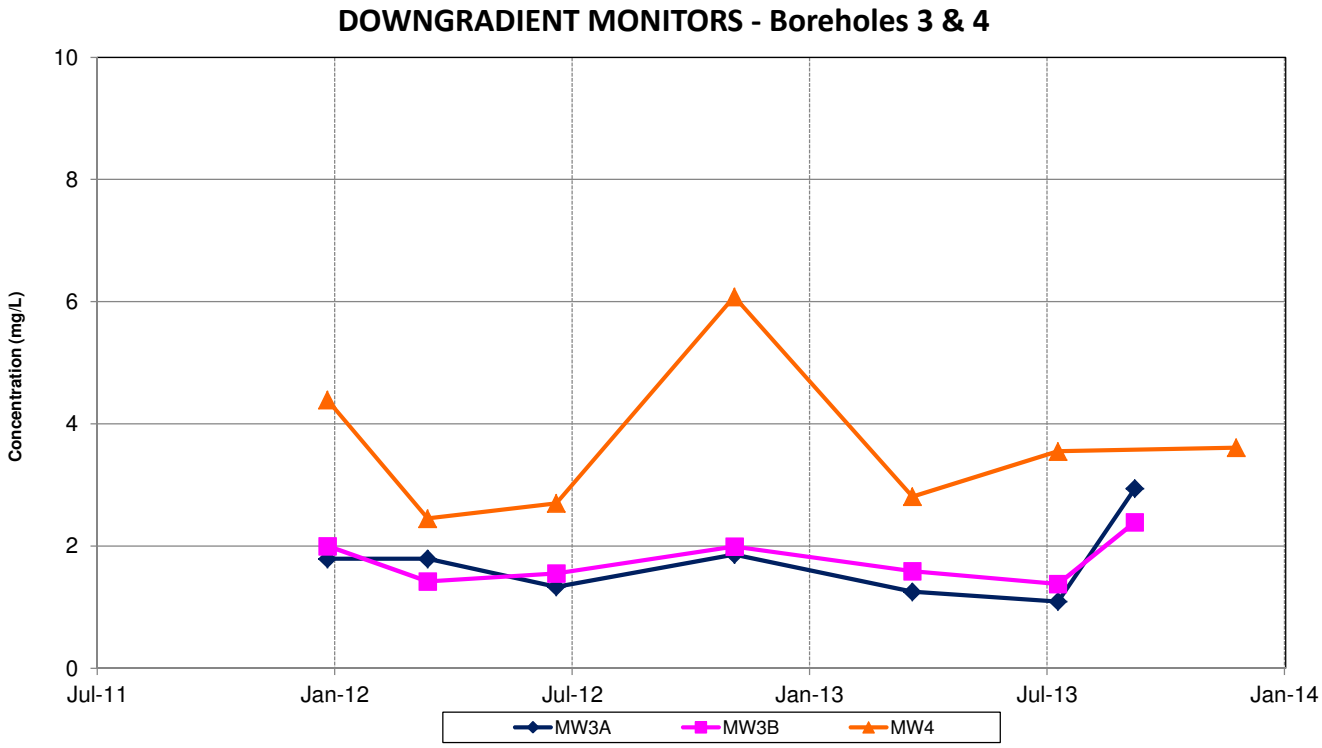
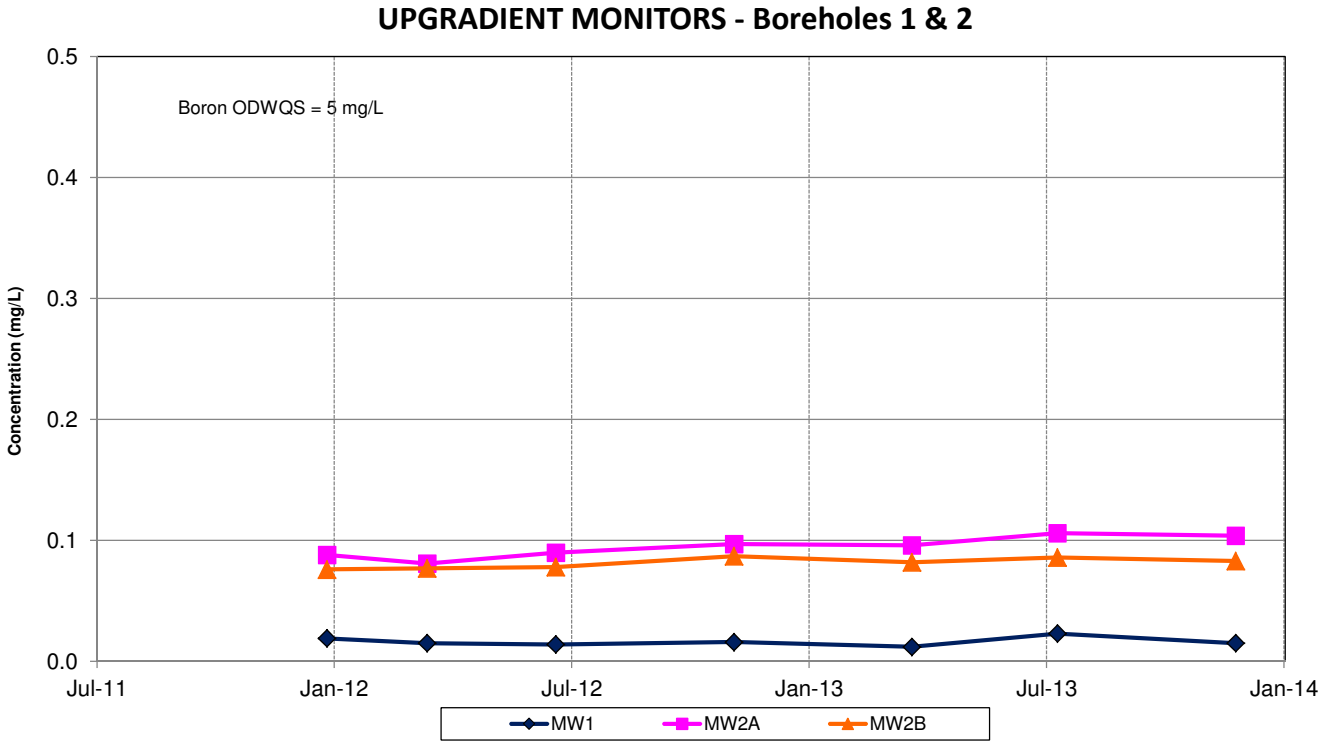


FIGURE B-7
GROUNDWATER TIME CONCENTRATION GRAPHS - BORON



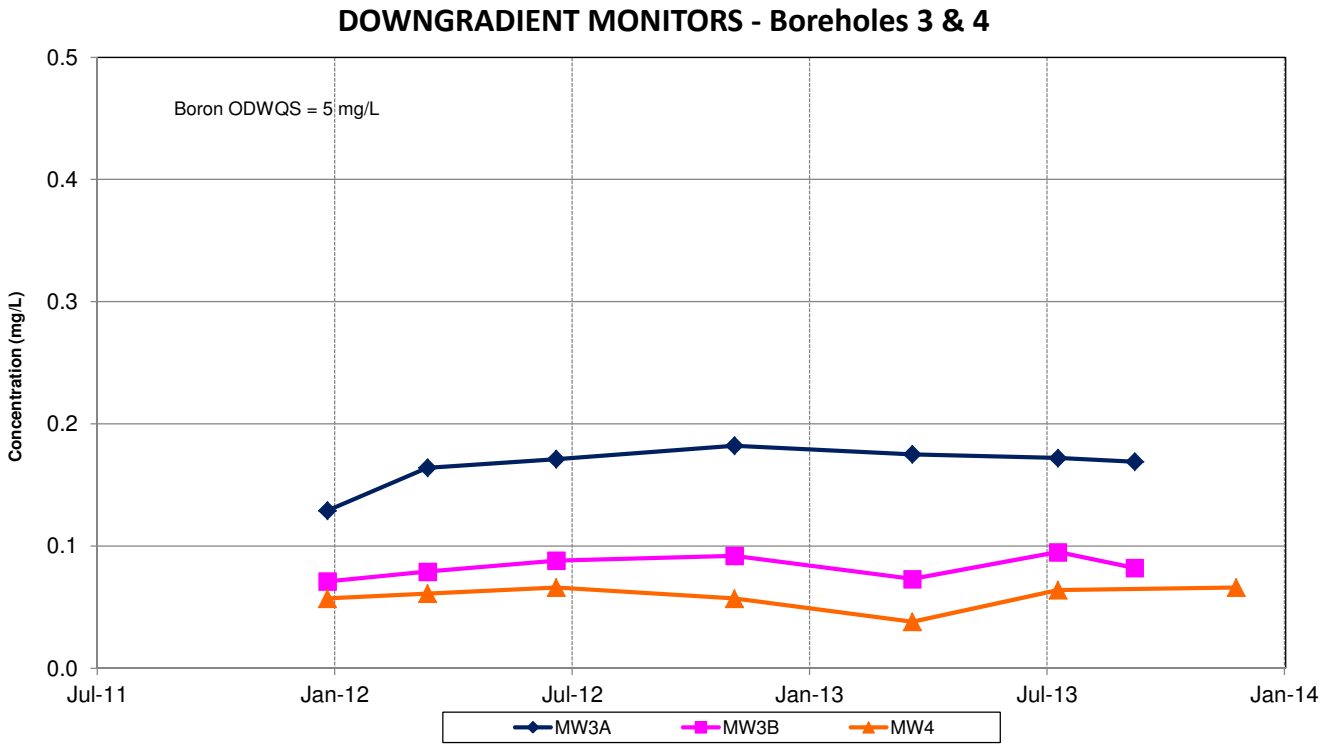
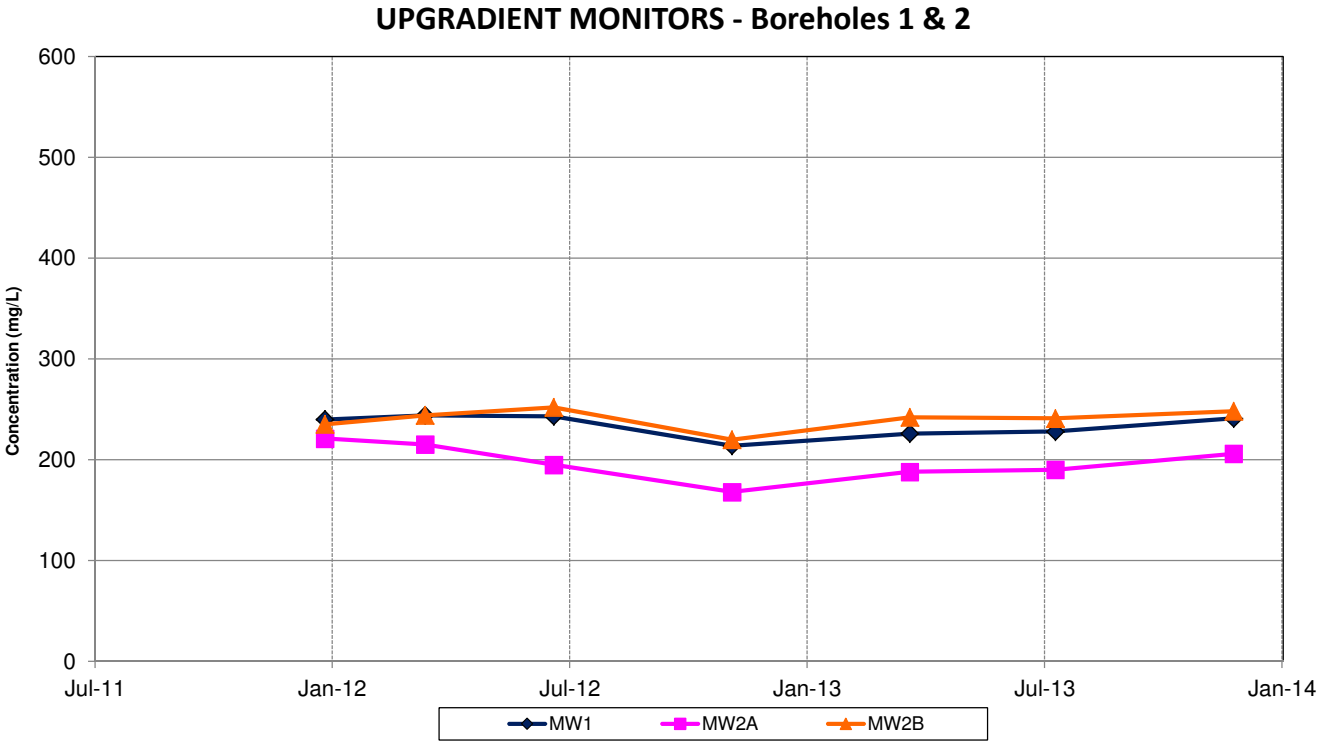


FIGURE B-8
GROUNDWATER TIME CONCENTRATION GRAPHS - BICARBONATE



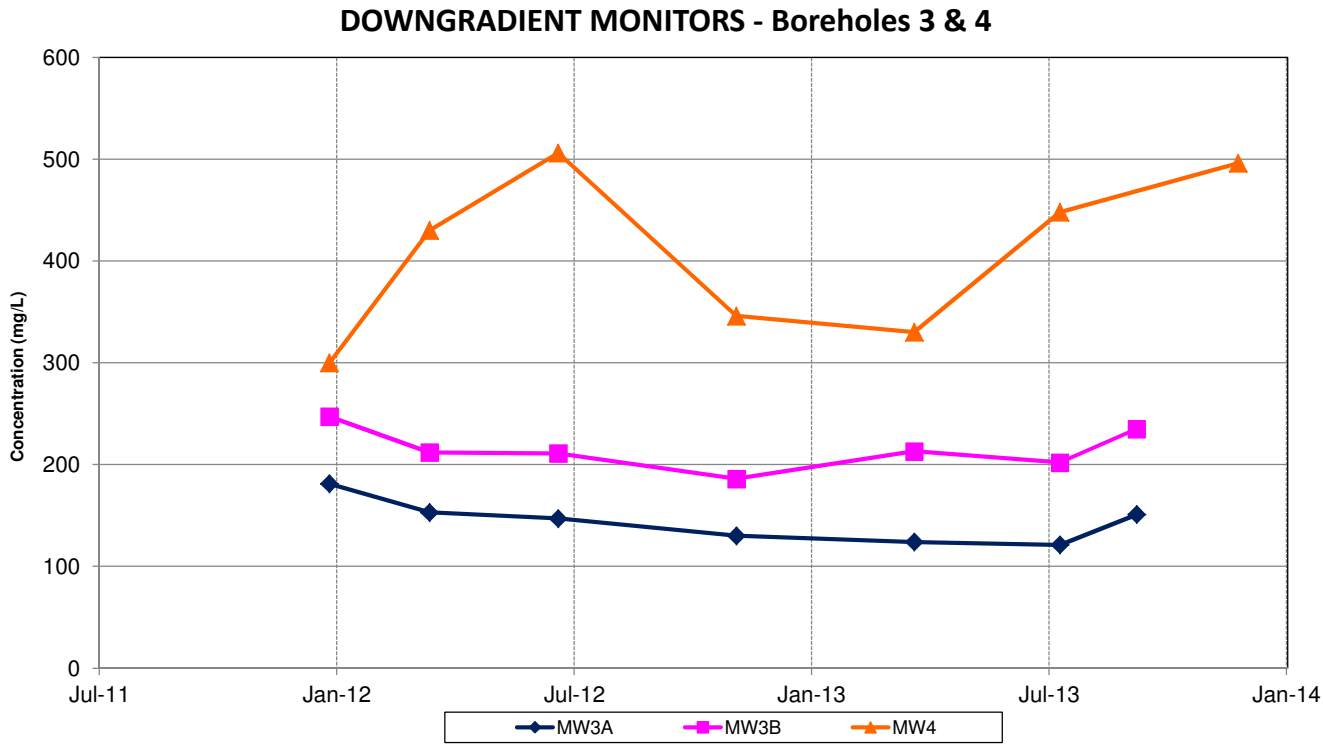


TABLE B-3

FIELD DUPLICATE SAMPLES - Relative Percent Differences

DURHAM YORK ENERGY CENTRE - 2013 MONITORING PROGRAM

PARAMETER	UNITS	MW2A			MW2A			MW1		
		March 2013			July 2013			November 2013		
		Original	Duplicate	RPD (%)	Original	Duplicate	RPD (%)	Original	Duplicate	RPD (%)
Bicarbonate (as CaCO3)	mg/L	188	190	**1**	190	188	**1**	241	242	**0**
Boron	mg/L	0.096	0.096	**0**	0.106	0.099	**7**	0.015	0.016	**6**
Cadmium	mg/L	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002	
Calcium	mg/L	17.9	17.8	**1**	15.4	15.8	**3**	65.5	64.1	**2**
Carbonate (as CaCO3)	mg/L	<5	<5		<5	<5		<5	<5	
Chloride	mg/L	1.92	1.95	**2**	2.74	2.31	**17**	13.4	13.7	**2**
Cobalt	mg/L	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	
Lead	mg/L	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002	
Magnesium	mg/L	37.5	38.1	**2**	32.3	32.3	**0**	43.6	43	**1**
Mercury	mg/L	<0.0001	<0.0001		<0.0001	<0.0001		<0.0001	<0.0001	
Potassium	mg/L	1.75	1.64	**6**	1.34	1.33	**1**	2.98	2.91	**2**
Sodium	mg/L	17.6	18.1	**3**	15.2	15.4	**1**	10	9.93	**1**
Sulphate	mg/L	15.6	16.2	**4**	18.9	16.8	**12**	132	133	**1**

NOTES: 1) Blank indicates parameter not analysed.

2) RPD = Relative Percent Difference $\quad RPD = \frac{X1-X2}{Xavg} \times 100$

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Certificate of Analysis

AGAT WORK ORDER: 13T699459

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

GW-D Parameters

DATE RECEIVED: 2013-03-25

DATE REPORTED: 2013-04-02

		SAMPLE DESCRIPTION:		MW1	MW2A	MW2B	MW3A	MW3B	MW4	Duplicate
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:								
Parameter	Unit	G / S	RDL	4216197	4216198	4216201	4216204	4216208	4216211	4216214
Bicarbonate (as CaCO3)	mg/L		5	226	188	242	124	213	330	190
Carbonate (as CaCO3)	mg/L		5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	(250)	0.10	14.8	1.92	14.2	25.1	15.6	8.21	1.95
Sulphate	mg/L	(500)	0.10	127	15.6	84.9	29.3	33.9	38.5	16.2
Calcium	mg/L		0.05	73.8	17.9	46.2	26.4	55.5	42.2	17.8
Magnesium	mg/L		0.05	53.2	37.5	54.5	8.76	26.4	68.8	38.1
Sodium	mg/L	20 (200)	0.05	10.2	17.6	21.9	49.6	26.4	23.7	18.1
Potassium	mg/L		0.05	3.28	1.75	2.23	1.25	1.59	2.81	1.64
Boron	mg/L	5	0.010	0.012	0.096	0.082	0.175	0.073	0.038	0.096
Cadmium	mg/L	0.005	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L		0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03(mg/L)

Certified By:

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Guideline Violation

AGAT WORK ORDER: 13T699459

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
4216201	MW2B	O.Reg.169/03(mg/L)	GW-D Parameters	Sodium	20 (200)	21.9
4216204	MW3A	O.Reg.169/03(mg/L)	GW-D Parameters	Sodium	20 (200)	49.6
4216208	MW3B	O.Reg.169/03(mg/L)	GW-D Parameters	Sodium	20 (200)	26.4
4216211	MW4	O.Reg.169/03(mg/L)	GW-D Parameters	Sodium	20 (200)	23.7

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 13T699459

PROJECT NO: 111-26648-00

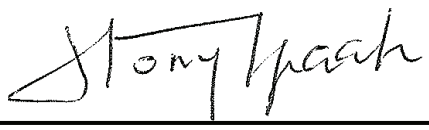
ATTENTION TO: Steve Taziar

Water Analysis

RPT Date: Apr 02, 2013			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
GW-D Parameters															
Chloride	4221076		161	160	0.2%	< 0.10	106%	90%	110%	102%	90%	110%	85%	80%	120%
Sulphate	4221076		63.0	60.4	4.3%	< 0.10	93%	90%	110%	98%	90%	110%	88%	80%	120%
Calcium	1	4216197	73.8	73.9	0.1%	< 0.05	105%	90%	110%	104%	90%	110%	105%	70%	130%
Magnesium	1	4216197	53.2	53.3	0.2%	< 0.05	108%	90%	110%	108%	90%	110%	111%	70%	130%
Sodium	1	4216197	10.2	10.1	1.0%	< 0.05	103%	90%	110%	103%	90%	110%	108%	70%	130%
Potassium	1	4216197	3.28	3.30	0.6%	< 0.05	102%	90%	110%	102%	90%	110%	105%	70%	130%
Boron	1	4216214	0.0962	0.0953	0.9%	< 0.010	109%	90%	110%	110%	90%	110%	100%	70%	130%
Cadmium	1	4216214	< 0.002	< 0.002	0.0%	< 0.002	106%	90%	110%	110%	90%	110%	109%	70%	130%
Cobalt	1	4216214	< 0.001	< 0.001	0.0%	< 0.001	105%	90%	110%	110%	90%	110%	100%	70%	130%
Lead	1	4216214	< 0.002	< 0.002	0.0%	< 0.002	106%	90%	110%	107%	90%	110%	100%	70%	130%
Mercury	1	4215564	<0.0001	<0.0001	0.0%	< 0.0001	96%	90%	110%	97%	90%	110%	94%	80%	120%

Comments: NA signifies Not Applicable.

Certified By:



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Method Summary

CLIENT NAME: GENIVAR INC **AGAT WORK ORDER: 13T699459**

PROJECT NO: 111-26648-00 **ATTENTION TO: Steve Taziar**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS

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Certificate of Analysis

AGAT WORK ORDER: 13T735750

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

Groundwater - Group F Parameters

DATE RECEIVED: 2013-07-12

DATE REPORTED: 2013-07-24

		SAMPLE DESCRIPTION:		MW1		MW2A		MW2B		MW3A
		SAMPLE TYPE:		Water		Water		Water		Water
		DATE SAMPLED:		7/12/2013		7/12/2013		7/12/2013		7/12/2013
Parameter	Unit	G / S	RDL	4545573	RDL	4545574	RDL	4545577	RDL	4545580
Bicarbonate (as CaCO3)	mg/L		5	228	5	190	5	241	5	121
Carbonate (as CaCO3)	mg/L		5	<5	5	<5	5	<5	5	<5
Chloride	mg/L		0.50	14.6	0.20	2.74	0.50	15.2	0.20	23.8
Sulphate	mg/L		0.50	129	0.20	18.9	0.50	82.2	0.20	23.0
Calcium	mg/L		0.05	65.3	0.05	15.4	0.05	40.8	0.05	22.5
Magnesium	mg/L		0.05	46.0	0.05	32.3	0.05	46.8	0.05	6.68
Sodium	mg/L		0.05	8.64	0.05	15.2	0.05	18.5	0.05	40.8
Potassium	mg/L		0.05	2.71	0.05	1.34	0.05	1.82	0.05	1.09
Boron	mg/L		0.010	0.023	0.010	0.106	0.010	0.086	0.010	0.172
Cadmium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Cobalt	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Lead	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001

Certified By:

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AGAT WORK ORDER: 13T735750

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

Groundwater - Group F Parameters

DATE RECEIVED: 2013-07-12

DATE REPORTED: 2013-07-24

		SAMPLE DESCRIPTION:		MW3B	MW4		GW-DUP
		SAMPLE TYPE:		Water	Water		Water
		DATE SAMPLED:		7/12/2013	7/12/2013		7/12/2013
Parameter	Unit	G / S	RDL	4545583	4545586	RDL	4545589
Bicarbonate (as CaCO3)	mg/L		5	202	448	5	188
Carbonate (as CaCO3)	mg/L		5	<5	<5	5	<5
Chloride	mg/L		0.50	13.9	7.47	0.20	2.31
Sulphate	mg/L		0.50	39.9	62.6	0.20	16.8
Calcium	mg/L		0.05	46.8	44.7	0.05	15.8
Magnesium	mg/L		0.05	21.2	83.6	0.05	32.3
Sodium	mg/L		0.05	24.1	28.6	0.05	15.4
Potassium	mg/L		0.05	1.38	3.55	0.05	1.33
Boron	mg/L		0.010	0.095	0.064	0.010	0.099
Cadmium	mg/L		0.002	<0.002	<0.002	0.002	<0.002
Cobalt	mg/L		0.001	<0.001	<0.001	0.001	<0.001
Lead	mg/L		0.002	<0.002	<0.002	0.002	<0.002
Mercury	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

4545573-4545589 Samples required dilution prior to analysis for Anions ; the RDLs were changed to reflect the dilution.

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 13T735750

PROJECT NO: 111-26648-00

ATTENTION TO: Steve Taziar

Water Analysis

RPT Date: Jul 24, 2013			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Groundwater - Group F Parameters															
Bicarbonate (as CaCO3)	4545573	4545573	228	229	0.7%	< 5	NA	80%	120%	NA			NA		
Carbonate (as CaCO3)	4545573	4545573	<5	<5	0.0%	< 5	NA	80%	120%	NA			NA		
Chloride	1	4545583	13.9	13.8	0.7%	< 0.10	97%	90%	110%	97%	90%	110%	98%	80%	120%
Sulphate	1	4545583	39.9	39.8	0.3%	< 0.10	96%	90%	110%	90%	90%	110%	108%	80%	120%
Calcium	1	4545589	15.8	15.7	0.6%	< 0.05	102%	90%	110%	102%	90%	110%	100%	70%	130%
Magnesium	1	4545589	32.3	31.9	1.2%	< 0.05	100%	90%	110%	99%	90%	110%	100%	70%	130%
Sodium	1	4545589	15.4	15.5	0.6%	< 0.05	95%	90%	110%	95%	90%	110%	95%	70%	130%
Potassium	1	4545589	1.33	1.33	0.0%	< 0.05	97%	90%	110%	97%	90%	110%	96%	70%	130%
Boron	1	4545577	0.086	0.083	3.6%	< 0.010	100%	90%	110%	110%	90%	110%	90%	70%	130%
Cadmium	1	4545577	< 0.002	< 0.002	0.0%	< 0.002	102%	90%	110%	108%	90%	110%	98%	70%	130%
Cobalt	1	4545577	< 0.001	< 0.001	0.0%	< 0.001	102%	90%	110%	109%	90%	110%	109%	70%	130%
Lead	1	4545577	< 0.002	< 0.002	0.0%	< 0.002	104%	90%	110%	103%	90%	110%	100%	70%	130%
Mercury	1	4545573	<0.0001	<0.0001	0.0%	< 0.0001	99%	90%	110%	102%	90%	110%	101%	80%	120%

Comments: NA signifies not applicable

Certified By:

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Method Summary

CLIENT NAME: GENIVAR INC **AGAT WORK ORDER: 13T735750**

PROJECT NO: 111-26648-00 **ATTENTION TO: Steve Taziar**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS

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Certificate of Analysis

AGAT WORK ORDER: 13T757173

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2013-09-11

DATE REPORTED: 2013-09-19

		SAMPLE DESCRIPTION:		MW 3A	MW 3B
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		9/9/2013	9/9/2013
Parameter	Unit	G / S	RDL	4727846	4727868
Bicarbonate (as CaCO3)	mg/L		5	151	235
Carbonate (as CaCO3)	mg/L		5	<5	<5
Chloride	mg/L	(250)	0.10	26.2	18.8
Sulphate	mg/L	(500)	0.10	20.3	43.4
Calcium	mg/L		0.05	24.4	61.4
Magnesium	mg/L		0.05	6.91	25.1
Sodium	mg/L	20 (200)	0.05	44.7	27.1
Potassium	mg/L		0.05	2.94	2.39
Boron	mg/L	5	0.010	0.169	0.082
Cadmium	mg/L	0.005	0.002	<0.002	<0.002
Cobalt	mg/L		0.001	<0.001	<0.001
Lead	mg/L	0.01	0.002	<0.002	<0.002
Mercury	mg/L	0.001	0.0001	<0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03(mg/L)

Certified By:

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Guideline Violation

AGAT WORK ORDER: 13T757173

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
4727846	MW 3A	O.Reg.169/03(mg/L)	Durham - Groundwater - Group F Parameters	Sodium	20 (200)	44.7
4727868	MW 3B	O.Reg.169/03(mg/L)	Durham - Groundwater - Group F Parameters	Sodium	20 (200)	27.1

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 13T757173

PROJECT NO: 111-26648-00

ATTENTION TO: Steve Taziar

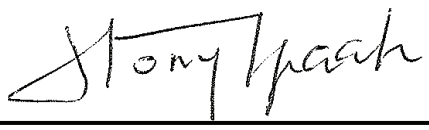
Water Analysis

RPT Date: Sep 19, 2013

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Durham - Groundwater - Group F Parameters															
Bicarbonate (as CaCO3)	4726605		355	369	3.9%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carbonate (as CaCO3)	4726605		<5	<5	0.0%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Chloride	4727548		62.5	62.6	0.1%	< 0.10	91%	90%	110%	92%	90%	110%	97%	80%	120%
Sulphate	4727548		5.23	5.25	0.3%	< 0.10	91%	90%	110%	94%	90%	110%	95%	80%	120%
Calcium	1		24.1	24.0	0.4%	< 0.05	101%	90%	110%	98%	90%	110%	96%	70%	130%
Magnesium	1		3.90	3.88	0.5%	< 0.05	99%	90%	110%	95%	90%	110%	92%	70%	130%
Sodium	1		81.4	80.6	1.0%	< 0.05	99%	90%	110%	96%	90%	110%	93%	70%	130%
Potassium	1		3.61	3.63	0.6%	< 0.05	102%	90%	110%	101%	90%	110%	95%	70%	130%
Boron	1	4727846	0.169	0.177	4.6%	< 0.010	101%	90%	110%	95%	80%	120%	99%	70%	130%
Cadmium	1	4727846	< 0.002	< 0.002	0.0%	< 0.002	101%	90%	110%	109%	80%	120%	103%	70%	130%
Cobalt	1	4727846	< 0.001	< 0.001	0.0%	< 0.001	105%	90%	110%	104%	80%	120%	101%	70%	130%
Lead	1	4727846	< 0.002	< 0.002	0.0%	< 0.002	96%	90%	110%	97%	80%	120%	99%	70%	130%
Mercury	1		<0.0001	<0.0001	0.0%	< 0.0001	100%	90%	110%	97%	90%	110%	93%	80%	120%

Comments: NA Signifies Not Applicable.

Certified By:



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Method Summary

CLIENT NAME: GENIVAR INC **AGAT WORK ORDER: 13T757173**

PROJECT NO: 111-26648-00 **ATTENTION TO: Steve Taziar**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 13T787634

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2013-11-27

DATE REPORTED: 2013-12-04

		SAMPLE DESCRIPTION:		MW2A		MW2B		MW4		MW1	Duplicate
		SAMPLE TYPE:		Water		Water		Water		Water	Water
		DATE SAMPLED:		11/26/2013		11/26/2013		11/26/2013		11/26/2013	11/26/2013
Parameter	Unit	G / S	RDL	5000406	RDL	5000413	RDL	5000416	RDL	5000419	5000422
Bicarbonate (as CaCO3)	mg/L		5	206	5	248	5	496	5	241	242
Carbonate (as CaCO3)	mg/L		5	<5	5	<5	5	<5	5	<5	<5
Chloride	mg/L	(250)	0.20	2.52	0.50	14.3	0.50	6.79	0.50	13.4	13.7
Sulphate	mg/L	(500)	0.20	21.8	0.50	77.3	0.50	62.6	0.50	132	133
Calcium	mg/L		0.05	16.5	0.05	39.4	0.10	39.0	0.05	65.5	64.1
Magnesium	mg/L		0.05	30.6	0.05	44.2	0.10	83.9	0.05	43.6	43.0
Sodium	mg/L	20 (200)	0.05	18.7	0.05	19.3	0.10	35.8	0.05	10.0	9.93
Potassium	mg/L		0.05	1.51	0.05	2.03	0.10	3.61	0.05	2.98	2.91
Boron	mg/L	5	0.010	0.104	0.010	0.083	0.010	0.066	0.010	0.015	0.016
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002
Cobalt	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001
Lead	mg/L	0.01	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O.Reg.169/03(mg/L)

5000406-5000422 Samples required dilutions prior to analysis in order to minimize matrix interference, and to keep the analytes within the valid calibration range of the instrument; the RDLs were adjusted accordingly.

Certified By: Sofya Pehlyova

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Guideline Violation

AGAT WORK ORDER: 13T787634

PROJECT NO: 111-26648-00

CLIENT NAME: GENIVAR INC

ATTENTION TO: Steve Taziar

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
5000416	MW4	O.Reg.169/03(mg/L)	Durham - Groundwater - Group F Parameters	Sodium	20 (200)	35.8

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Quality Assurance

CLIENT NAME: GENIVAR INC

AGAT WORK ORDER: 13T787634

PROJECT NO: 111-26648-00

ATTENTION TO: Steve Taziar

Water Analysis

RPT Date: Dec 04, 2013			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Durham - Groundwater - Group F Parameters															
Bicarbonate (as CaCO3)	4998680		168	171	1.9%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carbonate (as CaCO3)	4998680		<5	<5	0.0%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Chloride	5000413	5000413	14.3	14.0	1.6%	< 0.10	91%	90%	110%	98%	90%	110%	99%	80%	120%
Sulphate	5000413	5000413	77.3	76.3	1.2%	< 0.10	96%	90%	110%	98%	90%	110%	96%	80%	120%
Calcium	5000406	5000406	16.5	16.5	0.2%	< 0.05	99%	90%	110%	97%	90%	110%	86%	70%	130%
Magnesium	5000406	5000406	30.6	30.7	0.4%	< 0.05	94%	90%	110%	93%	90%	110%	84%	70%	130%
Sodium	5000406	5000406	18.7	18.6	0.6%	< 0.05	99%	90%	110%	98%	90%	110%	87%	70%	130%
Potassium	5000406	5000406	1.51	1.51	0.2%	< 0.05	103%	90%	110%	102%	90%	110%	91%	70%	130%
Boron	1	5000406	0.104	0.107	2.8%	< 0.010	103%	90%	110%	102%	80%	120%	98%	70%	130%
Cadmium	1	5000406	< 0.002	< 0.002	0.0%	< 0.002	100%	90%	110%	115%	80%	120%	118%	70%	130%
Cobalt	1	5000406	< 0.001	< 0.001	0.0%	< 0.001	101%	90%	110%	103%	80%	120%	100%	70%	130%
Lead	1	5000406	< 0.002	< 0.002	0.0%	< 0.002	98%	90%	110%	101%	80%	120%	98%	70%	130%
Mercury	1		<0.0001	<0.0001	0.0%	< 0.0001	100%	90%	110%	99%	90%	110%	102%	80%	120%

Comments: NA signifies Not Applicable.

Certified By: Sofiya Pehlyova

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Method Summary

CLIENT NAME: GENIVAR INC **AGAT WORK ORDER: 13T787634**

PROJECT NO: 111-26648-00 **ATTENTION TO: Steve Taziar**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW 846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS

Appendix C

MOE CHECKLIST

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	Durham York Energy Centre
Location (e.g. street address, lot, concession)	Osborne Road, south of South Service Road, southeast of Courtice Rd / Highway 401
GPS Location (taken within the property boundary at front gate/ front entry)	680660, 4860506, Zone 17, NAD 83
Municipality	Municipality of Clarington, in the Regional Municipality of Durham
Client and/or Site Owner	Regional Municipalities of Durham and York
Monitoring Period (Year)	2013
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	7306-8FDKNX
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	◉ **Annual** ○ **Other**	
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		N/A
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:	Site is in the construction phase.	
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)	○ Yes ◉ No	

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	◉ **Yes** ○ **No**	If no, list exceptions (Type Here):
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Some or all groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.	◯ **Yes** ◉ **No** ◯ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◉ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
		Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ◯ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	◉ **Yes** ○ **No**		
6) The site meets compliance and assessment criteria.	◉ **Yes** ○ **No**		
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	◉ **Yes** ○ **No**	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ **Yes** ○ **No**	**Note which practice(s):**	☐ **(a)** ☒ **(b)** ☐ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**		

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

29-Apr-2014

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No Changes to site design and operation are recommended** ○ **The following change(s) to the site design and operation is/ are recommended:**	Type Here

Name:	Stephen J. Taziar, P.Eng		
Seal:	Add Image 		
Signature:		**Date:**	29-Apr-2014
CEP Contact Information:	Type Here		
Company:	WSP Canada Inc.		
Address:	126 Don Hillock Drive, Suite 2, Aurora, ON, L4G 0G9		
Telephone No.:	(905) 750-3080	Fax No. :	(905) 727-0463
E-mail Address:	stephen.taziar@wspgroup.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date