File CG2430E03

Sears Canada Inc.

Updated Site Management Plan (2014) Groundwater Monitoring Well Abandonment Locations Report

Hounsfield Heights and North Hill Mall, Calgary, Alberta

Clifton Associates

Clifton Associates

09 March 2015

Attention:	Ms. Colette Petit, B.Sc. (colette.petit@calgary.ca)
	Environmental Specialist
Company:	The City of Calgary – Environmental and Safety Management
Address:	Calgary Public Building, 8th Floor
	205 - 8th Avenue SE
	Calgary, Alberta T2G 0K9

Updated Site Management Plan (2014) **CG2430E03**
Groundwater Monitoring Well Abandonments Report
Hounsfield Heights – Briar Hill Community
Calgary, Alberta

Dear Ms. Petit,

Clifton Associates Ltd. (Clifton) is pleased to submit this Well Abandonment Report (Report) on behalf of Sears Canada Inc. (Sears) to The City of Calgary – Environmental and Safety Management (the City) in accordance with the conditions of the Updated Site Management Plan (2014) for the Hounsfield Heights – Briar Hill Community (Updated SMP). This report includes a description of the groundwater monitoring well abandonment activities completed between August and December 2014 on City-owned property; however, it does not include groundwater monitoring wells that were decommissioned on privately-owned property.

A total of 50 groundwater monitoring wells were decommissioned in the following areas:

- 14th Avenue NW and the City-owned Right of Way (ROW) adjacent to the 14th Avenue NW;
- Lions Park;
- The area between the western curb of 17A street NW and the eastern curb of the 15th Street NW, and between the northern curb of the 13th Avenue NW and the northern curb of the 10th Avenue NW;
- The City-owned green space south of the 11th Avenue NW; and
- The natural area south of the 12th Avenue NW.

All applicable groundwater monitoring wells in the above referenced areas were abandoned in accordance with the industry standards, and the City of Calgary Roads directives for surface rehabilitation. Clifton was unable to pinpoint an exact location of two groundwater monitoring wells in the above referenced areas, and these wells are considered to be lost.

The locations of the abandoned wells are shown in Figures 1 and 2 of Appendix A.

Project Background

The well abandonment was completed in support of the implementation of the Updated SMP, submitted to the Alberta Environment and Sustainable Resource Development (AESRD) in 2014. Section 6.3.4. of the Updated SMP stipulates that the decommissioning of the existing groundwater monitoring wells in the area that do not meet requirements due to technical factors, such as screening through multiple geological strata, its relative location, and/or the condition of the well.
A total of 52 groundwater monitoring wells within City-owned property (two remain missing) were selected for abandonment. These wells were originally drilled in several stages, starting in the late 1990's and into the 2000's and were approved by the City under License of Occupation #42226-0.

Scope of Work

Based upon the requirements of the Updated SMP, Clifton conducted the following Scope of Work:

- Preparatory Activities:
  - Permitting;
  - Identification of the wells; and,
  - Utility locates.

- Field Activities:
  - Groundwater monitoring well abandonment;
  - Surface rehabilitation; and,
  - Drilling waste disposal.

Preparatory Activities

Clifton conducted the necessary preparatory work before commencement of the well abandonment. A part of the preparatory work consisted of applying for permits required for the work on the City-owned properties. Clifton applied and received approval for Utility Line Assignments (ULAs) through the City Infrastructure and Information Services groups. The ULAs for the work were granted under file number LU 13-02, and borehole file number 14-14. Subsequently, the applications for the Excavation Permits based on the ULAs were submitted to the City Roads department. In addition, the well abandonment work in and around 14th Avenue NW required temporary traffic detours, which were granted by the City Roads department under the Street Use Permit SU-14- 82000. Where required, Clifton prepared Tree Protection Plans together with Public Tree Disclosure Statements and Tree Protection Plan Agreements. These applications were submitted to the City Parks – Urban Forestry department.

The process of the well identification started with a field verification of well locations by Clifton personnel, and comparing locations of the wells against historic records and maps. Due to the significant age of some of the wells, in numerous instances wells were found to be obstructed by a new layer of asphalt, concrete, gravel, and/or asphalt chips. In these cases, Clifton deployed a metal detector and Ground Penetrating Radar (GPR) to facilitate localization of the obstructed wells. Despite Clifton's best efforts, in the case of two groundwater monitoring wells (BH-205 and BH-914) all attempts at their localization were unsuccessful. These wells are marked as lost (blue) on Figures 1 and 2 in Appendix A.

In accordance with Clifton's internal safety policies, prior to the start of the decommissioning program, Clifton completed a hazard assessment, a ground disturbance checklist, prepared an emergency action plan, and held a safety kick-off meeting. During the well abandonment operations, traffic signs were placed at the work sites, and portable barriers were used to secure a safe distance between the drilling rig and potential local pedestrian and vehicular traffic. Locations of public and private underground utilities adjacent to or beneath the Site were identified by Alberta One-Call Corporation.

Field Activities

The fifty groundwater monitoring wells were abandoned in place, according to industry standards. Well abandonment consisted of re-drilling the well using a hollow stem auger with a 203.2 mm (8") OD drilling head to the total depth of the well as recorded in the installation borehole logs. The created opening was subsequently backfilled using a pressure-injected, bentonite-cement grout. The objectives of monitoring well abandonment were to:

- Prevent vertical migration of fluids within the monitoring well being abandoned;
- Prevent intermixing of waters from different water-bearing zones;
- Eliminate physical hazards (e.g., open boreholes); and,
- Preserve aquifer properties.

All well abandonment drilling was conducted by All Service Drilling Ltd. A truck-mounted drilling rig was utilized for the well abandonment on hard surfaces, while a drilling rig with rubber tracks was used on soft surfaces to minimize any surface disturbance. A qualified Clifton technician supervised the well abandonment operations and recorded all relevant data. The step-by-step procedure used for well abandonments was as follows:

- Upon initiation of the abandonment activities, the well was checked for obstructions and any obstructions were removed from the well;
- Using a weighted tape, the total depth of the well was measured and compared against the existing borehole logs;
- The well was re-drilled to the total depth noted in the borehole logs using the hollow stem auger. The screen, riser, sand pack, and all other monitoring well construction materials were removed from the well together with the drill cuttings;
- A neat grout mixture was prepared consisting of type II Portland cement, water, and bentonite. The organic-free bentonite was added at a ratio of 2.5 kg of bentonite per 50 kg bag of cement to produce 5% bentonite by weight. The grout was mixed with 25-28 liters of water to create pumpable slurry. The amount of neat grout needed to abandon each well was determined by calculating the volume of each well using the following formula:

$$V = D^2 h\pi/4$$

Where: V=Well volume
D=Diameter of well
h=Depth of well
π=3.14

- A decontaminated tremie pipe, with a side-discharge tip, was assembled and extended to the bottom of the well through the hollow stem drill string;
- Once thoroughly mixed, the grout was pumped through the tremie pipe to the bottom of the well. At the same time the drill string was slowly raised. The tremie pipe was gradually moved up as the well filled with grout until approximately 0.3 m from the top of the well; and,
- The grout was allowed to settle for 3 to 4 hours, and then the surface was rehabilitated. Surface rehabilitation was completed by using concrete on top of the bentonite, followed by either cold-mix asphalt patch (hard surfaces) or by a layer of clean topsoil (grassy/soft surfaces). All surface rehabilitation work was completed flush with the ground surface. A second well visit was conducted within 48-hours to ensure that the well did not settle below the ground surface elevation.

The drill cuttings were collected and temporarily stored in secured soil bags to avoid contact between the soil and human or ecological receptors. A composite sample at an approximate rate of 1 sample per 10 m^3 of drill cuttings was taken and submitted to AGAT Laboratories in Calgary for Alberta Class II Landfill analysis. Analytical results were compared against the 1996 Alberta Environment Protection (AEP), *Alberta User Guide for Waste Managers,* Schedule Part 4, Table 2, Class 9.3 Substances: to allow for the proper disposal of the soil cuttings. The qualified subcontractor (Newalta Corporation) provided regular pick-up, and disposal of, the drill cuttings at a landfill. No exceedances of the Class II landfill limits were observed during the well

abandonment, therefore all drill cuttings were disposed as non-hazardous waste at a Class II landfill. The Scale Tickets, Bill of Ladings, and Alberta Class II Landfill analytical results related to the drill cuttings disposal are available upon request. All other produced waste (consumables, packing materials etc.) was collected at the end of each work day by All Service Drilling Ltd. for disposal as a general waste.

A copy of the borehole logs has been attached in Appendix B.

Summary

The following table summarizes abandoned monitoring wells, including their basic technical data:

Table 1 – Decommissioned Monitoring Wells on City-Owned Property

Well ID	Northing [m]	Easting [m]	Ground Elevation [m amsl]	Total Depth [m]	Well Material	Date Abandoned	Surface Rehabilitation Type
BH 201	5658698.7	-6844.3	1090.73	7.0	2"ID Sch. 40 PVC	13/08/2014	Clean Imported Topsoil
BH 204	5658698.5	-6876.6	1090.80	7.0	2"ID Sch. 40 PVC	18/08/2014	Clean Imported Topsoil
BH 204	5658698.5	-6876.6	1090.80	9.15	2"ID Sch. 40 PVC	18/08/2014	Clean Imported Topsoil
BH 506	5658548.0	-6859.7	1088.94	13.72	2"ID Sch. 40 PVC	12/09/2014	Cold-Mix Asphalt Patch
BH 711	5658488.3	-6858.7	1085.29	15.2	2"ID Sch. 40 PVC	17/09/2014	Cold-Mix Asphalt Patch
BH 721	5658500.7	-6741.4	1085.21	15.2	2"ID Sch. 40 PVC	15/08/2014	Cold-Mix Asphalt Patch
BH 729	5658515.7	-6798.0	1088.62	18.3	2"ID Sch. 40 PVC	26/08/2014	Cold-Mix Asphalt Patch
BH 733	5658451.5	-6767.8	1080.71	15.2	2"ID Sch. 40 PVC	02/09/2014	Cold-Mix Asphalt Patch
BH 734	5658450.8	-6763.3	1082.71	15.2	2"ID Sch. 40 PVC	03/09/2014	Cold-Mix Asphalt Patch
BH 736	5658451.6	-6903.5	1084.67	15.2	2"ID Sch. 40 PVC	04/09/2014	Cold-Mix Asphalt Patch
BH 737	5658451.9	-6784.9	1080.78	13.7	2"ID Sch. 40 PVC	02/09/2014	Cold-Mix Asphalt Patch
BH 738	5658484.9	-6797.2	1084.86	16.7	2"ID Sch. 40 PVC	26/08/2014	Cold-Mix Asphalt Patch
BH 739	5658474.9	-6797.3	1083.30	15.2	2"ID Sch. 40 PVC	27/08/2014	Cold-Mix Asphalt Patch
BH 740	5658623.9	-6994.3	1091.05	16.8	2"ID Sch. 40 PVC	08/09/2014	Cold-Mix Asphalt Patch
BH 742	5658550.8	-6970.4	1090.55	18.3	2"ID Sch. 40 PVC	05/09/2014	Cold-Mix Asphalt Patch
BH 744	5658484.5	-6937.4	1086.59	15.2	2"ID Sch. 40 PVC	05/09/2014	Cold-Mix Asphalt Patch
BH 904	5658500.7	-6858.9	1086.30	7.3	2"ID Sch. 40 PVC	16/09/2014	Cold-Mix Asphalt Patch
BH 905	5658523.7	-6861.6	1082.51	12.1	2"ID Sch. 40 PVC	03/09/2014	Cold-Mix Asphalt Patch
BH 907	5658415.3	-6797.9	1079.27	12.2	2"ID Sch. 40 PVC	27/08/2014	Cold-Mix Asphalt Patch
BH 913	5658385.2	-6858.9	1072.79	9.1	2"ID Sch. 40 PVC	17/09/2014	Cold-Mix Asphalt Patch
BH 915	5658372.9	-6742.3	1068.33	9.1	2"ID Sch. 40 PVC	15/08/2014	Cold-Mix Asphalt Patch
BH 916	5658372.2	-6797.6	1079.12	12.2	2"ID Sch. 40 PVC	28/08/2014	Cold-Mix Asphalt Patch
BH 917	5658357.3	-6797.5	1073.79	9.1	2"ID Sch. 40 PVC	28/08/2014	Cold-Mix Asphalt Patch
BH 1103	5658636.0	-6825.2	1089.48	16.8	2"ID Sch. 40 PVC	07/10/2014	Clean Imported Topsoil
BH 1104	5658644.6	-6859.7	1090.11	18.3	2"ID Sch. 40 PVC	07/10/2014	Clean Imported Topsoil
BH 1106	5658644.9	-6892.7	1090.85	16.8	2"ID Sch. 40 PVC	08/10/2014	Clean Imported Topsoil
BH 1107	5658647.3	-6913.7	1092.07	15.2	2"ID Sch. 40 PVC	08/10/2014	Clean Imported Topsoil
BH 1204	5658632.2	-6788.4	1089.29	15.2	2"ID Sch. 40 PVC	22/08/2014	Cold-Mix Asphalt Patch
BH 1205	5658644.8	-6794.2	1089.11	15.2	2"ID Sch. 40 PVC	23/08/2014	Cold-Mix Asphalt Patch

Well ID	Northing [m]	Easting [m]	Ground Elevation [m amsl]	Total Depth [m]	Well Material	Date Abandoned	Surface Rehabilitation Type
BH 1206	5658651.6	-6799.1	1089.07	15.2	2"ID Sch. 40 PVC	22/08/2014	Cold-Mix Asphalt Patch
BH 1207	5658652.2	-6802.3	1088.93	15.2	2"ID Sch. 40 PVC	24/08/2014	Cold-Mix Asphalt Patch
BH 1208	5658654.7	-6811.4	1088.75	9.1	2"ID Sch. 40 PVC	23/08/2014	Cold-Mix Asphalt Patch
BH 1301	5658462.8	-6798.4	1075.7	9.1	2"ID Sch. 40 PVC	09/12/2014	Clean Topsoil
BH 1302	5658517.3	-6845.3	1088.45	12.2	2"ID Sch. 40 PVC	06/10/2014	Clean Imported Topsoil
BH 1303	5658524.6	-6855.3	1088.67	15.1	2"ID Sch. 40 PVC	14/10/2014	Clean Imported Topsoil
BH 1702	5658621.5	-6882.6	1090.08	15.3	2"ID Sch. 40 PVC	19/08/2014	Cold-Mix Asphalt Patch
BH 1703	5658613.1	-6873.6	1089.77	14.0	2"ID Sch. 40 PVC	19/08/2014	Cold-Mix Asphalt Patch
BH 1705	5658611.6	-6803.9	1089.69	12.2	2"ID Sch. 40 PVC	20/08/2014	Cold-Mix Asphalt Patch
BH 1706	5658582.5	-6867.9	1089.40	13.7	2"ID Sch. 40 PVC	09/09/2014	Cold-Mix Asphalt Patch
BH 1707	5658593.1	-6803.7	1090.82	15.2	2"ID Sch. 40 PVC	21/08/2014	Cold-Mix Asphalt Patch
BH 1708	5658528.9	-6863.7	1087.69	15.2	2"ID Sch. 40 PVC	15/09/2014	Cold-Mix Asphalt Patch
BH 1709	5658551.2	-6803.1	1092.07	18.3	2"ID Sch. 40 PVC	25/08/2014	Cold-Mix Asphalt Patch
BH 1710	5658562.9	-6865.1	1088.91	15.2	2"ID Sch. 40 PVC	11/09/2014	Cold-Mix Asphalt Patch
BH 1711	5658582.3	-6804.0	1091.70	15.2	2"ID Sch. 40 PVC	20/08/2014	Cold-Mix Asphalt Patch
BH 1712	5658432.2	-6788.9	1089.56	12.2	2"ID Sch. 40 PVC	16/09/2014	Cold-Mix Asphalt Patch
BH 1713	5658526.4	-6859.3	1088.43	7.6	2"ID Sch. 40 PVC	06/10/2014	Clean Imported Topsoil
BH 1714	5658532.3	-6858.7	1088.39	7.6	2"ID Sch. 40 PVC	06/10/2014	Clean Imported Topsoil
BH 1715	5658529.9	-6860.2	1088.87	12.2	2"ID Sch. 40 PVC	09/09/2014	Cold-Mix Asphalt Patch
BH 1716	5658527.8	-6858.4	1088.30	12.2	2"ID Sch. 40 PVC	11/09/2014	Cold-Mix Asphalt Patch
BH 1717	5658509.8	-6853.7	1087.98	12.2	2"ID Sch. 40 PVC	15/09/2014	Cold-Mix Asphalt Patch

Two groundwater monitoring wells installed on the City-owned property were declared "lost", and Clifton was unable to abandon them.

Table 2 - Lost Monitoring Wells on City-Owned Property

Well ID	Northing [m]	Easting [m]	Ground Elevation [m amsl]	Total Depth [m]	Well Material	Date Installed	Notes
BH 205	5658698.9	-6854.0	1090.85	9.15	2"ID Sch. 40 PVC	19/10/1998	Destroyed by re-paving
BH 914	5658390.4	-6742.4	1070.25	9.14	2"ID Sch. 40 PVC	18/02/2004	Destroyed by re-paving

Closure

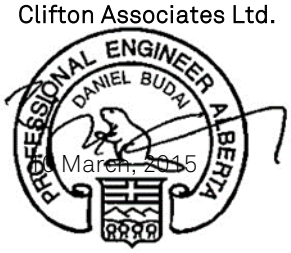
This report was prepared by Clifton Associates Ltd. for the account of the City of Calgary. The material in it reflects Clifton Associates Ltd. best judgment available to it at the time of preparation. Any use that a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Clifton Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report has been prepared in accordance with generally accepted engineering practice common to the local area. No other warranty, expressed or implied, is made.

We appreciate the opportunity to provide quality environmental services and trust that this Well Abandonment Report meets your current expectations for this project. Should you have any concerns regarding this report or require additional information, please contact us at (403) 219-2704 or by e-mail at daniel_budai@clifton.ca.

Yours truly,

Clifton Associates Ltd.



6 March, 2015

Daniel Budai, P.Eng.
Environmental Engineer

Mark A. Lehar, P.Geo.
Regional Environmental Lead and Senior Environmental Geologist

List of Tables:

Appendices:

Appendix A

Clifton and Associates
Figures

Clifton Associates

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2222 30th Avenue NE
Calgary, Alberta T2E 7K9

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Facsimile 403 234 9033

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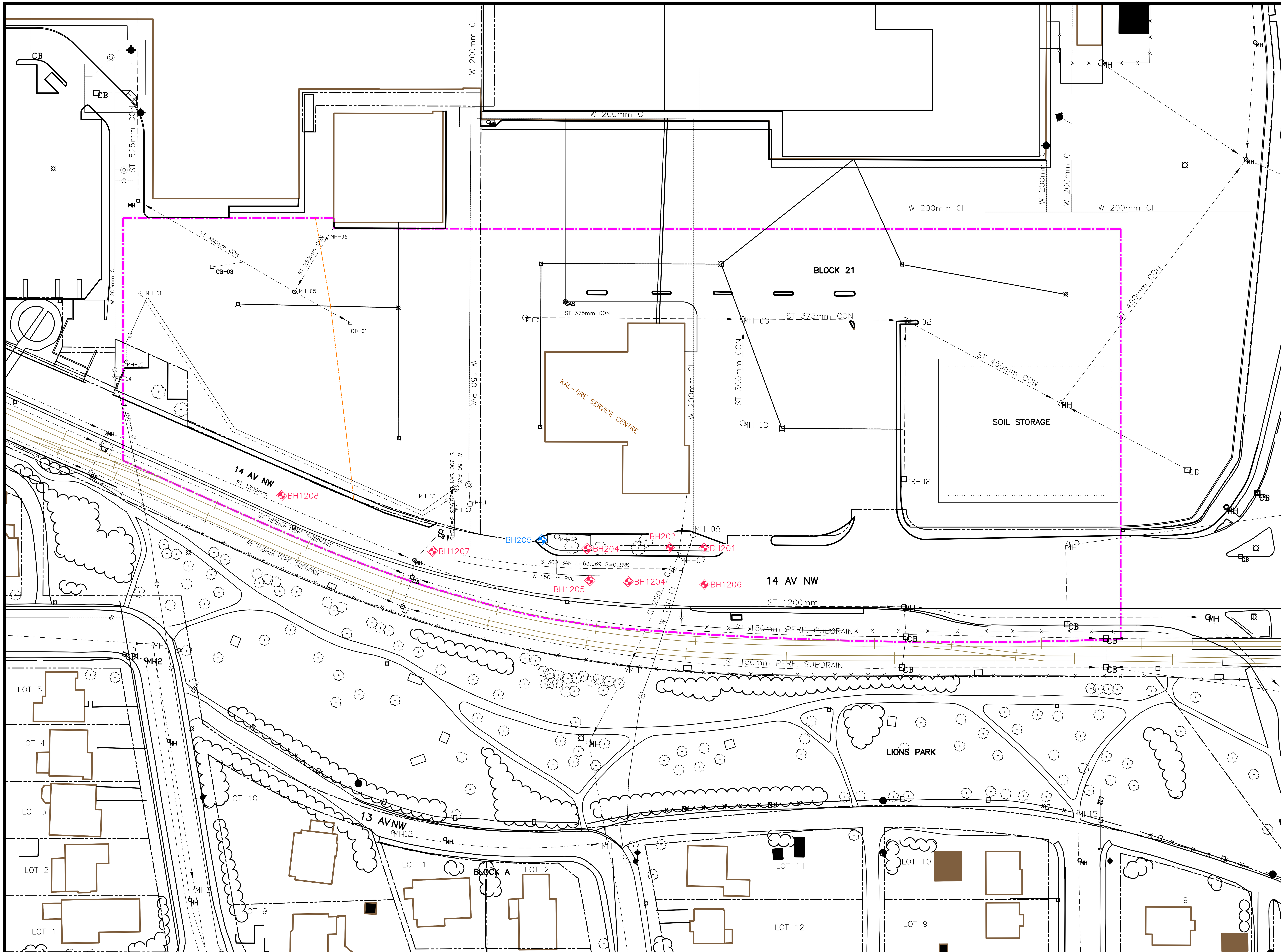
www.clifton.ca



LEGEND

DECOMMISSIONED MONITORING WELLS	
LOST MONITORING WELL	
INVESTIGATION BOUNDARY	
LRT TRACKS	
FENCE LINE	
LEGAL LINE	
FACILITY/FEATURE	
BUILDING	
TREES	

UTILITIES & SYMBOLS

NATURAL GAS LINE	
SANITARY SEWER	
STORM SEWER	
WATER	
FIBRE OPTICS CABLE	
UNDERGROUND POWER	
TELEPHONE	
POWER POLE	
CATCH BASIN	CB
FIRE HYDRANT	
LIGHT STANDARD	
MANHOLE	MH
VALVE	
TRAFFIC ISLAND	

ABBREVIATIONS

W - WELL INSTALLED
I - INFILL
US - UPPER SANDY STRATA
UC - UPPER CLAY STRATA
LS - LOWER INTERBEDDED SILT AND SAND STRATA
DA - DEEPER AQUIFER

NOTES:

1. DRAWING COMPILED FROM PLANIMETRIC FILES SUPPLIED BY THE CITY OF CALGARY (INCLUDING U/G UTILITIES), SITE ASSESMENT INFORMATION, AND TRONNES SURVEYS LTD SURVEY DONE JUNE 14,15 OF 2005. ADDITIONAL REFERENCES FROM SEACOR ENVIRONMENTAL ENGINEERING INC., DRAWINGS 149-5A6.DWG AND 149-5A6.DWG

2. TEMPORARY BENCHMARKS:
ASCM 57265 AT COORDINATES
N. 5658680.491 E. -6627.858
ELEVATION 1090.078m ASL.

ASCM 75838 AT COORDINATES
N. 5658986.637 E. -6668.803
ELEVATION 1091.344m ASL.

0 10 20 30 40 50 m

ENGINEER
Clifton Associates

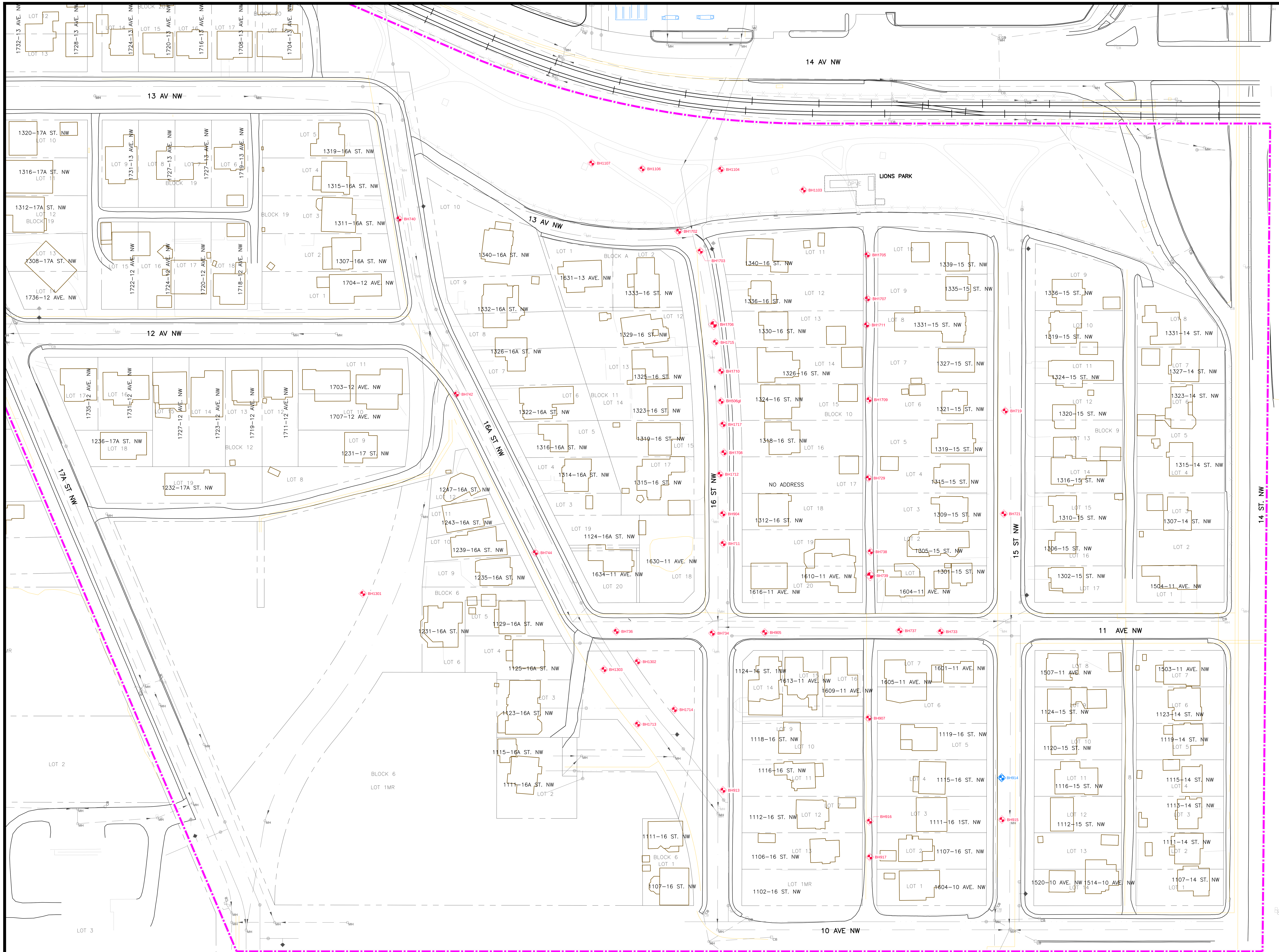
CLIENT
SEARS Canada Inc.

PROJECT
UPDATED SITE MANAGEMENT PLAN (2014)
HOUNSFIELD HEIGHTS - BRIAR HILL COMMUNITY
CALGARY, ALBERTA

TITLE
GROUNDWATER MONITORING WELL
ABANDONMENT LOCATIONS
14TH AVENUE NW

DESIGNED	SCALE	DATE
	1:500	2015-02-13
DRAWN: RD	PROJECT NO.: CG2430	DWG NO.: 1
CHECKED	FILE NO.: CG2430E03-2	

J:\CALGARY PROJECTS\C2000s\C2400s\CG2430s\CG2430\CURRENT\E03 - DECOMMISSIONED WELLS\CG2430E03-2.dwg, 03/10/2015 10:13:35 AM



LEGEND

DECOMMISSIONED MONITORING WELLS	
LOST MONITORING WELL	
INVESTIGATION BOUNDARY	
LRT TRACKS	
FENCE LINE	
LEGAL LINE	
FACILITY/FEATURE	
BUILDING	
TREES	

UTILITIES & SYMBOLS

NATURAL GAS LINE	
SANITARY SEWER	
STORM SEWER	
WATER	
FIBRE OPTICS CABLE	
TELEPHONE	
POWER POLE	
CATCH BASIN	CB
FIRE HYDRANT	
LIGHT STANDARD	
MANHOLE	MH
VALVE	
TRAFFIC ISLAND	

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0 10 20 30 m

ENGINEER

Clifton Associates

CLIENT

SEARS Canada Inc.

PROJECT

UPDATED SITE MANAGEMENT PLAN (2014)
HOUNSFIELD HEIGHTS - BRIAR HILL COMMUNITY
CALGARY, ALBERTA

TITLE

GROUNDWATER MONITORING WELL
ABANDONMENT LOCATIONS
LIONS PARK AND SOUTH

DESIGNED	SCALE 1:750	DATE 2015-02-13
DRAWN RD	PROJECT NO. CG2430	DWG NO. 2
CHECKED	FILE NO. CG2430E03-3	

Appendix B

Clifton and Associates
Borehole Logs

Clifton Associates

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www.clifton.ca

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 201

Page: 1 of 1

Client:	City of Calgary	Northing:	5658698.7	Date:	13 August 2014
Project:	Well Decommission	Easting:	-6844.3	Driller:	All Services
Location:	Houndsfield Heightsl, Calgary, AB	Ground Elev.:	1090.73m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Topsoil
1									sand
2		See soil description for BH 201 logged on 19 October 1998.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7		Monitor well drilled out to 7.0m. Bentonite grout tremied in place.							
8									

Env BH m elev CAL v09.tdf

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BOREHOLE LOG

Borehole: 202

Page: 1 of 1

Client:	City of Calgary	Northing:	5658701.0 m	Date:	18 August 2014
Project:	Well Decommission	Easting:	-6889.6 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.95 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ 0 50 100	Headspace Vapour ppm 10 100 1000 10000	Monitor Well Construction Detail
0		Decommissioned							Topsoil
1		See soil description for BH 202 logged on 19 September 1998.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7		Monitor well drilled out to 7.0 m. Bentonite grout tremied in place.							
8									

Env BH m elev CAL v09.idf

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BOREHOLE LOG

Borehole: 204

Page: 1 of 1

Client:	City of Calgary	Northing:	5658698.5 m	Date:	18 August 2014
Project:	Well Decommission	Easting:	-6876.6 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.80 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Topsoil
1									
		See soil description for BH 204 logged on 19 October 1998.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9		Monitor well drilled out to 9.15 m.							
10		Bentonite grout tremied in place.							

Env BH m elev CAL v09.tdf

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BOREHOLE LOG

Borehole: 506

Page: 1 of 1

Client:	City of Calgary	Northing:	5658548.000 m	Date:	12 September 2014
Project:	Well Decommission	Easting:	-6859.650 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1088.941 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH506 logged on 13 November 2002.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14		Monitor well drilled out to 13.72 m. Bentonite grout tremied in place.							
15									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 711

Page: 1 of 1

Client:	City of Calgary	Northing:	5658488.278 m	Date:	17 September 2014
Project:	Well Decommission	Easting:	-6858.715 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1085.285 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH711 logged on 10 February 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 719

Page: 1 of 1

Client:		Northing:	5658543.730	Date:	14 August 2014
Project:	Well Decommission	Easting:	-6740.914	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1089.231m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content: percent (Plastic Limit ▲, Natural Moisture ●, Liquid Limit ◆; 0 – 50 – 100)	Headspace Vapour: ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Sand
1		See soil description for BH 719 logged on 12 September 2003.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 721

Page: 1 of 1

Client:	City of Calgary	Northing:	5658500.723	Date:	15 August 2014
Project:	Well Decommission	Easting:	-6741.436	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1085.211	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt
1									Sand
2		See soil description for BH 721 logged on 15 September 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 729

Page: 1 of 1

Client:	City of Calgary	Northing:	5658515.668 m	Date:	26 August 2014
Project:	Well Decommission	Easting:	-6798.024 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1088.621 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH729 logged on 18 May 2003.							Asphalt Concrete
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18		Monitor well drilled out to 18.3 m. Bentonite grout tremied in place.							
19									
20									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 733

Page: 1 of 1

Client:	City of Calgary	Northing:	5658451.470 m	Date:	02 September 2014
Project:	Well Decommission	Easting:	-6767.817 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1080.706 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH733 logged on 19 September 2004.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 734

Page: 1 of 1

Client:	City of Calgary	Northing:	5658450.827 m	Date:	03 September 2014
Project:	Well Decommission	Easting:	-6763.296 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1082.710 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH734 logged on 22 September 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 736

Page: 1 of 1

Client:	City of Calgary	Northing:	5658451.574 m	Date:	04 September 2014
Project:	Well Decommission	Easting:	-6903.473 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1084.671 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH736 logged on 22 September 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

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BOREHOLE LOG

Borehole: 737

Page: 1 of 1

Client:	City of Calgary	Northing:	5658451.888 m	Date:	02 September 2014
Project:	Well Decommission	Easting:	-6784.950 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1080.782 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH737 logged on 23 September 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14		Monitor well drilled out to 13.7 m. Bentonite grout tremied in place.							
15									

Env BH m elev CAL v09.tdf

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BOREHOLE LOG

Borehole: 738

Page: 1 of 1

Client:	City of Calgary	Northing:	5658484.873 m	Date:	26 August 2014
Project:	Well Decommission	Easting:	-6797.195 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1084.857 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH738 logged on 24 September 2003.							Asphalt Sand
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17		Monitor well drilled out to 16.7 m. Bentonite grout tremied in place.							
18									
19									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 739

Page: 1 of 1

Client:	City of Calgary	Northing:	5658474.917 m	Date:	27 August 2014
Project:	Well Decommission	Easting:	-6797.328 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1083.295 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Sand
1		See soil description for BH739 logged on 24 September 2003.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 740

Page: 1 of 1

Client:	City of Calgary	Northing:	5658623.974 m	Date:	08 September 2014
Project:	Well Decommission	Easting:	-6994.263 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1091.054 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH740 logged on 29 September 2003.							Asphalt Concrete Sand
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17		Monitor well drilled out to 16.8 m. Bentonite grout tremied in place.							
18									
19									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 742

Page: 1 of 1

Client:	City of Calgary	Northing:	5658550.810 m	Date:	05 September 2014
Project:	Well Decommission	Easting:	-6970.380 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.553 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH742 logged on 29 September 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19		Monitor well drilled out to 18.3 m. Bentonite grout tremied in place.							
20									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 744

Page: 1 of 1

Client:	City of Calgary	Northing:	5658484.537 m	Date:	05 September 2014
Project:	Well Decommission	Easting:	-6937.354 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1086.585 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH744 logged on 30 September 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 904

Page: 1 of 1

Client:	City of Calgary	Northing:	5658500.699 m	Date:	16 September 2014
Project:	Well Decommission	Easting:	-6858.892 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1086.315 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ 0 50 100	Headspace Vapour ppm 10 100 1000 10000	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1		See soil description for BH904 logged on 04 February 2004.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7		Monitor well drilled out to 7.3 m. Bentonite grout tremied in place.							
8									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 905

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	03 September 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1		See soil description for BH905 logged on 22 September 2003.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12		Monitor well drilled out to 12.1 m.							
13		Bentonite grout tremied in place.							
14									

Env BH m elev CAL v09.ldf

Clifton Associates

BOREHOLE LOG

Borehole: 907

Page: 1 of 1

Client:	City of Calgary	Northing:	5658415.323 m	Date:	27 August 2014
Project:	Well Decommission	Easting:	-6797.980 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1079.266 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitoring Well Construction Detail
0 / 0		Decommissioned							Asphalt Sand
-1 / 1		See soil description for BH907 logged on 04 February 2004.							
-2 / 2									
-3 / 3									Backfilled with Bentonite Grout
-4 / 4									
-5 / 5									
-6 / 6									
-7 / 7									
-8 / 8									
-9 / 9									
-10 / 10									
-11 / 11									
-12 / 12		Monitor well drilled out to 12.2 m.							
-13 / 13		Bentonite grout tremied in place.							
-14 / 14									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 913

Page: 1 of 1

Client:	City of Calgary	Northing:	5658385.191 m	Date:	17 September 2014
Project:	Well Decommission	Easting:	-6858.851 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1072.791 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
		See soil description for BH913 logged on 18 February 2004.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9		Monitor well drilled out to 9.1 m. Bentonite grout tremied in place.							
10									

Env BH m elev CAL v09.tdf

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BOREHOLE LOG

Borehole: 915

Page: 1 of 1

Client:	City of Calgary	Northing:	5658372.921 m	Date:	15 August 2014
Project:	Well Decommission	Easting:	-6742.277 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1068.332 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 / 50 / 100)	Headspace Vapour ppm (10 / 100 / 1000 / 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt
1									Sand
2		See soil description for BH 915 logged on 18 September 2004.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9		Monitor well drilled out to 9.1 m. Bentonite grout tremied in place.							
10									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 916

Page: 1 of 1

Client:	City of Calgary	Northing:	5658372.240 m	Date:	28 August 2014
Project:	Well Decommission	Easting:	-6797.601 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1079.121 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete
1		See soil description for BH916 logged on 19 February 2004.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12		Monitor well drilled out to 12.2 m.							
13		Bentonite grout tremied in place.							
14									

Env BH m elev CAL v09.tdf

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BOREHOLE LOG

Borehole: 917

Page: 1 of 1

Client:	City of Calgary	Northing:	5658357.279 m	Date:	28 August 2014
Project:	Well Decommission	Easting:	-6797.466 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1073.793 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete
1		See soil description for BH917 logged on 19 February 2004.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9		Monitor well drilled out to 9.1 m. Bentonite grout tremied in place.							
10									
11									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1103

Page: 1 of 1

Client:	City of Calgary	Northing:	5658636.015 m	Date:	07 October 2014
Project:	Well Decommission	Easting:	-6825.230 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1089.476 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ 0 50 100	Headspace Vapour ppm 10 100 1000 10000	Monitor Well Construction Detail
0		Decommissioned							Top Soil
1		See soil description for BH1103 logged on 27 February 2004.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17		Monitor well drilled out to 16.8 m.							
18		Bentonite grout tremied in place.							
19									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1104

Page: 1 of 1

Client:	City of Calgary	Northing:	5658644.628 m	Date:	07 October 2014
Project:	Well Decommission	Easting:	-6859.737 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.113 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH1104 logged on 01 March 2004.							Top Soil
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19		Monitor well drilled out to 18.3 m. Bentonite grout tremied in place.							
20									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1106

Page: 1 of 1

Client:	City of Calgary	Northing:	5658644.903 m	Date:	08 October 2014
Project:	Well Decommission	Easting:	-6892.653 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.854 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH1106 logged on 01 March 2004.							Top Soil
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17		Monitor well drilled out to 16.8 m. Bentonite grout tremied in place.							
18									
19									

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Clifton Associates

BOREHOLE LOG

Borehole: 1107

Page: 1 of 1

Client:	City of Calgary	Northing:	5658647.284 m	Date:	08 October 2014
Project:	Well Decommission	Easting:	-6913.689 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1092.069 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH1107 logged on 02 March 2004.							Top Soil
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m. Bentonite grout tremied in place.							
16									
17									

Env BH m elev CAL v09.ldf

Clifton Associates

BOREHOLE LOG

Borehole: 1204

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	22 August 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitoring Well Construction Detail
0 / 0		Decommissioned See soil description for BH1204 logged on 04 May 2004.							Asphalt Concrete Backfilled with Bentonite Grout
-1 / 1									
-2 / 2		Refusal @ 1.5 m. Monitor well drilled out to 1.5 m. Bentonite grout tremied in place.							
-3 / 3									
-4 / 4									
-5 / 5									
-6 / 6									
-7 / 7									
-8 / 8									
-9 / 9									
-10 / 10									
-11 / 11									
-12 / 12									
-13 / 13									
-14 / 14									
-15 / 15									
-16 / 16									
-17 / 17									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1205

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	23 August 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete
1									
2		See soil description for BH1205 logged on 04 May 2004.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1206

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	22 August 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH1206 logged on 05 May 2004.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16		Monitor well drilled out to 15.2 m. Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 1207

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	24 August 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete
1									
2		See soil description for BH1207 logged on 05 May 2004.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.2 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 1208

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	23 August 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete
1		See soil description for BH1208 logged on 05 May 2004.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9		Monitor well drilled out to 9.1 m. Bentonite grout tremied in place.							
10									
11									

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Clifton Associates

BOREHOLE LOG

Borehole: 1301

Page: 1 of 1

Client:	City of Calgary	GPS North:		Date:	09 December 2014
Project:	Well Decommission	GPS West:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitoring Well Construction Detail
0		Decommissioned							Topsoil
1									Sand
2		See soil description for BH1301 logged on 15 December 2004.							Backfilled with Bentonite Grout
3									
4									
5									
6									
7									
8									
9		Monitor well drilled out to 9.1 m. Bentonite grout tremied in place.							
10									

Env BH m elev CAL v09.ldf

Clifton Associates

BOREHOLE LOG

Borehole: 1302

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	6 October 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ 0 50 100	Headspace Vapour ppm 10 100 1000 10000	Monitoring Well Construction Detail
0 0		Decommissioned							Top Soil
-1 1		See soil description for BH1302 logged on 16 December 2004.							Sand
-2 2									
-3 3									Backfilled with Bentonite Grout
-4 4									
-5 5									
-6 6									
-7 7									
-8 8									
-9 9									
-10 10									
-11 11									
-12 12		Monitor well drilled out to 12.2 m.							
-13 13		Bentonite grout tremied in place.							

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1303

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	14 October 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Top Soil
1									
2		See soil description for BH1303 logged on 16 December 2004.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.1 m.							
16		Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1702

Page: 1 of 1

Client:	City of Calgary	Northing:	5658621.462 m	Date:	19 August 2014
Project:	Well Decommission	Easting:	-6882.644 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.078 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1		See soil description for BH 1702 logged on 08 July 2008.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16		Monitor well drilled out to 15.3 m. Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 1703

Page: 1 of 1

Client:	City of Calgary	Northing:	5658613.124 m	Date:	19 August 2014
Project:	Well Decommission	Easting:	-6873.553 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1089.771 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH 1703 logged on 08 July 2008.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14		Monitor well drilled out to 14.0 m.							
15		Bentonite grout tremied in place.							
16									

Env BH m elev CAL v09.ldf

Clifton Associates

BOREHOLE LOG

Borehole: 1705

Page: 1 of 1

Client:	City of Calgary	Northing:	5658611.595 m	Date:	20 August 2014
Project:	Well Decommission	Easting:	-6803.872 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1089.678 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Elev (m) Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content: percent (Plastic Limit ▲, Natural Moisture ●, Liquid Limit ◆; 0 – 50 – 100)	Headspace Vapour: ppm (10 – 100 – 1000 – 10000)	Monitoring Well Construction Detail
0 – 0		Decommissioned See soil description for BH 1705 logged on 08 July 2008.							Asphalt 0.3m Sand Backfilled with Bentonite Grout
-12 – 12		Monitor well drilled out to 12.2 m. Bentonite grout tremied in place.							
-14 – 14									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 1706

Page: 1 of 1

Client:	City of Calgary	Northing:	5658582.510 m	Date:	09 September 2014
Project:	Well Decommission	Easting:	-6867.964 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1089.369 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH1706 logged on 09 July 2008.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14		Monitor well drilled out to 13.72 m. Bentonite grout tremied in place.							
15									

Env BH m elev CAL v09.ldf

Clifton Associates

BOREHOLE LOG

Borehole: 1707

Page: 1 of 1

Client:	City of Calgary	Northing:	5658593.133 m	Date:	21 August 2014
Project:	Well Decommission	Easting:	-6803.713 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1090.816 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitoring Well Construction Detail
0 / 0		Decommissioned See soil description for BH1707 logged on 09 July 2008.							Asphalt 0.3m Sand Backfilled with Bentonite Grout
-15 / 15		Monitor well drilled out to 15.24 m. Bentonite grout tremied in place.							
-17 / 17									

Env BH m elev CAL v09.idf

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BOREHOLE LOG

Borehole: 1708

Page: 1 of 1

Client:	City of Calgary	Northing:	5658528.864 m	Date:	15 September 2014
Project:	Well Decommission	Easting:	-6863.704 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1087.668 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH1708 logged on 09 July 2008.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16		Monitor well drilled out to 15.24 m. Bentonite grout tremied in place.							
17									

Env BH m elev CAL v09.tdf

Clifton Associates

BOREHOLE LOG

Borehole: 1709

Page: 1 of 1

Client:	City of Calgary	Northing:	5658551.168 m	Date:	25 August 2014
Project:	Well Decommission	Easting:	-6803.101 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1092.068 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH1709 logged on 09 May 2008.							Asphalt Concrete
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19		Monitor well drilled out to 18.3 m. Bentonite grout tremied in place.							
20									

Env BH m elev CAL v09.idf

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BOREHOLE LOG

Borehole: 1710

Page: 1 of 1

Client:	City of Calgary	Northing:	5658562.869 m	Date:	11 September 2014
Project:	Well Decommission	Easting:	-6865.082 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1088.911 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content: Plastic Limit ▲ / percent Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned See soil description for BH1710 logged on 09 July 2008.							Asphalt Concrete Sand
1									
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15		Monitor well drilled out to 15.24 m. Bentonite grout tremied in place.							
16									
17									

Env BH m elev CAL v09.ldf

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BOREHOLE LOG

Borehole: 1711

Page: 1 of 1

Client:	City of Calgary	Northing:	5658582.280 m	Date:	20 August 2014
Project:	Well Decommission	Easting:	-6804.038 m	Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:	1091.659 m	Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitoring Well Construction Detail
0 / 0		Decommissioned See soil description for BH1711 logged on 09 July 2008.							Asphalt 0.3m Sand Backfilled with Bentonite Grout
-15 / 15		Monitor well drilled out to 15.24 m. Bentonite grout tremied in place.							
-17 / 17									

Env BH m elev CAL v09.idf

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BOREHOLE LOG

Borehole: 1712

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	16 September 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1		See soil description for BH1712 logged on 20 Janurary 2009.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12		Monitor well drilled out to 12.2 m.							
13		Bentonite grout tremied in place.							
14									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1713

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	06 October 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content percent: Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Top Soil
1		See soil description for BH1713 logged on 20 Janurary 2009.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8		Monitor well drilled out to 7.62 m. Bentonite grout tremied in place.							
9									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1714

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Client:	City of Calgary	Northing:		Date:	06 October 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Top Soil
1		See soil description for BH1714 logged on 20 Janurary 2009.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8		Monitor well drilled out to 7.62 m. Bentonite grout tremied in place.							
9									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1715

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Client:	City of Calgary	Northing:		Date:	09 September 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample Type	Sample No.	SPT 'N'	USC	Moisture Content (percent) Plastic Limit ▲ Natural Moisture ● Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1									
2		See soil description for BH1715 logged on 19 Janurary 2003.							
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12		Monitor well drilled out to 12.2 m.							
13		Bentonite grout tremied in place.							
14									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1716

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Client:	City of Calgary	Northing:		Date:	11 September 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1		See soil description for BH1716 logged on 19 Janurary 2009.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12		Monitor well drilled out to 12.2 m.							
13		Bentonite grout tremied in place.							
14									

Env BH m elev CAL v09.idf

Clifton Associates

BOREHOLE LOG

Borehole: 1717

Page: 1 of 1

Client:	City of Calgary	Northing:		Date:	15 September 2014
Project:	Well Decommission	Easting:		Driller:	All Services
Location:	Houndsfield Heights, Calgary, AB	Ground Elev.:		Method:	Hollow Stem
Project No.:	CG2430-E03	Top Casing Elev.:	N/A	Logged by:	GAC

Depth (m)	Symbol	Soil Description	Sample: Type	Sample: No.	Sample: SPT 'N'	USC	Moisture Content (percent): Plastic Limit ▲ / Natural Moisture ● / Liquid Limit ◆ (0 – 50 – 100)	Headspace Vapour ppm (10 – 100 – 1000 – 10000)	Monitor Well Construction Detail
0		Decommissioned							Asphalt Concrete Sand
1		See soil description for BH1717 logged on 20 Janurary 2009.							
2									
3									Backfilled with Bentonite Grout
4									
5									
6									
7									
8									
9									
10									
11									
12		Monitor well drilled out to 12.2 m.							
13		Bentonite grout tremied in place.							
14									