

February 22, 2011

Ref. No.: 09-202-11C

National Capital Commission
Central Region – Planning & Environmental Office
202-40 Elgin Street,
Ottawa, Ontario K1P 1C7

Attn: Ms. Allison Myatt**RE: Limited Groundwater and Soil Remediation Project, Richmond Landing, Ottawa, Ontario, NCC Property Asset 96189.**

Dear Ms. Myatt:

1 INTRODUCTION

Geofirma Engineering Ltd. (formerly INTERA Engineering Ltd.) was retained by the National Capital Commission (NCC) to complete a limited soil and groundwater remediation, and well decommissioning program for Richmond Landing located in Ottawa, Ontario. The work was completed in accordance with the proposal dated May 17, 2010, as approved by the NCC.

1.1 Site Description

Richmond Landing (NCC Property Asset Number 96189) is located on the Ottawa River, south of Victoria Island, and east of the Portage Bridge in Ottawa, Ontario. The site includes green space and recreational pathways. The site was previously used as a bulk oil and fuel storage facility. Figure 1, Attachment A provides a site layout, including location of groundwater monitoring wells.

1.2 Background and Previous Work

Intera Technologies Ltd. completed an Initial Site Characterization for the property, in a report dated August 1989 (Intera Technologies Ltd., 1989). The report identified a bulk fuel storage facility and rail sidings as former land uses of concern on the site. Soil and groundwater analyses identified low levels of hydrocarbon and metals contamination.

A Phase II ESA was completed on the site by Trow Associates Inc. (Trow) during January to May of 2009 (Trow, 2009a). The work included drilling of 25 boreholes, with installation of 23 groundwater monitoring wells. Soil and groundwater samples were collected and analyzed for metals, petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAH) and polychlorinated biphenyls (PCBs).

Waste materials including brick, wood, glass, coal etc. were present in most of the 25 boreholes. Shallow surface soil samples (defined by Trow as the upper 0.1 m of soil) met applicable federal guidelines and provincial standards, however surface (0.1 - 0.6 metres below ground surface [BGS]) and subsurface (>0.6 mBGS) soils had exceedences of standards and/or guidelines for metals, PAH and PHC parameters (Trow, 2009a).

Groundwater quality generally met Ontario Ministry of the Environment (MOE) non-potable groundwater standards (Table 3), however there were several exceedences of MOE Table 1 and CCME community water guidelines for BTEX and PAH parameters (and a few metals parameters). At the time of investigations, MOE did not have numerical standards for petroleum hydrocarbons in groundwater, however the presence of petroleum hydrocarbon contamination (sheen/odour), and high concentrations of PHCs in groundwater were detected at several wells during the Phase II ESA. Additional groundwater and surface water monitoring, as well as a preliminary quantitative risk assessment for the site was recommended.

Additional surface water and groundwater investigations were completed by Trow, in a report dated October 2009 (Trow, 2009b). These investigations identified PAH contamination exceeding MOE Table 3 standards for non-potable groundwater in five monitoring wells, and visual and olfactory evidence of petroleum hydrocarbon impact in six monitoring wells. Surface water results indicated no detections of PHC, BTEX or metals parameters; however a few exceedences of Provincial Water Quality Objectives (PWQOs) were noted for PAH parameters. Trow concluded PAH concentrations in the Ottawa River may be partially attributed to groundwater discharging from the site. Semi-annual surface water and groundwater sampling was recommended.

Geofirma Engineering Ltd. (as INTERA) completed a groundwater monitoring program and remedial options assessment (INTERA, 2010) in the spring of 2010. This assessment was to further evaluate groundwater conditions at the site, determine if a remediation program was required, and assess the feasibility of implementing a remediation option prior to the construction of a Navy monument scheduled for construction in July 2010 at Richmond Landing. The results of the groundwater monitoring concluded that metals in groundwater were not a significant concern and PAH concentrations were variable. Petroleum hydrocarbons were measured at variable concentrations throughout the site, although field evidence (sheen, odour) were observed at 12 of the wells onsite. An evaluation of natural attenuation was completed for the property (INTERA, 2010) as part of the groundwater monitoring program. This evaluation concluded that although natural attenuation was occurring, conditions did not appear adequate for the system to move to completion. Based on this, a groundwater remediation program was recommended for the site. Four remediation options were evaluated, and an in-situ chemical oxidation method was deemed to be the most effective and efficient remediation method for the site, given time and logistical constraints.

1.3 Objectives and Scope of Work

The objectives of the work were to remediate PAH and PHC contamination, and decommission all necessary wells, prior to breaking ground for a monument to be constructed on the site. The primary objective of the remediation program was the elimination of evidence of hydrocarbon contamination, such as sheen and odour, within the groundwater, and to bring concentrations of BTEX and PHC parameters to below MOE guidelines for non-potable groundwater (Table 3). The secondary objective was to breakdown the PAH and PHC parameters in saturated soil, and soil immediately adjacent to

the monitoring well screens, through contact with the chemical oxidant. To meet these objectives, the scope of work for this project consisted of:

- Project Initiation;
- Implementation of an in-situ, chemical oxidation method to remediate soil and groundwater;
- Decommissioning of 20 of the 23 monitoring wells installed by Trow in 2009, on the Richmond Landing site; and
- Reporting.

2 FIELD METHODOLOGY

Project field activities were supervised by Geofirma staff between June 7 and 22, 2010 and included the injection of the chemical oxidant on June 7, 8, 9 and 10, and the decommissioning of the monitoring wells on June 22, 2010.

2.1 Project Initiation

This task included a detailed review of the documentation for the site including NCC and Geofirma files, focusing on the available chemical groundwater data, the scheduling and coordination of activities, communications, and a site start up meeting. The remediation contractor, VERTEX Environmental Inc. (VERTEX) activated their mobile Certificate of Approval (C of A) from the Ontario Ministry of the Environment (MOE) on May 21, 2010 for use at the site.

2.2 Chemical Oxidant Injection

VERTEX, of Cambridge, Ontario was retained by Geofirma to design and implement the oxidant injection program for Richmond Landing.

Water level measurements were collected from 21 monitoring wells on June 7, 2010 using a Solinst® electronic water level tape. The probe of the water level tape was decontaminated with methyl hydrate and de-ionized water between monitoring wells to prevent cross-contamination. Groundwater levels were taken to determine a base groundwater level prior to injection in 19 monitoring wells on site.

On June 7, 2010 VERTEX commenced the injection of approximately 9,375 liters (L) of sodium persulphate solution into the subsurface at the site, over four days. The solution was comprised of sodium persulphate (oxidant) and hydrogen peroxide (activator) which was mixed with water obtained from the Ottawa River adjacent to the site. Persulphate was selected as the primary chemical oxidant as it is proven effective in oxidizing both PHC and PAH parameters by forcing the chemical destruction of the hydrocarbon to carbon dioxide and water. Hydrogen peroxide was selected to both “activate” the persulphate, and provide a source of oxygen to promote aerobic bioremediation after the oxidant is spent (VERTEX, 2010a). Use of these liquid products under pressure promotes migration within the subsurface.

The following wells were injected with the solution: MW09-02, MW09-03, MW09-04, MW09-06, MW09-07, MW09-08, MW09-09, MW09-10, MW09-11, MW09-12, MW09-13, MW09-18, MW09-19, MW09-20, MW09-21, MW09-22, MW09-23, MW09-24 and MW09-25. Monitoring wells MW5, MW14

and MW15 did not show significant impacts from PAH or PHC in groundwater, therefore oxidant injection was not completed in these well intervals, as there would have been minimal benefit to these areas. Oxidant volumes injected varied between wells, and was based on several factors including level of contamination detected within each well, the proximity of other wells receiving injection, overall mass of contaminant expected on site, and ultimately how much oxidant volume each well would accommodate (screened interval, hydraulic conductivity etc.). Proposed volumes were calculated for the site by VERTEX using equations for in-situ chemical oxidation, prior to commencement of the field work. These volumes were amended, as required, based on site conditions at the time of injection. For the total volume injected in each well see the VERTEX report in Attachment B.

The injection fixture was outfitted with a pressure gage and fittings for hoses as shown in picture one, Attachment A. The fixture was placed over top of the riser at each well location while the hoses led to a trailer where the solution was mixed and then pressurized into the well. The solution was injected at a rate of 10 to 15 Liters per minute (L/min) and at a pressure of less than 20 pounds per square inch (psi).

Water levels were continually measured in adjacent wells while the persulphate solution was injected. This was to detect any change in the groundwater level which would suggest the migration of the oxidant throughout the subsurface. To monitor the movement of the solution, oxidant sampling was conducted in the river and adjacent wells using a CHEMetrics persulfate visual test kit. While injecting MW09-6, persulphate was detected in the casing of adjacent well MW09-20 at a concentration of 29 milligrams per liter (mg/L). Oxidant sampling at other monitoring well locations did not indicate the presence of persulphate. Both visual monitoring and the CHEMetrics kit were used in the Ottawa River, and sewers/utilities on the property to regularly monitor potential release of solution throughout the injection. No oxidant was detected in the Ottawa River, or the storm sewer locations on site (VERTEX 2010b).

While injecting MW09-18 on June 9, 2010 some oxidant came to surface through the exterior of the flushmount casing. Upon observation of the solution at surface, the injection into MW09-18 ceased immediately and absorbent socks were placed to contain the oxidant, which was diluted with water and neutralized with application of sodium thiosulphate (a reductant), as shown in picture two, Attachment A. MW09-18 was monitored for a period of 4 hours to ensure that no further oxidant came to surface. MW09-18 finished injection at 0 psi (gravity feed) on June 10, 2010. Injection into MW09-3 showed signs of the oxidant coming to surface around the casing also, thus VERTEX ceased the injection and on June 10, 2010 finished by gravity feeding the oxidant into the well. As a precaution, MW09-19 and MW09-2 were also gravity fed as they were similar in construction to MW09-18 and MW09-3. Further details are provided in the VERTEX Memorandum, Attachment B (VERTEX, 2010b).

2.3 Well Decommissioning

All wells that would be impacted by the monument construction and re-landscaping were removed from site. Refer to Attachment A for well locations and site layout. Well decommissioning activities were completed by Strata Soil Sampling Inc. (Strata) of Richmond Hill, Ontario, an MOE-licensed well driller, on June 22, 2010 under the supervision of Geofirma personnel. The following monitoring wells were decommissioned: MW09-02, MW09-03, MW09-04, MW09-06, MW09-07, MW09-08, MW09-09, MW09-10, MW09-11, MW09-12, MW09-13, MW09-14, MW09-18, MW09-20, MW09-21, MW09-22,

MW09-23, MW09-24 and MW09-25. Wells were decommissioned in accordance with the Ontario Water Resources Act (O. Reg. 903). A copy of the MOE well decommissioning record is included in Attachment C. The following steps were undertaken to decommission each well:

- Removal of the aluminum flushmount casing, and removal of the PVC riser to a minimum of 2 mBGS.
- Remaining PVC riser and upper 2 metres of well annulus were filled with bentonite grout to completely seal the well.
- Borehole was then finished to near grade with silica sand and/or native soil.
- Capped with cement for locations on the pathway, or topsoil and grass for locations in the grassed areas.

During the decommissioning of wells on June 22, 2010, two historical wells were identified on site. Historical monitoring well RL-2, appeared to have been previously decommissioned. There was no casing for the well, and concrete had been poured into the riser and capped with asphalt at surface. The PVC riser was sticking up in the pathway creating an uneven and potentially hazardous surface. Strata removed the RL-2 riser several inches below ground surface, filled with a bentonite seal, then capped with concrete flush to ground surface.

A well directly beside MW09-14 (named MW09-14A by Strata on-site as there was no identifier on the well) appeared to have been partially decommissioned as well, although the flush-mount casing was still in place. The well casing was removed and all evidence of the PVC riser was removed (approx. 0.45m). The well was filled with bentonite grout and sealed at surface with cement.

As part of the cluster, MW09-1 was scheduled for decommissioning, however, it could not be located on site. .

On August 4 and 5, 2010 the concrete decommissioning caps on wells located in asphalt pathways were replaced by Strata and Geofirma with asphalt patch due to cracking of the concrete.

3 CONCLUSIONS AND RECOMMENDATIONS

Based on the in-situ chemical oxidation limited remediation program, and well decommissioning completed at Richmond Landing, Ottawa, Ontario, the following conclusions are offered:

- Using 19 pre-existing monitoring wells, approximately 9,375 L of a sodium persulphate solution was injected in to the subsurface to improve the quality of the groundwater and soil through chemical destruction of petroleum and polycyclic aromatic hydrocarbon contamination.
- The oxidant solution reacts quickly to oxidize hydrocarbons to inert materials, namely carbon dioxide and water. The majority of the reaction occurs within the first 14 days following injection and continues to remain active, to a lesser extent, for a period of up to 8 weeks.
- Monitoring Wells MW09-02, MW09-03, MW09-04, MW09-06, MW09-07, MW09-08, MW09-09, MW09-10, MW09-11, MW09-12, MW09-13, MW09-14, MW09-18, MW09-20, MW09-21, MW09-22, MW09-23, MW09-24, MW09-25 and historic wells RL-2 and a well identified on site as MW09-14A, were decommissioned in accordance with the Ontario Water Resources Act (O. Reg. 903).
- Monitoring wells MW09-5, MW09-15 and MW09-19 remain on site.

Based on the above conclusions, following the monument construction and re-landscaping at the Richmond Landing site, a limited number of well intervals (approximately 7) should be installed into bedrock to monitor the effectiveness of the remediation and continued natural attenuation on site. Annual groundwater monitoring should continue on the site for a minimum of 5 years, to evaluate remediation. An estimated cost for the initial well installation and sampling is \$35,000-\$40,000, with annual monitoring costs of approximately \$12,000-\$15,000 per year.

4 REFERENCES

Intera Technologies Ltd., 1989. Initial Site Characterization, Richmond Landing, Ottawa, Ontario, NCC Property Asset No. 96189. Final Report prepared for the National Capital Commission, August.

Trow 2009a. Phase II ESA – Richmond Landing, NCC Property Asset #96189, Ottawa, Ontario. Final Report prepared for the National Capital Commission, July.

Trow 2009b. Surface Water and Groundwater Monitoring Program – Richmond Landing, NCC Property Asset No. 96189, Ottawa, Ontario. Final Report prepared for the National Capital Commission, October.

Intera Engineering Ltd., 2010. 2010 Groundwater Sampling and Remedial Options Assessment Richmond Landing, Ottawa Ontario NCC property Asset 96189. June 21.

VERTEX Environmental Inc., 2010a. Proposal for In-Situ Remediation of Subsurface Impacts, Richmond Landing, Ottawa ON. May 19.

VERTEX Environmental Inc., 2010b. Summary of Oxidant Injection - Richmond Landing, Ottawa ON. Technical Memorandum. July 28.

Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,
Geofirma Engineering Ltd.



Siobhan M. Quinlan,
Environmental Technologist

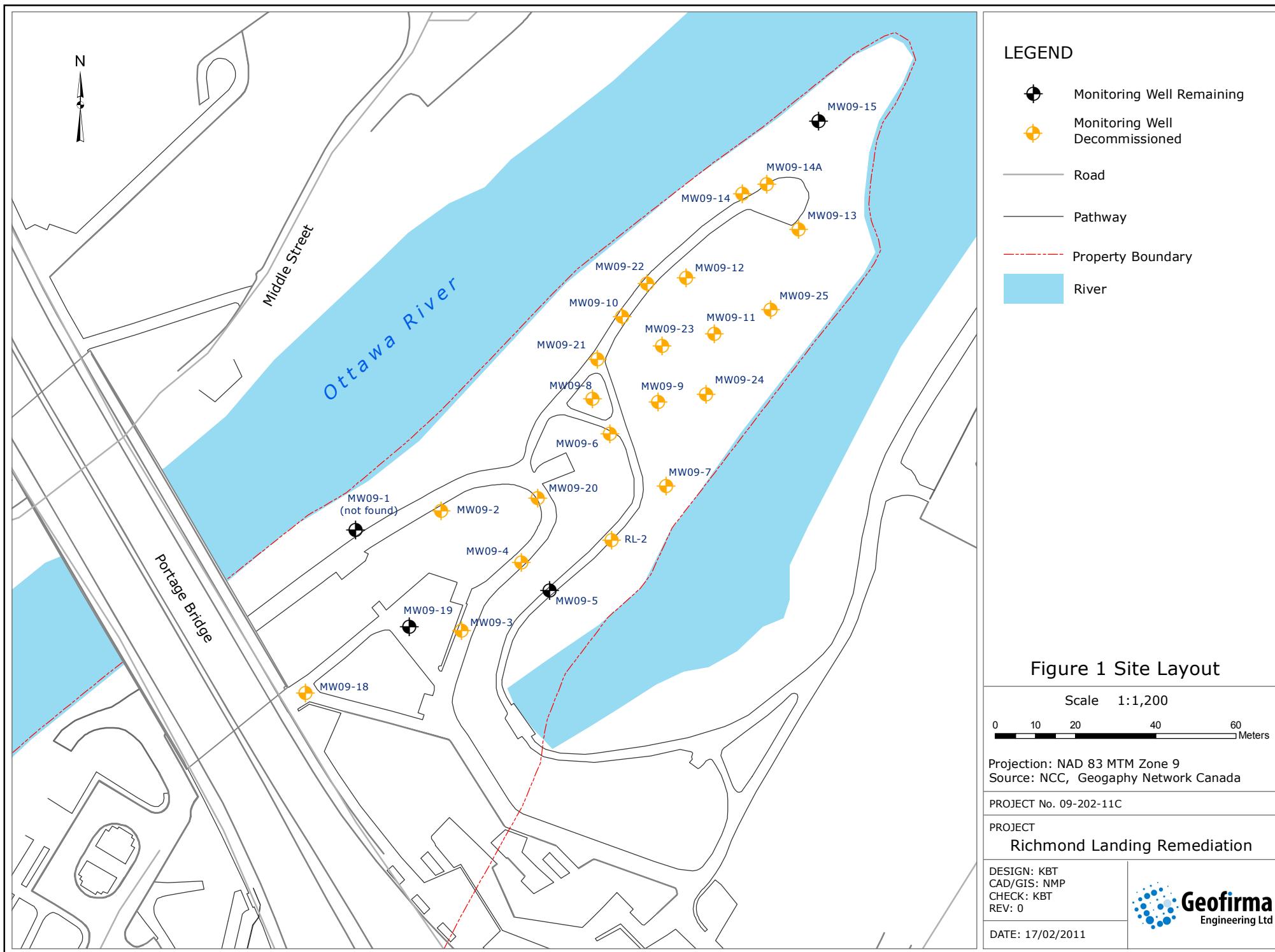


Krista B. Trounce, P.Eng.
Senior Project Manager

Doc. ID:	09-202-11C_Richmond Landing Remed_R0	
Revision Number:	R0	Date: February 22, 2011
Prepared By:	Siobhan M. Quinlan, Krista B. Trounce	
Reviewed By:	Krista B. Trounce	

ATTACHMENT A

Site Figures and Photographs



LEGEND







-  Monitoring Well Remaining
-  Monitoring Well Decommissioned
-  Road
-  Pathway
-  Property Boundary
-  River

Figure 1 Site Layout

Scale 1:1,200



Projection: NAD 83 MTM Zone 9
Source: NCC, Geogaphy Network Canada

PROJECT No. 09-202-11C

PROJECT
Richmond Landing Remediation

DESIGN: KBT
CAD/GIS: NMP
CHECK: KBT
REV: 0

DATE: 17/02/2011



Picture 1: Attachment injection fixture at monitoring wells



Picture 2: Post cleanup at MW09-18



ATTACHMENT B

VERTEX Technical Memorandum

VERTEX

Environmental Inc.

239 Montrose Street North, Cambridge, ON, Canada N3H 2J3
Tel: (519) 653-8444 Fax: (519) 653-8494 E-mail: info@vertexenvironmental.ca

MEMORANDUM

To:	Krista B. Trounce
Company:	INTERA Engineering Ltd.
From:	Bruce Tunncliffe
Subject:	Summary of Oxidant Injection Richmond Landing, Ottawa ON
Date:	July 28, 2010

Vertex Environmental Inc. (Vertex) has produced this memorandum summarizing the injection completed at Richmond Landing, Ottawa ON (the site).

Timeline

- **C of A:** On May 21, 2010 Vertex submitted a Notice of Intended Location to the Ontario Ministry of the Environment (MOE) Ottawa District Office to “activate” Vertex’s mobile persulfate Certificate of Approval (C of A) for the Site. The comment period passed without any questions or concerns being raised by the MOE.
- **Injection #1:** On June 7, 2010, Vertex personnel mobilized to the Site to complete an injection into existing wells.

Results

Injection #1

- **Injection Dates:** June 7- June 10, 2010.
- **Reagent:** Sodium Persulphate.
- **Solution:** Sodium Persulphate (oxidant) and hydrogen peroxide (activator) mixed with water obtained from the adjacent Ottawa River.
- **Injection Locations:** Nineteen (19) existing wells as shown on Trow Figure 2.
- **Injection Mass:** Approximately 1,875 kg of persulphate, as provided on Table 1.

During Injection #1, approximately 9,375 L of oxidant solution was injected into the subsurface. The solution was generally injected at less than 20 psi and at a rate of approximately 10-15 L/minute. During oxidant injection at MW09-6, persulphate was detected at a concentration of 29 mg/L at adjacent well MW9-20 suggesting oxidant migration through the subsurface between these two locations. Oxidant sampling at other

monitoring well locations did not report the presence of persulphate. Monitoring of nearby possible discharge locations (i.e. sewers, rivers, and utilities) was regularly completed on and near the Site during the injection work. No oxidant was detected at these discharge locations.

On June 9, 2010 after injecting 70 L into MW09-18, some oxidant solution short circuited to ground surface ("day lighted") from the exterior of the flush mount casing. Upon observation of the solution, injection at MW09-18 immediately ceased, the oxidant was neutralized and MW09-18 was monitored for a period of 4 hours to ensure no additional oxidant day lighted. To avoid oxidant at ground surface at MW09-18 continued injection at MW09-18 was completed at 0 psi pressure (gravity feeding). No day lighting was observed at any other injection location.

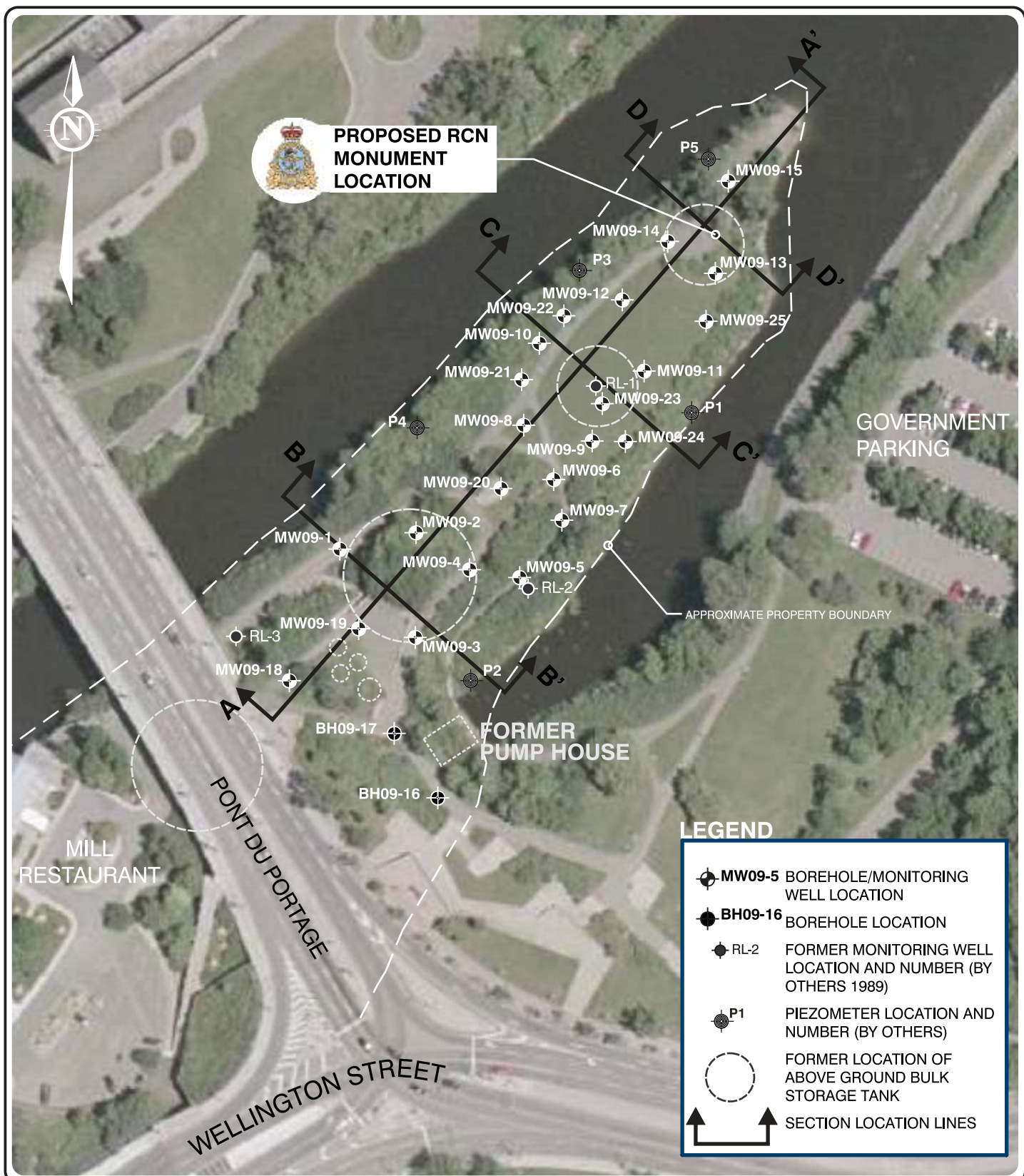
Limitations

The information, results and discussions presented in this memorandum are based on information recorded by Vertex Environmental Inc. at selected injection and observation locations at Richmond Landing, Ottawa, Ontario. Conditions observed on the property or noted in documents regarding the property may differ from time to time and may become apparent during future investigations or on-site work. Observations are made for select injection points only, conditions between and beyond these sampling points may be different. As a result, some conditions may not have been detected or anticipated at the time of this work and as such Vertex Environmental Inc. cannot be held responsible for environmental conditions at the Site.

The scope of this report is limited to the matters expressly covered. This report is prepared for the sole benefit of INTERA Engineering Ltd., and may not be relied upon by any other person or entity without the written authorization of Vertex Environmental Inc. Any use or reuse of this document (or the opinions, findings, or conclusions represented herein), by parties other than those listed above is at the sole risk of those parties.

Table 1
Injection Summary - Injection #1
Richmond Landing, Ottawa, Ontario

Injection Well	Injection Date	Oxidant (persulphate) (kg)	Activator (50% H2O2) (kg)	Solution Volume (L)	Well Total		
					Persulphate (kg)	Activator (L)	Solution Volume (L)
MW09-02	10-Jun-10	20.0	24.0	100.0	20.0	24.0	100.0
MW09-03	09-Jun-10	50.0	60.0	250.0	62.0	74.4	310.0
	10-Jun-10	12.0	14.4	60.0			
MW09-04	09-Jun-10	68.0	81.6	340.0	221.0	265.2	1105.0
	10-Jun-10	153.0	183.6	765.0			
MW09-06	08-Jun-10	125.0	150.0	625.0	200.0	240.0	1000.0
	10-Jun-10	75.0	90.0	375.0			
MW09-07	10-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-08	08-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-09	08-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-10	07-Jun-10	125.0	150.0	625.0	175.0	210.0	875.0
	10-Jun-10	50.0	60.0	250.0			
MW09-11	08-Jun-10	125.0	150.0	625.0	125.0	150.0	625.0
MW09-12	07-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-13	08-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-18	09-Jun-10	14.0	16.8	70.0	24.0	28.8	120.0
	10-Jun-10	10.0	12.0	50.0			
MW09-19	09-Jun-10	11.0	13.2	55.0	23.0	27.6	115.0
	10-Jun-10	12.0	14.4	60.0			
MW09-20	08-Jun-10	125.0	150.0	625.0	200.0	240.0	1000.0
	10-Jun-10	75.0	90.0	375.0			
MW09-21	07-Jun-10	125.0	150.0	625.0	175.0	210.0	875.0
	10-Jun-10	50.0	60.0	250.0			
MW09-22	07-Jun-10	125.0	150.0	625.0	175.0	210.0	875.0
	10-Jun-10	50.0	60.0	250.0			
MW09-23	08-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-24	08-Jun-10	50.0	60.0	250.0	50.0	60.0	250.0
MW09-25	08-Jun-10	125.0	150.0	625.0	125.0	150.0	625.0
Grand Total:					1,875.0	2,250.0	9,375.0



Trow Associates Inc.

154 Colonnade Road South,
Ottawa, Ontario K2E 7J5

Tel: (613) 225-9940
Fax: (613) 225-7337



DATE	JULY 2009
DESIGN	MGM
CHECKED	CTK
DRAWN	RG

CLIENT	NCC CCN Canada
BOREHOLE LOCATION PLAN RICHMOND LANDING, OTTAWA, ON.	

JOB No.	OTEN00019406P
SCALE	1:1500±
FIG 2	

ATTACHMENT C

Well Decommissioning Record

Master Well Owner's and Land Owner's Information

First Name N. C. C.		Last Name Allison Myatt		E-mail Address	
Mailing Address (Street Number/Name, RR) 202-40 Elgin St.		Municipality Ottawa		Province ON	Postal Code K1P 1C7
				Telephone No. (inc. area code) 613 239 5031	

Location and Construction of the Master Well in the Cluster

Address of Well Location (Street Number/Name, RR) Richmond Landing (Portage Bridge)		Township	Lot	Concession
County/District/Municipality		City/Town/Village Ottawa	Province Ontario	Postal Code

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation:	Undifferentiated	<input checked="" type="checkbox"/> Averaged
NAD 83	18	444327	5029839	Garmin	Etrex	<input type="checkbox"/> Differentiated, specify		

Overburden and Bedrock Materials (see instructions on the back of this form)

[illegible]

Hole Details

Depth (Metres)		Diameter (Centimetres)
From	To	
0	0.91	Brass
1.01		Brass
0	1.83	10.92

Water Use

<input type="checkbox"/> Public	<input type="checkbox"/> Industrial	<input type="checkbox"/> Not used	<input type="checkbox"/> Other, specify _____
<input type="checkbox"/> Domestic	<input type="checkbox"/> Commercial	<input type="checkbox"/> De-watering	
<input type="checkbox"/> Livestock	<input type="checkbox"/> Municipal	<input checked="" type="checkbox"/> Monitoring	
<input type="checkbox"/> Irrigation	<input checked="" type="checkbox"/> Test Hole	<input type="checkbox"/> Cooling & Air Conditioning	

Method of Construction

<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Air Percussion	<input type="checkbox"/> Digging
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Diamond	<input type="checkbox"/> Boring
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Jetting	<input type="checkbox"/> Other, specify _____
<input type="checkbox"/> Rotary (Air)	<input type="checkbox"/> Driving	

Status of Well

☐ Test Hole
☐ Replacement Well
☐ Dewatering Well
☐ Alteration (Construction)

☐ Abandoned, insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Other, specify _____
☒ Abandoned, other, specify not needed

No Casing and Screen Used

Open Hole

Yes No

Meters

Static Water Level Test

Open Hole	Yes	No	Mean
1			
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Screen

Galvanized Steel Fibreglass Concrete ☒ Plastic
Outside Diameter (Centimetres) Slot No. 10

Water Details

Water found at Depth	Kind of Water
Metres <input type="checkbox"/> Gas <input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals	
Water found at Depth	Kind of Water
Metres <input type="checkbox"/> Gas <input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals	
Water found at Depth	Kind of Water
Metres <input type="checkbox"/> Gas <input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals	

Disinfected <input type="checkbox"/> Yes <input type="checkbox"/> No. If no, provide reason:	Date Master Well Completed (yyyy/mm/dd)
--	--

Cluster Information (Please also fill out the additional Cluster Well Information for Well Construction for each parcel of land and cluster.)

Total Wells in Cluster	20	Please indicate Number of Cluster Well Information Log Sheets Submitted
Total Wells on this Property	2	

Location of Well Cluster

Detailed Map must be provided as an attachment no larger than legal size (8.5" x 14"). Sketches are not allowed.
☒ Check box to confirm: detailed map is provided as per Section 11.1 (c)

Consent to release additional information concerning the cluster to the Director upon request

Signature of Technician/Contractor	Date (yyyy/mm/dd)
------------------------------------	-------------------

Well Contractor and Well Technician Information

Business Name of Well Contractor Strata Soil Sampling		Well Contractor's Licence No. 7241
Business Address (Street No. Name, number, RR) #2-147 West Beaver Creek		Municipality Richmond Hill
Province Ontario	Postal Code L4B 1N2	Business E-mail Address strata@strata-soil.com

Bus. Telephone No. (no area code) Name of Well Technician (Last Name, First Name)
905 764-9304 [Signature] Lewis
Well Technician's Licence No. [Blank] Signature of Technician Date Submitted (yyyy/mm/dd)

Master Well Owner's/Land Owner's consent to use Cluster Form

Signature _____ Date (mm/dd/yyyy) _____

5.1.21 Jun 22/10

Ministry Use Only

M 05287

Date Received 9/27/2009 Date of Inspection 10/1/2009[illegible]

Well Tag No. for Master Well (Print Well Tag No.)
A0745701A083107

Cluster Well Information for Cluster Well Construction
Regulation 903 Ontario Water Resources Act

Property Owner's Information

First Name: M.C. C. Last Name: Allison M. Gaff
Province: ON Postal Code: K1P1C7 E-mail Address:
Mailing Address (Street No./Name, RR): 202-40 Elgin St.
Municipality: Ottawa
Telephone No. (inc. area code): 6132395035

Cluster Well Information

Address of Well Location (Street Number/Name, RR): Richmond Landing (Postage Bridge)
City/Town/Village: Ottawa Province: Ontario
Lot: Concession: Township: County/District/Municipality:
GPS Unit Make: Garmin Model: Etrex
Unit Mode of Operation: ☐ Undifferentiated ☒ Averaged
☐ Differentiated, specify:

Consent
Property Owner's Consent to use cluster form
Signature: [Signature] Date: 2010/06/22
Consent to release additional information to the Director upon request
Signature of Technician/Contractor: [Signature] Date: (yyyy/mm/dd)

Well # on Sketch	Zone	Easting	Northing	Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres) From To	Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion (yyyy/mm/dd)
MW01	1	844435	35028865	10.7			PVC							
MW02	1	844436	05029874	8.3			"							
MW03	1	844436	45029152	4.74			"							
MW04	1	844437	25029915	5.2			"							
MW05	1	844437	15029920	4.9			"							
MW06	1	844437	85029928				"							
MW07	1	844438	55029434				"							
MW08	1	844439	45029940				"							
MW09	1	844440	35029950	4.6			"							

Well Contractor and Well Technician Information

Business Name of Well Contractor: Strata Soil Sampling
Business Address (Street Number/Name, RR): 147-2 W. Beaver Creek
Municipality: Richmond Hill Province: ON
Postal Code: L4B1C6 Business Telephone No. (inc. area code): 9057644304
Well Contractor's Licence No.: Well Contractor's E-mail Address:
Name of Well Technician (First Name, Last Name): Travis Hansen
Well Technician's Licence No.: 3159
Date Submitted (yyyy/mm/dd): 2010/06/27
Signature of Technician: [Signature]

Date 1st Well in Cluster Constructed (yyyy/mm/dd): 2010/06/22
Date Last Well in Cluster Constructed (yyyy/mm/dd): 2010/06/22
Ministry Use Only
Date Received (yyyy/mm/dd):
Date Inspected (yyyy/mm/dd):
Audit No.: C05895
Remarks: BB, 176

Well Tag No. for Master Well (Print Well Tag No.)
A0745701 A083107

Property Owner's Information

First Name: M. C. C. Last Name: Allison
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Cluster Well Information

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Lot: Concession: GPS Unit Make: Garmin Model: Etrex
Unit Mode of Operation: ☒ Averaged ☐ Undifferentiated ☐ Differentiated, specify:

Consent

Property Owner's Consent to use cluster form
Signature: S. A. 2. 2. Date (yyyy/mm/dd): 2010/06/22
Consent to release additional information to the Director upon request
Signature of Technician/Contractor: Date (yyyy/mm/dd):

Well # on Sketch	Zone	UTM Coordinates				Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres)		Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion (yyyy/mm/dd)
		Easting	Northing	From	To												
MW1-14	1	8	4	4	4	1	6	5	0	2	9	9	6	4		Decommissioned	2010/06/22
MW1-14A	1	8	4	4	4	1	7	5	0	2	9	9	6	7			
MW1-13	1	8	4	4	4	1	3	5	0	2	9	9	5	9			
MW1-25	1	8	4	4	4	1	8	5	0	2	9	9	5	4			
MW1-11	1	8	4	4	4	1	9	5	0	2	9	9	3	4	4.6		
MW1-24	1	8	4	4	4	1	8	5	0	2	9	9	3	3			
MW1-23	1	8	4	4	4	1	5	0	2	9	9	9	4	0			
MW1-9	1	8	4	4	4	1	8	2	5	0	2	9	9	2	1	4.6	
MW1-7	1	8	4	4	4	1	8	5	0	2	9	9	0	2	4.6		
MW1-21	1	8	4	4	4	1	8	5	0	2	9	9	8	9	2		

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Business Address (Street Number/Name, RR): 147-2 w Beaver Creek
Municipality: Richmond Hill Province: ON
Postal Code: L4B 1C6 Business Telephone No. (inc. area code): 905 764 9133
Well Contractor's Licence No.: Well Technician's Licence No.: 3159
Name of Well Technician (First Name, Last Name): Travis Robinson
Date Submitted (yyyy/mm/dd): 2010/06/22
Signature of Technician: [Signature] BB, 1796

Date 1st Well in Cluster Constructed: 2010/06/22 Date Last Well in Cluster Constructed: 2010/06/22
Ministry Use Only
Date Received (yyyy/mm/dd): Date Inspected (yyyy/mm/dd):
Audit No.: C05894 Remarks: