



Hamilton Conservation Authority

Sediment Management Plan

For

Crooks' Hollow Dam Removal and
Restoration of Spencer Creek

H337415-0000-00-124-0002

Rev. 4

March 9, 2012

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Project Report

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1. Introduction

This document describes the Sediment Management Plan (SMP) associated with the Crook's Hollow Dam Removal and Restoration of Spencer Creek Project.

1.1 Background

The Hamilton Conservation Authority (HCA) owns and operates the Crooks' Hollow Dam located on Spencer Creek, near the former Town of Greensville, now part of the City of Hamilton, Ontario. This dam is over 95 years old, and although minor repairs have been carried out periodically, no significant rehabilitation work has been done recently. The dam, nearing its useful life expectancy, was considered to be in poor condition and engineering studies by Hatch Ltd. (Hatch) in 2007 confirmed that the dam would require extensive rehabilitation to ensure its safe operation during major storm events.

HCA initiated a Class Environmental Assessment (Class EA) in accordance with Conservation Ontario's Class EA for Remedial Flood and Erosion Control Projects in 2005. The final Class EA prepared by Hatch in 2009 concluded that the preferred remedial alternative would be to remove the dam and rehabilitate the existing reservoir and surrounding lands. As a result of the review process, several requests to elevate the project to an Individual Environmental Assessment were sent to the Ontario Ministry of the Environment (MOE) Environmental Assessment and Approvals Branch (EAAB). The Minister of the Environment decided not to require an Individual EA, provided that HCA comply with several conditions in his letter of May 13, 2009. These conditions included the following:

- “1. The HCA must prepare a Sediment Management plan that addresses all aspects related to the removal of sediment, including method and amount of excavation, removal and final disposal of sediment and all measures to ensure that sediment release does not occur during the course of the removal.*
- 2. As part of the preparation of this plan, the HCA must undertake further consultation with any other agencies, particularly the Ministry of Natural Resources and Fisheries and Oceans Canada, who share a mandate for water quality and fishery resource protection.*
- 3. The HCA must submit the Sediment Management plan to the Technical Support Section of the Ministry of the Environment's West Central Region Office for technical review.*
- 4. No physical activities related to sediment management and dam-decommissioning may take place until the Technical Support Section of the Ministry of the Environment's West Central Region Office has confirmed in writing that the Sediment Management plan is acceptable.*
- 5. The HCA shall indicate in the Sediment Management plan, as described in the above conditions and provided to the satisfaction of the Technical Support Section of the Ministry of the Environment's West Central Regional Office, that the Sediment Management plan has been conducted in order to satisfy the above conditions.”*

1.2 Preferred Option

HCA retained Hatch to prepare this SMP as per the MOE requirement. As part of this process, Hatch carried out additional sediment sampling and geotechnical investigations to determine the extent and the volume of the sediment deposition in the reservoir. A preferred option was selected and conceptual layout sketches of sediment removal and disposal were prepared. The Spencer Creek Restoration Plan incorporated a natural channel design approach. This preliminary plan was completed in August 2010 and the general approach was accepted by MOE in December 2010 subject to receipt of additional details.

The preferred Sediment Management Plan option outlined in the August 2010 SMP was to remove materials in a dewatered condition and place most of the sediments in a designated area within the creek floodplain (former reservoir area). Some materials (localized and in limited quantities) would require special handling and disposal off site based on testing during construction. It was suggested that these suspect sediments (i.e., sediment locations where metal concentrations exceeded the 2004 Soil Standards) be handled under these special requirements.

Subsequent to the completion of the SMP, new Soil and Sediment Standards were established in the amended Ontario Regulations 153/04 (O. Reg. 153/04), effective July 1, 2011. As a consequence of the lowering of some metal concentrations in the generic sediment standards, a revised approach for the SMP was developed. This involved an enhanced sampling program that included testing both sediment samples as well as soil samples within the floodplain area. Results from this sampling indicated that the floodplain soils were of similar composition to the deposited sediments. As such, after discussion with MOE it was determined that (i) sediment could be deposited directly on floodplain soils, (ii) an area of sediment with elevated mercury (Hg) would be removed off site for disposal at a MOE-licensed landfill facility, (iii) the remaining sediment would be placed on the banks of the creek, maximizing the amount of sediment placed above the 100 year flood line, while recognizing that there are only small areas available at the site which are above the 100 year flood line and therefore, most of the excavated sediment would be placed within the 100 year floodplain in areas requiring fill as part of the creek restoration and (iv) stabilizing the sediment using erosion control measures (silt fences and coir mats) as shown in the construction drawings provided in Appendix A. (v) Surface water would be directed into a secondary channel along Spencer Creek to minimize infiltration of water through the sediment management area during the construction period.

Several items were agreed with MOE in a meeting on January 12, 2012. These items included (i) the creek is a groundwater discharge zone and therefore additional groundwater sampling is not required (ii) HCA has a Permit To Take Water from MOE for the surface water diversion during construction (iii) monitoring requirements as detailed in Section 3.

1.2.1 Restoration of Spencer Creek

There will be several significant benefits to the restoration of Spencer Creek within the Crooks' Hollow Conservation Area and the larger Spencer Creek system with the removal of Crooks' Hollow Dam. The removal of this impoundment will serve to improve water quality (e.g. stream temperature, dissolved oxygen etc.) along this reach of Spencer Creek, as well

as downstream to Cootes Paradise and Hamilton Harbour. The dam removal will also re-establish natural sediment transport to downstream reaches of Spencer Creek to improve aquatic habitat by aiding in natural channel formation, controlling channel and bank erosion as well as restoring critical ecological interactions. Improvement to fish habitat will include restoration of habitat, fish passage for fish and other aquatic species, establishing riparian vegetation which will create refuge habitat for various juvenile fish species, and maintaining stream temperature regimes. The extent of the restoration area along the Spencer Creek is shown in Figure 1.

This reach of Spencer Creek historically functioned as a coolwater fishery, supporting fish species such as Brook trout (*Salvelinus fontinalis*), Northern hog sucker (*Hypentelium nigricans*), River chub (*Nocomis micropogon*), Blackside darter (*Percina maculata*) and Finescale dace (*Phoxinus neogaeus*). Currently the aquatic system consists of warm water habitat due to the lake ecosystem behind the dam which is favourable to nuisance non-native fish species such as Common carp (*Cyprinus carpio*) and Goldfish (*Carassius auratus*). The warm water and eutrophic conditions also support the production of algae, which depletes dissolved oxygen in the water column that is further contributing to undesirable conditions downstream.

The proposed naturalization works will facilitate ongoing restoration efforts downstream, as well as aid in the conservation and recovery of rare and at-risk flora and fauna (such as Eastern milk snake (*Lampropeltis triangulum triangulum*), Black redhorse (*Moxostoma duquesnei*), Snapping turtle (*Chelydra serpentina*) and American chestnut (*Castanea dentata*) that have been historically documented in this ecosystem.

1.2.2 **Water Quality**

The removal of the dam will improve the quality of the aquatic ecosystem, including improved water quality, both upstream and downstream of the impoundment. By removing the physical impediment of the dam, and in turn dewatering the reservoir and re-establishing a riverine system, Spencer Creek will revert to a lotic ecosystem where the transport of nutrients, sediment, and energy will be equilibrated. In its previous lentic state, the dam and the reservoir promoted sedimentation behind the dam, starving downstream reaches of Spencer Creek from vital channel building materials and promoting downstream erosion of the creek.

The maintenance of the reservoir created an aquatic environment disjunct from its upstream and downstream riverine reaches that promoted thermal loading, decreased levels of dissolved oxygen, and increased nutrient loading. During the warmer summer months, when the abundant groundwater seepage from the surrounding valley slopes would normally abate increased water temperatures, this impoundment promoted further thermal loading, the proliferation of nuisance algae blooms, reduced water clarity, and anoxic conditions that were detrimental to aquatic life inhabiting the system. This condition would have further served to alter the composition of the faunal community inhabiting this section of Spencer Creek, increasing the proportion of tolerant fish (e.g., carp) and benthic invertebrate (e.g., bloodworms, tubificids) species indicative of lake-like habitat conditions, and reducing the proportion of sensitive, riverine species found in the less impacted reaches upstream and downstream of the dam. The proposed natural channel design (riffle/pool sequence) will

allow for a self sustaining stable stream to return which is critical to water quality and aquatic health. In addition, the proposed stream restoration measures include rocky riffles, which will help aerate the flowing water, thereby further improving the water quality.

1.2.3 **Stream Function/Erosion of Placed Fill**

Natural, stable streams are dynamic, which in turn implies the ability to be resilient in adjusting to changes in flow and sediment. The term dynamic refers to the shape and position of the stream, in which they are continually shifting in its valley and adjusting its form. This occurs as the stream conveys water and sediment, including natural erosion of its bed and banks. These are necessary and natural processes that occur in all streams. With the presence of the Crooks' Hollow dam, these processes were halted. Typically, the loss of sediment movement can result in greater erosion in the downstream reaches, as the channel tries to adjust to accommodate this change. These effects have been observed in Spencer Creek, however, they have been less pronounced due to its steep gradient and local presence of bedrock. The removal of the dam will greatly restore stream functions and health.

In completing the stream restoration, there are several locations where fill is required to improve the shape of the channel and increase the definition of the banks. The use of the excavated sediment material from the creek bed with the presence of the organics will provide a source for rapid growth to establish riparian vegetation.

The dam removal and creek restoration will improve the hydraulics along this reach of the creek. With the dam in place during a 1:100 year storm event Crooks' Hollow Road may be impacted, however with the dam removed flooding will not be as extensive in the area immediately upstream of the dam location. The placed sediment material will be stable and not prone to erosion from the stream flow as through the natural channel design, flows in the floodplain area will be reduced and in addition will be protected from the stream flow by a variety of bank treatments (e.g., stone; crib wall – bio-engineering techniques) and appropriate vegetative cover. As much of the sediment material as possible will be placed above the 1:100 year flood for further protection. Assuming the vegetation, at a minimum is grasses and some herbaceous plants; the permissible velocity over this material and plants is 1.2 m/s. Thus, provided the overbank velocities are below 1.2 m/s, there will not be any loss of plants or erosion of the fill. A review of the hydraulic modeling for the post-restoration condition on Spencer Creek, reveals that there are no instances where the overbank, flood velocity exceeds 1.0 m/s up to the 100-year return interval flood. This is expected given the nature of flows as they enter the floodplain and spread across the landscape. A table of calculated velocities is provided in Appendix B.

1.3 **Compliance With MOE Conditions**

In order to address the conditions required by the Minister of the Environment as listed in Section 1.1, the following actions were implemented:

- This SMP addresses the requirement for a sediment management plan in Condition 1.

- Consultation was carried with the Ministry of Natural Resources and Fisheries and Oceans Canada as required in Condition 2; a copy of these approvals are provided in Appendix C.
- This SMP has been submitted to the Technical Support Section of MOE's West Central Office for technical review in order to comply with Condition 3.
- No physical activities associated with sediment management or dam decommissioning will take place until the MOE's West Central Regional Office has confirmed in writing that this SMP is acceptable (confirmation of Condition 4).
- This SMP has been prepared to address Conditions 1 to 4 and in order to satisfy the Technical Support Section of MOE's West Central Regional Office that the SMP has been conducted in accordance with this plan a Project Completion Report and annual monitoring reports will be prepared as described in Section 3.

2. Field Sampling and Testing Programs

2.1 Sediment, Sediment Pore Water, Soil and Surface Water – November /December 2011

2.1.1 *Sample Collection and Testing*

On November 7, and December 28, 2011 Hatch carried out a bulk sediment, sediment pore water and surface water sampling program at the Crooks' Hollow site.

Sediment samples from the bottom of Spencer Creek were collected to (i) characterize the quality of the sediment and (ii) characterize the pore water quality of the sediment to determine if collection and treatment of the pore water would be needed during the creek restoration activities. Bulk sediment samples were collected at three locations upstream of the Crooks' Hollow Dam. These sample locations included T1, T2 and T3, as shown on Figure 3, at approximately 10 m, 60 m and 120 m upstream of the dam, respectively. At each of the sampling locations a sample was collected for bulk inorganic analyses (metals) and a sample of the pore water was drained and filtered. A composite sediment sample consisting of equal portions from each location was prepared for TCLP testing (inorganics and PCBs).

Soil samples from three test pits were collected and tested for soil quality along the alignment of the proposed water diversion channel. These samples were labelled as T4, T5 and T6 as shown on Figure 3.

A surface water sample was collected upstream and downstream of the proposed creek restoration area to establish baseline conditions.

In December 2011, MOE requested the collection and testing of additional channel sediment samples including (i) the area of sediment sample C9 that was collected during the 2009 sampling event (Hatch, 2010) and (ii) along a bend on the opposite bank of the creek. These samples were collected during the December 28, 2011 sampling event primarily to (i) determine if the mercury test results were similar to test results at C9 and (ii) determine the mercury concentration along a bend in the creek on the south bank.

Soil samples were collected during the December 28, 2011 event in proposed excavated sediment placement areas (primarily Areas C and D and E) as shown in Figure 3 to determine if floodplain sediments were of a similar quality compared to channel sediments.

An additional soil sample from BH11-01, located in Area 3 as shown on Figure 3, was submitted for chemical testing in January 2012.

All of the collected samples were sent to Paracel Laboratories Ltd. (Paracel) in Ottawa, Ontario with the exception of the TCLP test that was completed by Maxxam Analytics Ltd. (Maxxam) in Mississauga, Ontario. Descriptions of the sediment and soil samples are provided in Appendix D.

2.1.2 **Chemical Test Results**

A copy of the Paracel and Maxxam laboratory test reports are provided in Appendix E. Please see the following sections of Appendix E for the specific laboratory test reports:

E1 - Sediment and soil – November 2011.

E2 - Pore water and surface water – November 2011.

E3 - Sediment composite TCLP – November 2011.

E5 – Sediment and soil – December 2011.

E6 – Soil – Area A.

The test results for the bulk channel sediment samples (T1, T2 and T3 indicated lower metal concentrations than the previous core samples at specific locations. The results show that one of the sediment samples exceeds the Table 8 Standard for zinc (T2) at 361 mg/kg compared to the Standard of 290 mg/kg, and one sample exceeds the Table 8 Standard for mercury (T3) at 1.1 mg/kg compared to the Standard of 0.27 mg/kg.

Laboratory test results for soil samples in Areas B and C indicated similar results compared to the sediment samples. The mercury concentration at 0.4 mg/kg in soil sample T4 exceeded the Table 8 Standard of 0.27 mg/kg, while the zinc concentration in samples T4, T5 and T6 at 416, 447 and 434 mg/kg, respectively, exceeded the Standard of 290 mg/kg.

The TCLP test results indicated that the channel sediment material is non-hazardous.

The laboratory test results indicated that the concentrations of the tested parameters are all less than the Provincial Water Quality Objectives. With the exception of sample T1 adjacent to the dam, there is no significant difference between the pore water samples and the upstream/downstream surface water samples. Based on this data, a collection and treatment system for sediment pore water is not needed.

The laboratory test results from the December 28, 2011 sampling event indicated that the concentrations of metals in most of the sediment and soil samples were less than the Table 8 Soil Standards. There were some exceedances of the Table 8 Standards as described below.

- The channel sediment test results showed that one of the sediment samples, C11-01, which was collected in close proximity to the previous sediment sample C9, exceeded the

Table 8 Soil Standard of 1.5 mg/kg for Boron (available) at 1.8 mg/kg, mercury at a concentration of 0.4 mg/kg compared to the soil Standard of 0.27 mg/kg and zinc with a concentration of 290 mg/kg compared to the soil Standard of 290 mg/kg. Similarly, the mercury concentration was 0.4 mg/kg in sample C11-04, located immediately downstream from C11-01.

Other results included:

- Zinc concentration in samples C11-05, C11-06, C11-07 and C11-08 was 328, 332, 307 and 321 mg/kg, respectively
- Antimony concentration of 2 mg/kg in sample C11-06 exceeded the soil Standard of 1.3 mg/kg.

Soil sample test results from the proposed sediment placement areas indicated that some metal concentrations exceeded the Table 8 Soil Standards as follows:

- Area A: Mercury at a concentration of 1.1 and 2.7 mg/kg in samples Area A -1 and Area A -2, respectively; zinc at a concentration of 380, 222 mg/kg in samples Area A -1 and Area A -2, respectively.
- Area C: Zinc at a concentration of 518 and 329 mg/kg in samples Area C -1 and Area C -2, respectively.
- Area D: Boron (available) at a concentration of 2.0 mg/kg in sample Area D -1; mercury at a concentration of 0.3 and 4.3 mg/kg in soil samples Area D -1 and Area D -2, respectively; zinc at a concentration of 388 and 334 mg/kg in samples Area D-1 and Area D -2, respectively.

2.2 Sediment – February 2012

2.2.1 Sample Collection and Testing

On February 20, 2012 Hatch carried out an additional bulk sediment sampling program at the Crook's Hollow site to further delineate the mercury concentration in sediment.

Bulk sediment samples were collected at and near two locations upstream of the Crooks' Hollow Dam that were identified from the December 28, 2011 sampling as C11-1 and C11-4. At each of the fourteen sampling locations a sample was collected for bulk inorganic analyses (metals). A duplicate sediment sample was prepared for TCLP testing from the C11-1 location (inorganics and PCBs).

The collected samples, including both bulk and TCLP, were sent to Paracel Laboratories Ltd. (Paracel) in Ottawa, Ontario. Descriptions of the sediment and soil samples are provided in Appendix D.

2.2.2 Chemical Test Results

A copy of the Paracel laboratory test reports are provided in Appendix E. Please see the following sections of Appendix E for the specific laboratory test reports:

E7 - Sediment and soil – February 2012.

E8 – Sediment TCLP – February 2012.

The laboratory test results from the February 20, 2012 sampling event indicated that the concentration of mercury in the sediment samples was generally less than the Table 8 Soil Standards, with the exception of the areas previously identified as exceeding the Table 8 Soil Standards (i.e., C11-1 and C11-4). These exceedances of the Table 8 Standards are described below.

- The channel sediment test results showed that the sediment samples, C11-09A, C11-7 and C11-10 which were collected in close proximity to the previous sediment samples C9 and C11-1, exceeded the Table 8 Soil Standard of 0.27 mg/kg for mercury at a concentration of 0.7, 0.5 and 0.6 mg/kg, respectively. Similarly, the mercury concentration in samples C11-16, C11-17 and C11-11 was 0.3, 0.4 and 0.5 mg/kg. These samples were collected near C11-04, located immediately downstream from C11-01.
- The TCLP test results from sample C11-9B indicated that the channel sediment material is non-hazardous.

2.3 Imported Fill

Fill materials will be imported during construction for completing stream restoration and bank stabilization, primarily in Area A.

Samples of soil material from the Waynco Limited Sand & Gravel (Waynco Pit Cambridge) were collected on December 8, 2011 and sent to Paracel in Mississauga, Ontario. Testing of inorganics (metals) was carried out on the collected samples. The laboratory test results indicated that all of the tested parameters are accepted to the Table 8 Standards. A copy of the test results is provided in Appendix E4.

3. Sediment Management Work Plan

3.1 Site Preparation Work

HCA has selected R&M Construction (Contractor) to carry out the dam removal and creek restoration at the Crooks' Hollow site. Following the Contractor's mobilization and setup at the Site, the Contractor will undertake the following work:

- Construct a by-pass channel from approximately chainage 0+0250 m to 0+450 m along the west side of the floodplain area, as shown in Figure 1 and Drawing H337415-0000-10-042-0004 (Appendix A). This by-pass channel will allow flow from the creek to be redirected during construction activities.
- Stockpile the above noted imported fill at the Imported Fill Staging Area shown in Figure 2. It is expected that approximately 50 m³ of imported fill materials will be transported to the Site each day using dump trucks, with a total of 500 m³ of imported fill required over the duration of the Project. This imported fill will be used primarily in Area A and along the creek banks in other areas.

3.2 Excavation Work and Sediment Management

Following the Site Preparation Work, the Contractor will undertake the following work:

- Excavate, dewater, transport and dispose of channel sediment within Hg-impacted sediment 'hot spot' at the C9, C11-1 (C11-9A, C11-7 and C11-10) and C11-4 (C11-16, C11-17 and C11-11) locations at a MOE-licensed landfill facility. Sediment material will be removed from an area of approximately 25 m x 10 m at an average thickness of 1 m or as defined by the additional sampling and testing. The total estimated volume of Hg-impacted sediment to be removed and disposed is approximately 250 m³. This volume includes an area to clean margins as shown in Figure 4 and the excavated zone along the creek bank for construction of a riffle section in the creek. The tonnage was calculated as 250 m³ x 2 tonnes/m³ = 500 tonnes based on average density of sediment and particle size.
- Panda Environmental based in Acton, Ontario, will provide the transport and disposal of this material (Transfer License No. 841607 and Plant License No. 4450-6NDKTS). As the material has been deemed to be non-hazardous, the disposal facility will be the NewAlta landfill, 65 Green Mountain Road West, Hamilton. (Certificate of Approval No. A100143).
- Commencing at approximately chainage 0+100 m and proceeding in a downstream direction to chainage 0+375 m at the dam site, excavate the sediment from the bottom of Spencer Creek and then transfer and stockpile the excavated sediment within designated sediment placement areas. In the preliminary sediment management report it was estimated that approximately 5,000 m³ of sediment would be excavated from the creek channel based on 2005 reconnaissance data. Some floodplain sediment was likely included in this early estimate based on a conceptual plan for the creek restoration. This information was later improved by (i) an accurate survey with more surveyed sections at lower water levels in 2011, (ii) channel sediment was accurately delineated from the underlying native materials in this survey and (iii) consideration of the detailed design for the restored creek channel. The 2011 survey indicated a total of approximately 2000 m³ of channel sediment.
- It is expected that approximately 200 m³ of sediment will be excavated from the bottom of Spencer Creek each day, so that approximately 10 working days will be needed to excavate a total of 2,000 m³ from the creek. As discussed in Section 3.1, pore water from the stockpiled sediment will be allowed to freely drain to Spencer Creek.

3.3 Placement of Excavated Sediment in Designated Fill Areas, Re-Grading and Erosion Protection

Following the Excavation Work the Contractor will undertake the following work:

- The Contractor will transfer and place the excavated sediment in a designated fill area in lifts of 0.3 m, commencing at the south end of Area E (above 100 year flood line) and working northward to Areas C and D as shown in Figure 2. Approximately 300 m³ of sediment will be placed above the 1:100 year flood line in Area E where the existing soil thickness ranges from 0 to 0.5 m over bedrock, while another 700 m³ and 1000 m³ will be

placed in Areas C and D, respectively. The average height of fill in these areas at the completion of the Project is expected to be 0.3 to 1.0 m based on a total volume of sediment placement of 2,000 m³.

- Once all the excavated sediment soil has been transferred and placed in designated areas, then the Contractor will carry out the final compaction and re-shaping of the fill areas. The fill areas will be compacted by making several passes over the area with a track-mounted excavator. The side slopes will then be graded to a final side slope of 2H:1V, with the top slope graded to the original ground surface. Upon completion of the re-grading, various erosion protection measures will be placed on the side slopes of the creek including a live crib wall, and banks comprised of rock. Details of the erosion protection measures are provided in Drawings H337415-0000-10-042-0004 to -0007 (Appendix A). Standard temporary erosion control measures including silt fencing, coir mats and mulch will be used on an interim basis to ensure sediment is not eroded (e.g., mats on steeper slopes and mulch on flatter slopes with silt fencing used on a break in slope and bottom of slope).

3.4 Monitoring Program

Following the completion of the above noted works, the following Surface Water Monitoring Program will be implemented by HCA.

3.4.1 *Surface Water Sampling and Chemical Analyses*

- On a semi-annual basis, a representative sample of Spencer Creek will be collected from a point upstream of Area A and downstream of Area D as shown in Figure 5. The two surface water samples will be submitted to an accredited chemical laboratory for analysis of pH, alkalinity, hardness, metals and hydrides (i.e., unfiltered samples for analysis of aluminum, antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, silver, thallium, uranium, vanadium and zinc). Temperature, conductivity, dissolved oxygen, and pH will be measured in the field.
- The test results will be compared against the MOE July 1994 Provincial Water Quality Objectives (PWQO).

3.4.2 *Reporting*

3.4.2.1 *Project Completion Report*

Following the completion of the construction phase of Crooks' Hollow Dam Removal and Spencer Creek Restoration Project, a project completion report will be prepared and submitted to the MOE Hamilton District Office. This report will include (i) the specific locations of sediment excavation, (ii) quantities of sediment excavated, (iii) quantities of Hg-impacted sediment removed and disposed at a MOE-licensed landfill facility, (iv) on-site placement quantities of sediment in Areas E, C and D, (v) erosion control measures used during construction (See Figure 6 for typical erosion control measures) and (vi) record drawings noting any changes from the SMP.

3.4.2.2 *Annual Monitoring Report*

An annual monitoring report will be prepared to summarize the results from the Surface Water Monitoring Program, ongoing monitoring of the permanent erosion protection measures (monthly during the first year following construction followed by a recommendation for decreased monitoring frequency following a period of stability) and monitoring carried out in accordance with general Department of Fisheries and Oceans effectiveness monitoring protocols (bank stability and health of planted materials). This information will be documented in the annual monitoring report and submitted to the MOE Hamilton District Office following the fall sampling program and before the year-end. HCA is preparing an Adaptive Management Plan which will be implemented approximately one year following the completion of construction at the site. Information on this plan will also be included in the annual monitoring report.

If, after 5 years of monitoring, the results of the Surface Water Monitoring Program demonstrate that surface water quality in the surface water samples show no significant difference or improvement from pre-construction samples or between the upstream and downstream sampling stations, the monitoring program will be terminated by HCA.

Should the results from a sampling event differ significantly from the baseline conditions then re-sampling and testing will be carried out to determine if there was a sampling or analytical issue with the initial sample. Should the second sampling event confirm the results from the initial event, an investigation program would be carried out to determine the extent and source of the impacted water.

3.5 **Contingency**

Monitoring and repairs of the temporary erosion protection measures will be carried out on a regular basis throughout the construction period. The existing dam will provide secondary containment for silt control, prior to the removal of the dam.

In order to minimize any potential offsite impacts during the construction period should a storm event occur that would generate flows greater than the capacity of the flow diversion system, several actions would be implemented including (i) providing erosion control blankets over the working face of exposed sediment material, (ii) moving any existing sediment stockpiles to area near the maximum extent of the 1:00 year storm event, (iii) using the existing dam to pond water and prevent migration of silt downstream and (iv) communication with HCA to control flows from the Christie Dam located upstream from the site.

Additional Contingency measures include

1. all groundwater seeps from the north side of the site will be diverted into the constructed diversion channel. This will minimize water in the construction area
2. all trails on site will be closed to ensure public safety
3. construction vehicles will be prohibited from idling on site
4. once the original creek is dewatered, a fish rescue plan will be implemented by HCA

5. sorbent protection booms will be inserted at the existing dam to protect against any oil/gas leaks that occur on site from migrating downstream
6. noise will be controlled on site. Work will only be permitted during the hours of 7 a.m. to 7 p.m.
7. dust will be controlled on site by spraying dry material with water
8. mud mats will be provided onsite to minimize tracking of mud offsite by construction vehicles.

4. References

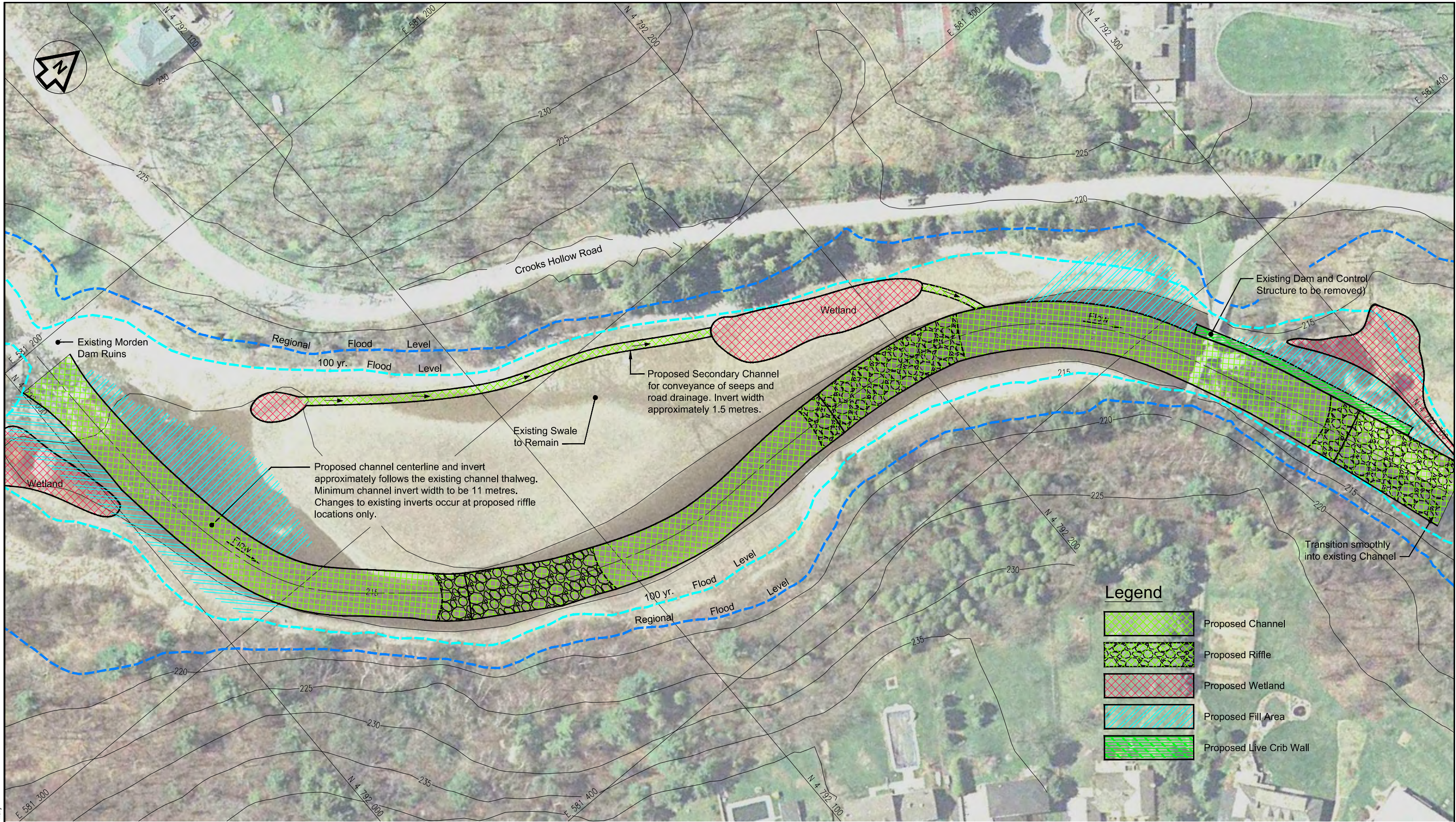
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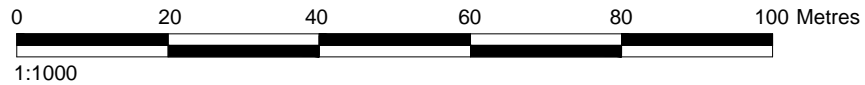
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Warren Hoyle/Bruce Bennett
WRH:kln
Attachment(s)/Enclosure



Legend

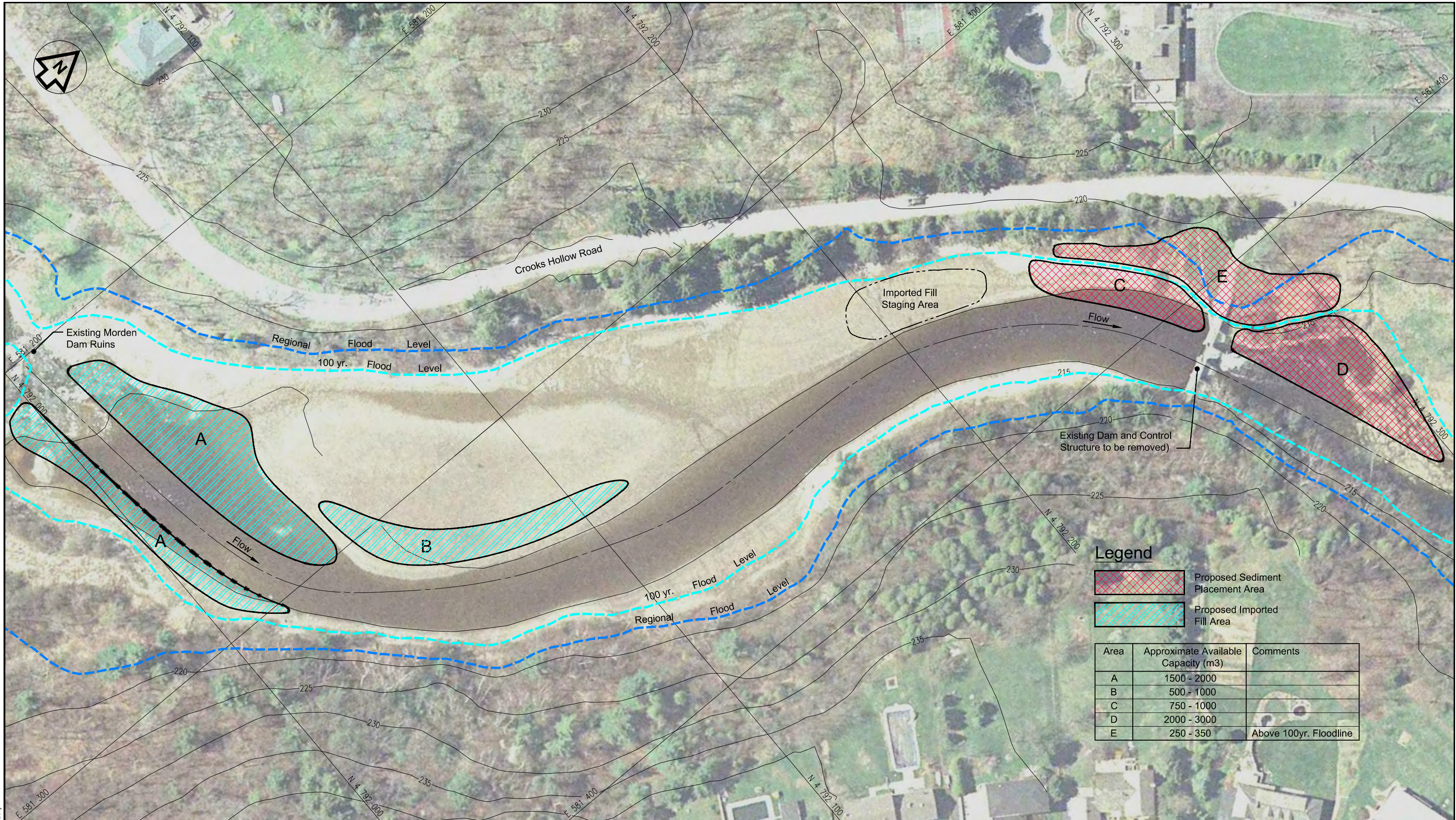
	Proposed Channel
	Proposed Riffle
	Proposed Wetland
	Proposed Fill Area
	Proposed Live Crib Wall



Mar 05, 2012 7:33am Layout: Channel Works
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 Drawing Name: P:\MCA\37415\CAD\CAD\37415_Engine_1.dwg

Figure 1

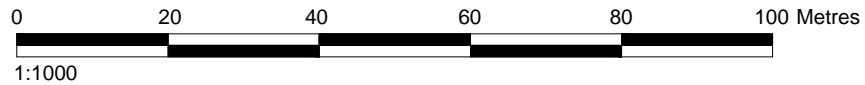




Legend

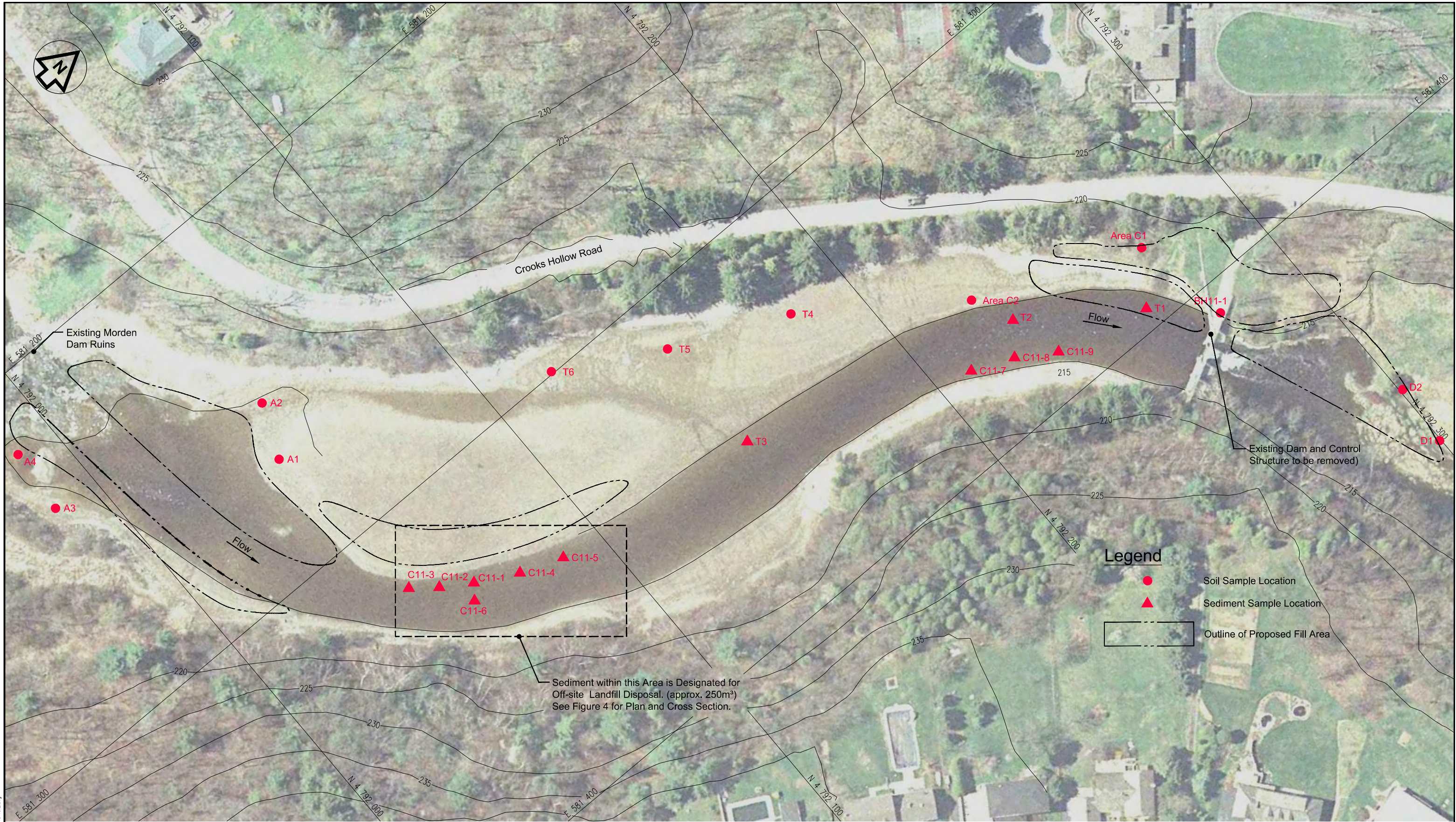
- Proposed Sediment Placement Area
- Proposed Imported Fill Area

Area	Approximate Available Capacity (m3)	Comments
A	1500 - 2000	
B	500 - 1000	
C	750 - 1000	
D	2000 - 3000	
E	250 - 350	Above 100yr. Floodline



File: 08_2012_241.mxd; Layout: Channel Works; Date: 2012-08-24 10:11:03; User: jh; Plot: 08_2012_241.mxd; Figure: 2.dwg; Drawing Name: F:\NCA\337415\CAD\C\NCA\337415_Figure 2.dwg

Figure 2



Mar 05 2012 7:17pm Layout: Channel Works
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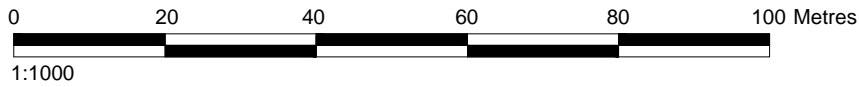
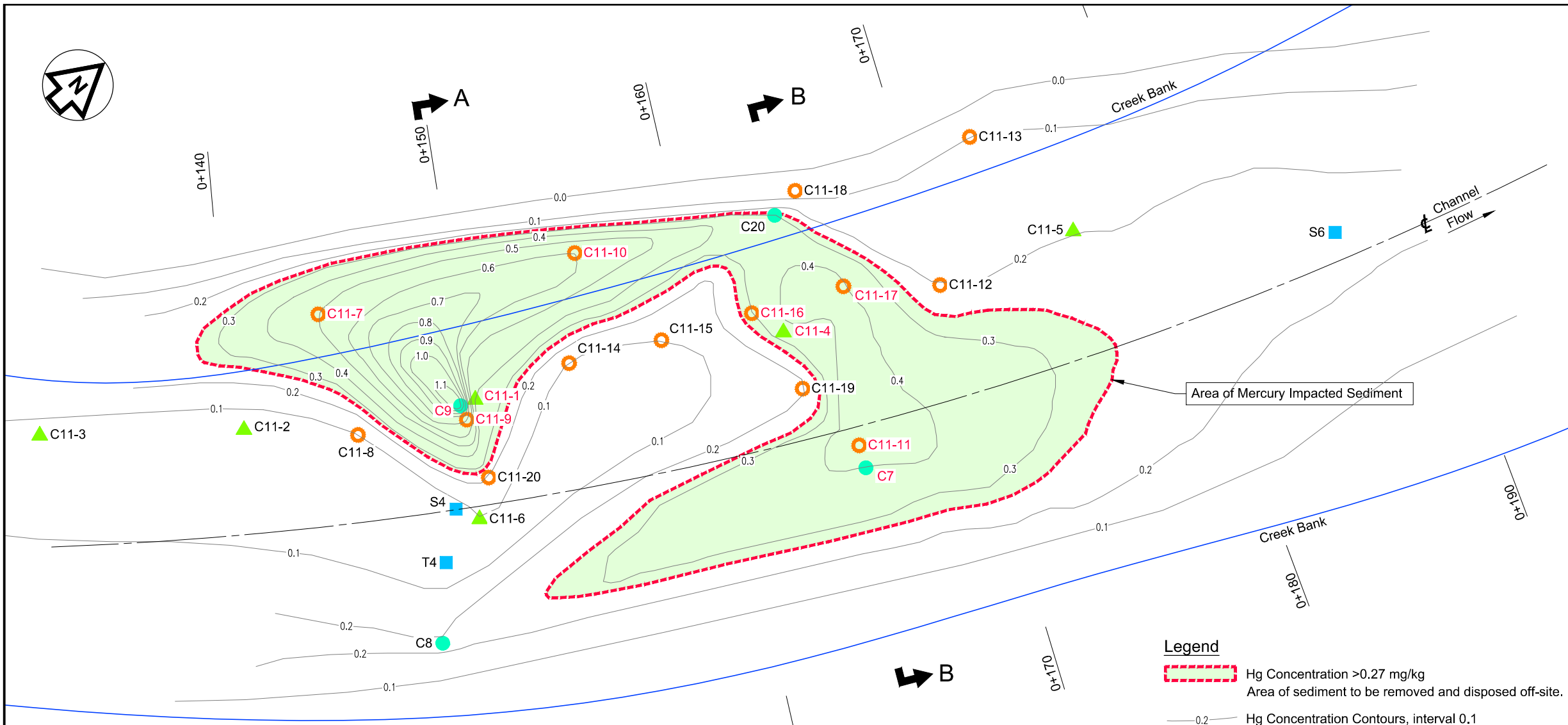


Figure 3



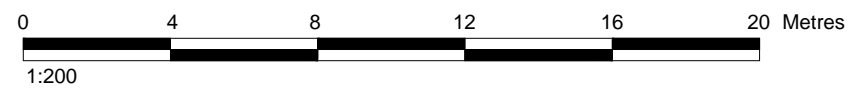
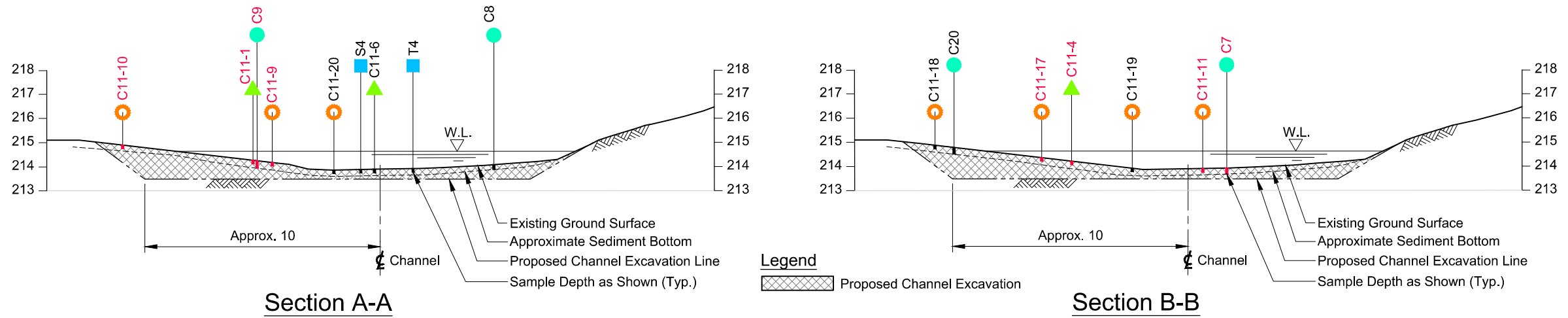
Year	Sample ID	Hg Concentration (mg/kg)		
		Sample Method		
		Top	Bottom	Bulk
2005	S4	<0.1	0.07	
	T4	<0.1	No Data	
	S6	0.08	0.25	
2009	C7	<0.1	0.4 *	
	C8	0.2 *	0.1	
	C9	1.1	0.7 *	
	C20	0.3 *	0.2	
2011	C11-1			0.4
	C11-2			<0.1
	C11-3			<0.1
	C11-4			0.4
	C11-5			0.2
	C11-6			0.1
2012	C11-7			0.5
	C11-8			0.1
	C11-9a			0.7
	C11-10			0.6
	C11-11			0.5
	C11-12			0.2
	C11-13			0.1
	C11-14			0.1
	C11-15			0.1
	C11-16			0.3
	C11-17			0.4
	C11-18			<0.1
	C11-19			0.2
	C11-20			0.2

- Notes:**
- Hg Concentration >0.27 mg/kg marked in RED
 - Asterisk (*) indicates value used in Hg Concentration Contours shown on Plan.
 - For Key Plan of Area see Figure 3.

Legend

- Hg Concentration >0.27 mg/kg
Area of sediment to be removed and disposed off-site.
- 0.2— Hg Concentration Contours, interval 0.1

Plan



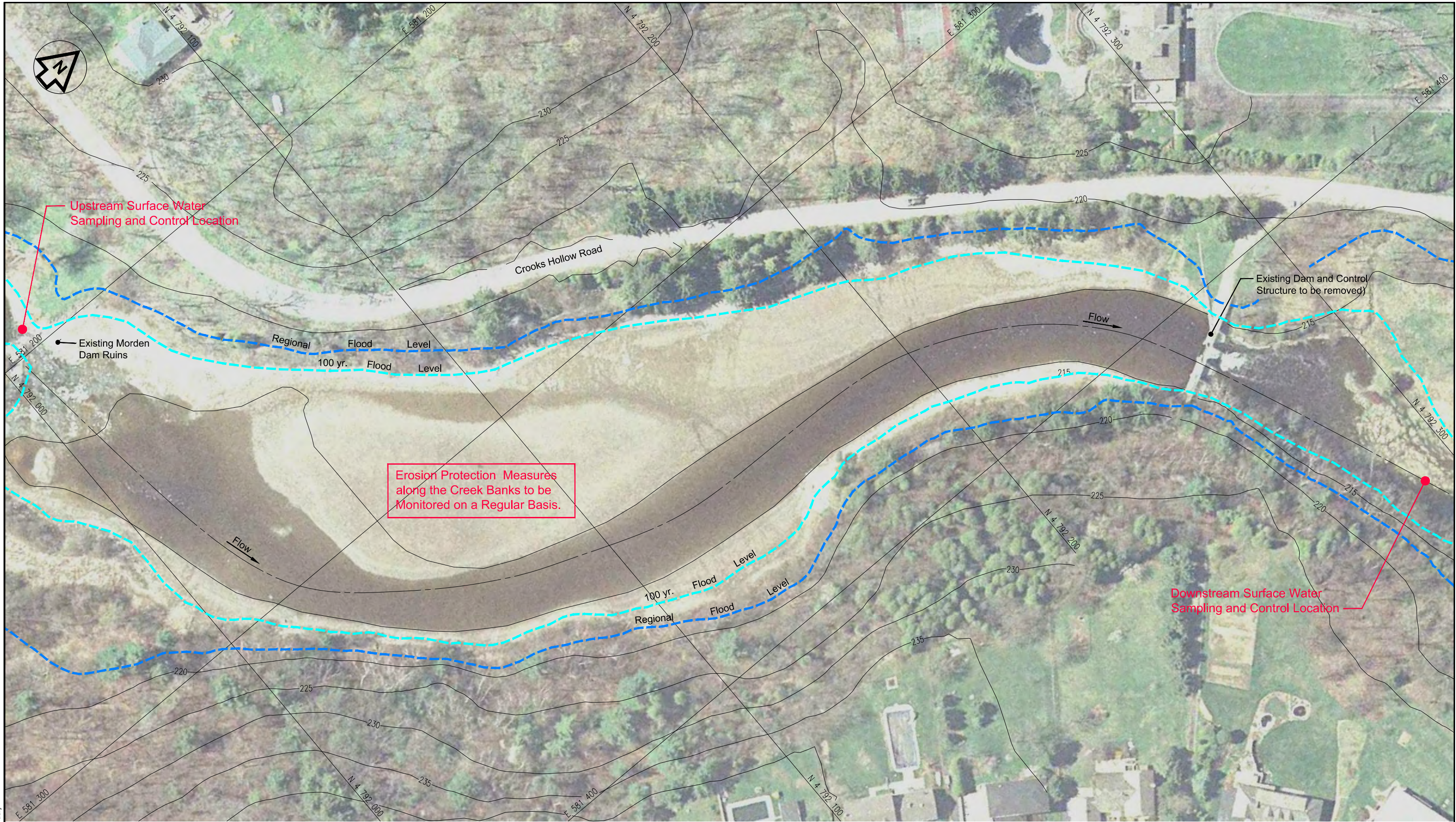
Sediment Management Plan - Mercury (Hg) Impacted Sediment Removal Plan

Hamilton Conservation Authority
Crooks' Hollow Dam Removal and Restoration of Spencer Creek



Figure 4

Mar 05, 2017, 7:00pm
 Login name: park110733
 Drawing Name: F:\HQA\327415\CAD\C\ME\337415_Figure 4.mxd



File: 08_2012_130km Layout: Channel Works
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 Date: 08/2012 13:00m
 User: JAC

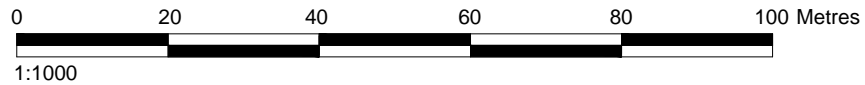
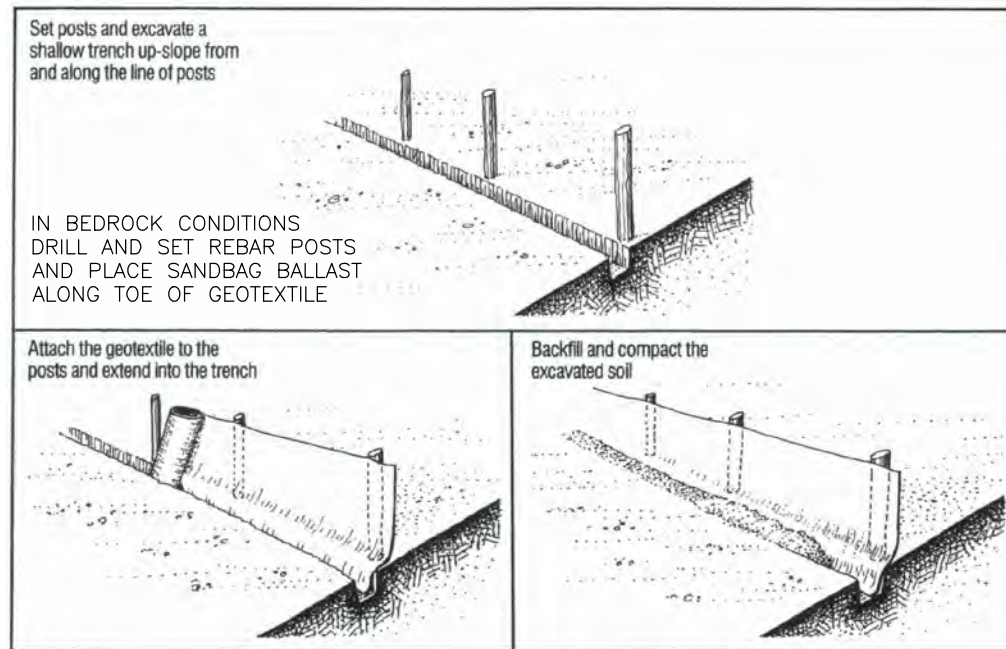


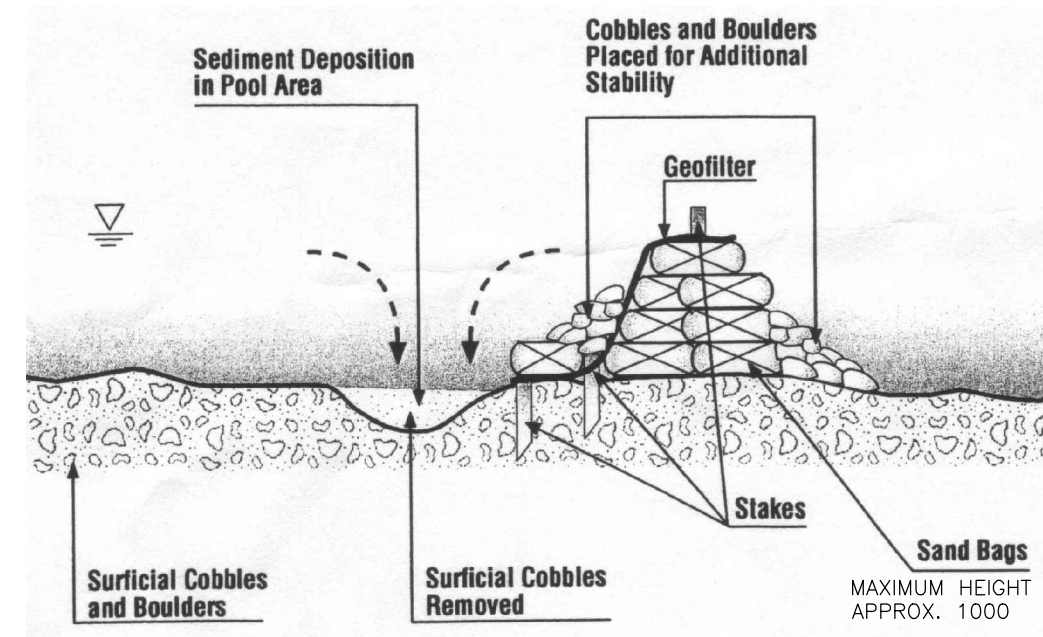
Figure 5





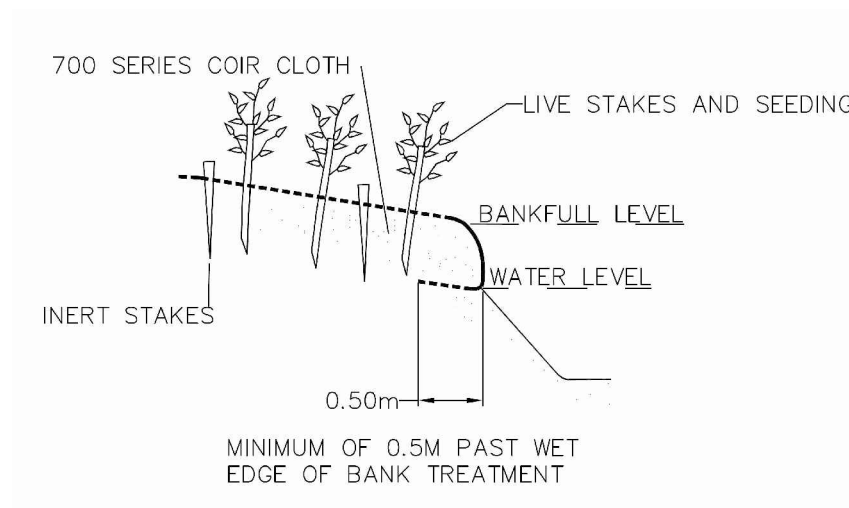
Typical Construction of a Silt Fence

Locations of Silt Fence to be determined on Site by Owners Representative and shall be altered with Construction Sequences.



Typical Sediment Containment Structure

Source: MNR, 1990 Environmental Guidelines for Access Roads and Water Crossings.



Typical Coir Cloth Detail

Appendix A

Construction Drawings

See separate transmittal with zipped file.

Appendix B

Spencer Creek Velocity Model Results

Existing conditions with bridge

Table with columns: HEC-RAS Plan, River, Spencer Creek, Reach, Profile, Vel Left, Vel Right, Vel Chnl, Q Channel, Q Left, Q Right, W.S. Elev. Rows include various Creek Hollow locations and years (e.g., 0.54 20 year, 0.48 100 year).

Existing creek profile, bridge removed, assumed smooth transition across bridge

Table with columns: HEC-RAS Plan, River, Spencer Creek, Reach, Profile, Vel Left, Vel Right, Vel Chnl, Q Channel, Q Left, Q Right, W.S. Elev. Rows include various Creek Hollow locations and years (e.g., 0.42 5 year, 0.39 Regional).

Appendix C

DFO and MNR Approvals



Transport Canada
Marine

Transports Canada
Maritime

Navigable Waters Protection Program
Programme de protection des eaux navigables
100 Front Street South
Sarnia, Ontario N7T 2M4

Your File Votre référence

Our File Notre référence
8200-2005-400554 (8200-05-7019)

REGISTERED MAIL

JAN 09 2012

Hamilton Region Conservation Authority
838 Mineral Springs Road
PO Box 7099
Ancaster, ON L9G 3L3

Attention: Hazel Breton

Dear Sir:


Re.: Application under the *Navigable Waters Protection Act* by Hamilton Region Conservation Authority for Approval of the Footbridge located at Spencer Creek in the Province of Ontario

Enclosed herewith is an Approval document signed on behalf of the Minister of Transport, Infrastructure and Communities pursuant to subsections 5(1) and (3) of the *Navigable Waters Protection Act* (R.S.C. 1985, c. N-22), as amended by Part 7 of the *Budget Implementation Act*, 2009, S.C. 2009, c. 2.

Please note Transport Canada has determined, that for the purposes of issuing the aforementioned *Navigable Waters Protection Act* approval, Transport Canada is not required to complete an environmental assessment pursuant to the *Canadian Environmental Assessment Act* for the above-referenced project. Please note that your project may require other approvals and/or authorizations which could be subject to an environmental assessment under the *Canadian Environmental Assessment Act*.

Please advise this office of the completion of the work by facsimile transmission at 519-383-1989 or via email at NWPontario-PENontario@tc.gc.ca.

Sincerely,



Kelly Thompson
Navigable Waters Protection Officer
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

CC: Paul Holmes, Hatch Acres

Canada



NAVIGABLE WATERS PROTECTION ACT (R.S.C. 1985, c. N-22) as amended by Part 7 of the *Budget Implementation Act*, 2009, S.C. 2009, c. 2 (*Navigable Waters Protection Act*), PART I
Subsections 5(1) and (3) – Other than substantial interference

8200-2005-400554 (8200-05-7019)

Approval

APPLICANT: Hamilton Region Conservation Authority
838 Mineral Springs Road
PO Box 7099
Ancaster, ON L9G 3L3

WORK: Footbridge

SITE LOCATION: Located at Approximately 43° 16' 43.96" N – 79° 59' 48.05" W to 43° 16' 43.22" N – 79° 59' 47.47" W, Spencer Creek, Community of Greenville, City of Hamilton, in the Province of Ontario

IMPORTANT NOTICE: This document approves the work in terms of its effect on marine navigation under the *Navigable Waters Protection Act*. The work must be built, placed, maintained, operated, used and removed in accordance with the approved plan(s), the *Navigable Waters Protection Act*, its regulations and the terms and conditions in the Approval. It is the applicant's responsibility to obtain any other forms of approval, including building permits, under any applicable laws.

WHEREAS the above-named applicant has made application to the Minister of Transport, Infrastructure and Communities under the *Navigable Waters Protection Act* for approval of the above-described work at the above-referenced site in accordance with the attached plan(s);

WHEREAS it is considered advisable to approve the said work at the said site and plan(s) thereof for a period of 25 years pursuant to the Schedule referred to in subsection 3(1) of the *Navigable Waters Works Regulations*.

THEREFORE, the Minister of Transport, Infrastructure and Communities, pursuant to subsections 5(1) and (3) of the *Navigable Waters Protection Act*, hereby approves the said work at the said site and plan(s) thereof for the period of time aforesaid, providing:

1. The Minister or his representatives must be allowed unimpeded access to any site related to the project for inspection and/or monitoring purposes.
2. Any proposed changes to the project must be reviewed and accepted by Transport Canada prior to implementation of the same.
3. All vessels shall be allowed safe access through the site and assisted as necessary.

.../2

8200-2005-400554 (8200-05-7019)

4. All portions of the existing Crook's Hollow Dam shall be completely removed to an elevation at or below the bed of the waterway and in accordance with the approved plans within 2 months of completion of the new work.
5. No person shall permit any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in navigable water to remain in such water after the completion of the project.
6. Where a work or a portion of a work that is being constructed or maintained in a navigable water causes debris or other material to accumulate on the bed or on the surface of such water, the owner of that work or portion of that work shall cause the debris or other material to be removed to the satisfaction of the Minister.

Sarnia, Ontario

Date: JAN 09 2012



Kelly Thompson
Navigable Waters Protection Officer
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

for the Minister of Transport, Infrastructure and
Communities



This permit is issued under the authority and provisions of the following indicated Provincial Acts and their regulations, and is subject to the limitations and provisions thereof and is also subject to the terms and conditions herein.
Ce permis est émis conformément aux dispositions des lois provinciales ci-après et des règlements y afférents et est sujet aux restrictions et dispositions de ce lois et règlements ainsi qu'aux conditions ci-énoncées.

- Lakes and Rivers Improvement Act/Loi sur l'aménagement des lacs et des rivières
- Section 13(1), Public Lands Act/Loi sur les terres publiques, article 13(1)
- Section 2(1), Regulation 975, as amended, Public Lands Act/Loi sur les terres publiques, Règlement 975 tel que modifié, article 2(1)

Note : The issuance of this permit does not relieve the applicant from the responsibility of acquiring any other agency, board, government, etc. approval as may be required nor does it relieve the permittee from the requirements of any other legislation.

Remarque : La délivrance d'un permis n'exonère pas le demandeur de l'obligation d'obtenir l'autorisation de tout autre organisme, commission, gouvernement, etc. qui pourrait être exigée, non plus qu'elle exempte le détenteur des dispositions des lois.

The Permit is issued to : Ce Permis est délivré à :

Name of Permittee/Nom du détenteur : Hamilton Conservation Authority Attention: Hazel Breton
Post Office Address/Adresse postale : 838 Mineral Springs Road, Ancaster Ontario L9G 4X1

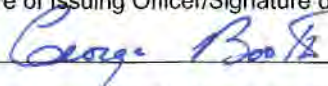
To conduct an operation from **21st** day of **October**, **2011** to and including the **21st** day of **October**, **2012**.
Pour effectuer des travaux du **jour de**, **20** jusqu'au **jour de**, **20**.

at location/à emplacement: **Crooks Hollow Dam**

as per your application dated/conformément à la demande de permis en date du : **June 10, 2011**
for the purpose of:/Aux fins de :
to decommission a dam

Subject to the following conditions:/Et sous les conditions suivantes :

1. The Permittee shall keep this permit or a true copy thereof on the work permit area./
Le détenteur conservera ce permis ou une copie conforme sur les lieux des travaux.
2. The person in charge of the operation conducted under this permit shall produce and show this permit or the true copy kept on the work permit area to any officer whenever requested by the officer./
Le responsable des travaux couverts par ce permis doit produire le permis ou sa copie conforme si un agent lui demande.
3. Other conditions as listed on the reverse side of this permit as well as those contained in Schedule(s) **F** attached.
Autres conditions énoncées au verso de ce permis ainsi que celles apparaissant aux annexes suivantes

Place of Issue/Émis à : Guelph	Signature of Issuing Officer/Signature du délivreur : 
Date/Date de délivrance : October 27, 2011	

Personal Information on this form is collected under the authority of Section 13 of the Public Lands Act, R.S.O. 1990, the Lakes and Rivers Improvement Act, R.S.O. 1990, and Regulation 975 as amended, and the information will be used for the purposes of the Act and Regulations. Questions about this information should be directed to the local MNR office.
Les renseignements personnels exigés dans les présentes sont recueillis en vertu de la Loi sur l'aménagement des lacs et des rivières et du règlement 975 de l'Ontario tel que modifié. Ils seront utilisés selon les termes de la Loi et des règlements. Veuillez adresser toute question à ce sujet au bureau du MRN. Une liste des bureaux du MRN avec adresses et numéros de téléphone en français est disponible.

Conditions

It is agreed by the parties hereto that:

- 1) This Work Permit gives the permittee only the right to carry out work on the described site for the purpose specified in this permit and does not convey any right, title or interest in the land.
- 2) The permittee covenants to indemnify and forever save and keep harmless the Crown, its officers, servants and agents from and against any and all claims, demands, suits, actions, damages, loss, cost or expenses arising out of any injury to persons, including death, or loss or damage to property of others which may be or be alleged to be caused by or suffered as a result of or in any manner associated with the exercise of any right or privilege granted to the permittee by this Work Permit.
- 3) a) A permittee is an occupier under the Trespass to Property Act and the Occupier's Liability Act and shall take such care as in all circumstances of the case is reasonable to see that persons entering on the premises, and the property brought on the premises by these persons, are reasonably safe while on the premises.

b) Any posting of signs or notices pursuant to the Trespass to Property Act and the Occupier's Liability Act, on the work permit area, shall be subject to prior approval of the issuing officer. The location and format of all signs and notices must be approved by an officer.

c) The permittee agrees to remove all signs or notices on termination of the permit, or at the direction of the issuing officer.

d) The permittee agrees to post any signs or notices as required or directed by an officer.
- 4) This Work Permit shall not be assigned or transferred.
- 5) The permittee may, with the approval of the District Manager, or will, at the District Manager's request, remove the improvements, property or other assets from the public lands and leave the site in a clean and safe condition, restored as much as possible to its original state except where the requirement to restore is waived in writing by the District Manager.
- 6) a) Upon termination of this permit, the permittee has no right to, or reasonable expectation of, the issuance of a new permit based on prior work on the land.

b) The successive issuance of any permit or permits for work on the land described herein will not create any future rights or interests whatsoever in the land.
- 7) Violations of any of the conditions constitutes an offence.

Conditions

Les parties conviennent que:

- 1) Ce permis de travail autorise le détenteur à effectuer les travaux sur le terrain décrit aux fins énoncées dans ce permis. Il ne confère aucun droit, titre ou intérêt sur le terrain.
- 2) Le détenteur indemnifiera et protégera la Couronne, ses agents, fonctionnaires et représentants de toute poursuite, demande, procès, dommages, perte ou coûts découlant de blessures, décès ou dommages matériels à autrui qui pourrait être causés ou infligés, ou présumer être causés ou infligés de quelque façon que ce soit, par l'exercice des droits ou privilèges accordés par ce permis à son détenteur.
- 3) a) Le détenteur est considéré comme un occupant aux termes de la Loi sur l'entrée sans autorisation et de la Loi sur la responsabilité des occupants et il doit prendre toute mesure qui, dans la situation, est considérée raisonnable afin que les personnes entrant sur les lieux, et les biens apportés par ces personnes, soient raisonnablement sécuritaires lorsqu'ils sont sur les lieux.

b) Les avis ou panneaux exigés par la Loi sur l'entrée sans autorisation et la Loi sur la responsabilité des occupants et installés sur les lieux de travail couverts par le permis doivent être préalablement approuvés par le délivreur. L'emplacement et le format des affiches ou des avis doivent être approuvés par le délivreur.

c) Le détenteur convient d'enlever ces avis ou panneaux conformément à la Loi sur l'entrée sans autorisation à l'expiration du permis ou sur l'ordre du délivreur.

d) Le détenteur accepte de poser des affiches ou des avis à la demande du délivreur.
- 4) Ce permis ne peut être ni cédé ni transféré.
- 5) Le détenteur peut, sous réserve de l'approbation du chef de district, ou doit à sa demande, enlever les aménagements, les biens ou autres avoirs des terres publiques et laisser le site propre et sûr, restauré dans toute la mesure du possible à sa condition originale sauf s'il en est dispensé par écrite par le chef de district.
- 6) a) À l'expiration de ce permis, il sera décidé de délivrer un nouveau permis conformément aux règlements afférents à la Loi sur les terres publiques et le détenteur n'a aucun droit, ni ne peut raisonnablement s'attendre, à ce qu'un nouveau permis lui soit accordé uniquement parce que des travaux ont été effectués sur le site.

b) La délivrance successive de permis d'effectuer des travaux sur le terrain décrit ici ne confère aucun droit ou intérêt futur sur ce terrain.
- 7) Les infractions à ces conditions sont punies par la Loi.

SCHEDULE 'F'

CONDITIONS

SUBJECT: Application for A Work Permit Under the Lakes and Rivers Improvement Act
 Crooks Hollow Dam Removal, Spencer Creek, City of Hamilton
 Applicant: Hamilton Conservation Authority
 Design Engineer: HATCH

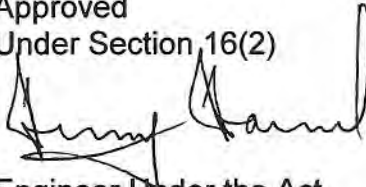
The plans and specifications for the decommissioning of the Crooks Hollow Dam, on Spencer Creek, City of Hamilton, have been approved under Sections 16(2) of the Lakes and Rivers Improvement Act subject to the following conditions:

1. This approval is given ONLY to the proposed works shown and/or described on the following documents prepared by the consultant, HATCH:
 - 1.1 Application for a Work Permit from Hamilton Conservation Authority, dated June 10, 2011
 - 1.2 Drawing No. H337415-0000-10-042-0001 titled 'Project General Arrangement and Drawing List', revision 'O' dated August 23, 2011
 - 1.3 Drawing No. H337415-0000-10-042-0002 titled 'Crooks' Hollow Dam Plan and Sections', revision 'O' dated August 23, 2011
 - 1.4 Drawing No. H337415-0000-10-042-0003 titled 'Water Diversion and Sediment Control', revision '1' dated September 01, 2011
 - 1.5 Drawing No. H337415-0000-10-042-0004 titled 'Spencer Creek Channel Restoration Plan and Profile', revision '2' dated October 06, 2011
 - 1.6 Drawing No. H337415-0000-10-042-0005 titled 'Spencer Creek Channel Restoration Cross Sections A, B, and C', revision 'O' dated August 23, 2011
 - 1.7 Drawing No. H337415-0000-10-042-0006 titled 'Spencer Creek Channel Restoration Cross Sections D, E, F, and G', revision 'O' dated August 23, 2011
 - 1.8 Drawing No. H337415-0000-10-042-0007 titled 'Spencer Creek Channel Restoration Details', revision '1' dated September 01, 2011
 - 1.9 Drawing No. H337415-0000-10-042-0009 titled 'Crooks Hollow Dam Demolition Drawing', revision 'O' dated August 23, 2011
 - 1.10 Drawing No. H337415-0000-10-042-0010 titled 'Spencer Creek Channel Restoration Planting Plan', revision 'O' dated August 23, 2011
 - 1.11 Data for Tenderers and Specifications, dated revision 3 Oct. 19, 2011.

2. With the exception of the construction and removal of temporary works (ie. cofferdams), the work shall be carried out in the "dry", under dewatered conditions only during low flow periods from October 21, 2011 to March 31, 2012 and from July 01, 2012 to March 31, 2012. No in-water work will be permitted from April 01, 2012 to June 30, 2012.
3. Prior to construction the working area shall be sealed off to prevent the entry of fish, and when sealed, fish found within the working area are to be removed and transferred elsewhere in the creek. A Scientific Collector's Licence will be required for fish transfers.
4. Any changes to the design for this project will require prior review and approval by the Ministry of Natural Resources.
5. Prior to any construction, land tenure must be obtained from the property owner(s) for the lands (not owned by the Applicant) on which the proposed works will be constructed.
6. The Applicant, Hamilton Conservation Authority, and his successors or assigns shall be responsible for periodic and regular inspection, maintenance, operation and repair of the approved works in accordance with the plans and specifications approval, to ensure structural integrity and functional performance.
7. The Applicant shall not allow any deleterious material, (as defined within the Canada Fisheries Act) caused by his/her activity, to enter or re-enter the water body.
8. The Applicant shall require that the construction of the aforementioned work be inspected by the design engineer, HATCH, or his/her representative, as frequently as may be required to ensure compliance with the plans and specifications and conditions of approval. If erosion and sediment control measures are ineffective or not in place, the Applicant shall immediately notify the Area Supervisor, Guelph Area Office, Guelph District, and take action to ensure appropriate controls are installed. Upon completion of construction, the Applicant shall, in writing, certify to the Area Supervisor, Guelph Area Office, Guelph District, that the work was completed in accordance with the approved plans or identify aspects of the work which were modified and provide a set of as-constructed drawings.

9. Approval under the Lakes and Rivers Improvement Act does not relieve the Applicant from compliance with the provisions of any other applicable Federal, Provincial, and/or Municipal Statutes, Regulations or By-Laws. **Approval of the 'sediment management area' may be required from the Ontario Ministry of the Environment. Approval under the Lakes and Rivers Improvement Act is not required for the sediment management area, and therefore this approval does not represent approval by the Province of Ontario for that component of the project.**
10. The Applicant shall contact George Booth, at the Guelph Area office, Guelph District (519) 826-4910, forty-eight hours prior to commencement of the work in order that inspections may be arranged.

Approved
Under Section 16(2)



Engineer Under the Act
Southern Region
Peterborough

Appendix D

Sediment and Soil Sample Descriptions

Crook's Hollow – Soil/Sediment Sampling Details (Dec. 28, 2011 and Feb. 20, 2012)

Date (dd/mm/yr)	Sampling Site	Sample Type	Description	Notes
28/12/2011	D-1	Soil	Brownish-black, wet, clayey silt mixed with organic debris.	Sample collected along left bank of channel, downstream of dam.
28/12/2011	D-2	Soil	Moist, clayey silt mixed with some organic debris	Sample collected along left bank of channel, downstream of dam.
28/12/2011	C11-1	Sediment	Brownish-grey, sandy gravel (0.00 m to 0.005 m) Dark brown, clayey silt (greater than 0.05 m)	Sample collected on left side of channel, upstream of dam.
28/12/2011	C11-2	Sediment	Brown sand mixed with organics (i.e., leaf and small shell debris)	Sample collected on left side of channel, upstream of dam.
28/12/2011	C11-3	Sediment	Brown, fine to medium sand with some silt and organics (i.e., shell debris)	Sample collected on left side of channel, upstream of dam.
28/12/2011	C11-4	Sediment	Dark brownish-grey, fine silt mixed with a minor amount of sand and organics	Sample collected on left side of channel, upstream of dam.
28/12/2011	C11-5	Sediment	Brownish-grey, sand mixed with organics (0.00 m to 0.05 m) Dark greyish-brown, fine silt (greater than 0.05 m)	Sample collected on left side of channel, upstream of dam.
28/12/2011	C11-6	Sediment	Grey-brown, sandy silt with some organics	Sample collected in middle of channel, upstream of dam.
28/12/2011	A1	Soil	Dark greyish-brown, silty clay mixed with some fine sand and organics	Sample collected along left bank of channel, upstream of dam.
28/12/2011	A2	Soil	Brown sand mixed with some organic debris over shallow bedrock	Sample collected along left bank of channel, upstream of dam.
28/12/2011	A3	Soil	Predominantly grey clay	Sample collected along right bank of channel, upstream of dam.
28/12/2011	A4	Soil	Brownish-grey clay mixed with some sandy silt	Sample collected along right bank of channel, upstream of dam.
28/12/2011	C11-7*	Sediment	Dark grey, fine, sandy silt mixed with some organics	Sample collected along right bank of channel, upstream of dam.
28/12/2011	C11-8*	Sediment	Thin sand and gravel top layer, with dark grey, fine, sandy and silty clay mixed with organics below	Sample collected along right bank of channel, upstream of dam.
28/12/2011	Area C1	Soil	Greyish-brown sand mixed with a large amount of organic debris (i.e., roots) over very shallow bedrock	Sample collected along left bank of channel, upstream of dam.
28/12/2011	Area C2	Soil	Brownish-grey, sandy silt	Sample collected along left bank of

Date (dd/mm/yr)	Sampling Site	Sample Type	Description	Notes
				channel, upstream of dam.
20/02/2012	C11-7*	Soil	Greyish-brown, sandy silt mixed with organics (i.e., roots) (0.00 m to 0.003 m) Organics, including roots and wood fragments (0.03 m to 0.04 m) Brownish-grey to reddish-brown, mottled sandy silt with some black organic pockets (0.04 m to 0.15 m)	Sample collected along left bank of channel, upstream of dam.
20/02/2012	C11-8*	Sediment	Dark brownish-grey silt mixed with some sand and fine organics	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-9a/ C11-9b	Sediment	Dark grayish-brown, sandy silt mixed with some organics	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-10	Soil	Greyish-brown, silty, fine sand mottled with grass roots, mixed with reddish-brown/grey pockets of finer organics throughout	Sample collected along left bank of channel, upstream of dam.
20/02/2012	C11-11	Sediment	Brownish-grey, sandy silt mixed with a minor amount of clay and coarse organic debris, with fine organic debris interspersed throughout	Sample collected in middle of channel, upstream of dam.
20/02/2012	C11-12	Sediment	Grey, compact sandy-silt with organics present in the top layer only	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-13	Soil	Brown, fine to medium sand mixed with some silt, grass roots and wood fragments	Sample collected along left bank of channel, upstream of dam.
20/02/2012	C11-14	Sediment	Dark, grayish-brown sandy silt mixed with organics (i.e., root and leaf debris) mixed throughout	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-15	Sediment	Brownish-grey organics (i.e., particularly wood fragments) mixed with some silty sand	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-16	Sediment	Dark grayish-brown, sandy silt mixed with fine organic debris	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-17	Sediment	Mottled dark grey to brownish-grey, sandy silt mixed with fine organics	Sample collected on left side of channel, upstream of dam.
20/02/2012	C11-18	Soil	Brown, fine to medium sand mixed with some silt, grass roots and wood fragments	Sample collected along left bank of channel, upstream of dam.
20/02/2012	C11-19	Sediment	Greyish-brown, compact silt mixed with a minor amount of sand, with coarse organics present in the top layer only	Sample collected on left side of channel, upstream of dam.

Date (dd/mm/yr)	Sampling Site	Sample Type	Description	Notes
20/02/2012	C11-20	Sediment	Brownish-grey silt mixed with a minor amount of sand and clay, with fine organics interspersed throughout and coarse organics present in the top layer only	Sample collected on left side of channel, upstream of dam.

*Note: Samples labelled as C11-7 and C11-8 were taken during both the December 28, 2011 and February 20, 2012 sampling periods (respectively), however, the sampling locations were different.

Appendix E

Chemical Test Results

E-1 Chemical Laboratory Report
Sediment and Soil
11-Nov-2011





Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Jordan Black

Phone: (905) 374-5200
Fax: (905) 374-1157

Client PO:
Project: 337415
Custody: 91345/91341

Report Date: 11-Nov-2011
Order Date: 7-Nov-2011

Order #: 1146048

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Parcel ID	Client ID
1146048-01	2011-T1
1146048-02	2011-T2
1146048-03	2011-T3
1146048-04	2011-T4
1146048-05	2011-T5
1146048-06	2011-T6

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	10-Nov-11	11-Nov-11
Mercury	EPA 7471A - CVAA, digestion	10-Nov-11	10-Nov-11
Metals	EPA 6020 - Digestion - ICP-MS	10-Nov-11	10-Nov-11
Solids, %	Gravimetric, calculation	9-Nov-11	9-Nov-11

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

	Client ID:	2011-T1	2011-T2	2011-T3	2011-T4
	Sample Date:	07-Nov-11	07-Nov-11	07-Nov-11	07-Nov-11
	Sample ID:	1146048-01	1146048-02	1146048-03	1146048-04
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	73.5	81.8	64.4	56.6
----------	--------------	------	------	------	------

Metals

		2011-T1	2011-T2	2011-T3	2011-T4
Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	1	2	4	<1
Barium	1 ug/g dry	26	52	42	81
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	<5.0	<5.0	7.8
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	0.6
Chromium	5 ug/g dry	<5	9	8	14
Chromium (VI)	0.4 ug/g dry	<0.4	<0.4	<0.4	<0.4
Cobalt	1 ug/g dry	2	4	4	6
Copper	5 ug/g dry	6	13	17	30
Lead	1 ug/g dry	12	27	44	70
Mercury	0.1 ug/g dry	<0.1	0.1	1.1	0.4
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	<5	8	7	14
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	<10	13	12	19
Zinc	20 ug/g dry	145	361	235	416

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Client ID:	2011-T5	2011-T6	-	-
Sample Date:	07-Nov-11	07-Nov-11	-	-
Sample ID:	1146048-05	1146048-06	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	59.7	53.3	-	-
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Metals

Antimony	1 ug/g dry	<1	<1	-	-
Arsenic	1 ug/g dry	3	4	-	-
Barium	1 ug/g dry	74	83	-	-
Beryllium	0.5 ug/g dry	<0.5	<0.5	-	-
Boron	5.0 ug/g dry	6.1	6.0	-	-
Cadmium	0.5 ug/g dry	0.7	0.6	-	-
Chromium	5 ug/g dry	14	14	-	-
Chromium (VI)	0.4 ug/g dry	<0.4	<0.4	-	-
Cobalt	1 ug/g dry	6	6	-	-
Copper	5 ug/g dry	28	27	-	-
Lead	1 ug/g dry	61	54	-	-
Mercury	0.1 ug/g dry	0.2	0.2	-	-
Molybdenum	1 ug/g dry	<1	<1	-	-
Nickel	5 ug/g dry	12	13	-	-
Selenium	1 ug/g dry	<1	<1	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1 ug/g dry	<1	<1	-	-
Uranium	1 ug/g dry	<1	<1	-	-
Vanadium	10 ug/g dry	20	19	-	-
Zinc	20 ug/g dry	447	434	-	-

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.4	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	8.0	1	ug/g dry	7.8			3.0	30	
Arsenic	17.8	1	ug/g dry	17.9			0.8	30	
Barium	123	1	ug/g dry	118			4.8	30	
Beryllium	0.70	0.5	ug/g dry	0.74			5.6	30	
Boron	18.2	5.0	ug/g dry	15.9			13.3	30	
Cadmium	0.90	0.5	ug/g dry	0.86			4.3	30	
Chromium (VI)	ND	0.4	ug/g dry	ND				35	
Chromium	24.4	5	ug/g dry	23.3			5.0	30	
Cobalt	8.2	1	ug/g dry	7.8			6.1	30	
Copper	245	5	ug/g dry	239			2.4	30	
Lead	139	1	ug/g dry	138			0.4	30	
Mercury	ND	0.1	ug/g dry	ND				35	
Molybdenum	1.8	1	ug/g dry	1.7			6.1	30	
Nickel	37.9	5	ug/g dry	36.1			4.8	30	
Selenium	1.7	1	ug/g dry	1.6			8.5	30	
Silver	0.50	0.3	ug/g dry	0.41			17.9	30	
Thallium	ND	1	ug/g dry	ND				30	
Uranium	ND	1	ug/g dry	ND				30	
Vanadium	33.0	10	ug/g dry	31.8			3.7	30	
Zinc	464	20	ug/g dry	466			0.5	30	
Physical Characteristics									
% Solids	74.4	0.1	% by Wt.	73.5			1.3	25	

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	58.2		ug/L	3.1	110	70-130			
Arsenic	60.5		ug/L	7.2	107	70-130			
Barium	104		ug/L	47.1	114	70-130			
Beryllium	48.1		ug/L	0.29	95.6	70-130			
Boron	47.7		ug/L	6.4	82.6	70-130			
Cadmium	48.5		ug/L	0.34	96.4	70-130			
Chromium (VI)	4.9	0.4	ug/g	ND	98.5	89-123			
Chromium	58.2		ug/L	9.3	97.7	70-130			
Cobalt	51.4		ug/L	3.1	96.7	70-130			
Copper	146		ug/L	95.7	99.6	70-130			
Lead	106		ug/L	55.3	101	70-130			
Mercury	1.63	0.1	ug/g	ND	109	72-128			
Molybdenum	50.0		ug/L	0.7	98.8	70-130			
Nickel	64.5		ug/L	14.4	100	70-130			
Selenium	47.3		ug/L	0.6	93.3	70-130			
Silver	47.8		ug/L	0.17	95.4	70-130			
Thallium	57.1		ug/L	0.1	114	70-130			
Uranium	47.4		ug/L	0.3	94.3	70-130			
Vanadium	61.0		ug/L	12.7	96.6	70-130			
Zinc	229		ug/L	186	85.9	70-130			

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 11-Nov-2011

Order Date: 7-Nov-2011

Sample and QC Qualifiers Notes

None

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

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Client Name: <u>Jordan Black</u>	Project Reference: <u>3374/5</u>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day Date Required: _____
Contact Name: <u>Hatch Ltd.</u>	Quote #	
Address: <u>4342 Queen St #500 Niagara Falls, L2E 7J7</u>	PO #	
Telephone: <u>905-374-5200</u>	Email Address: <u>JBlack@hatch.ca</u>	

Criteria: | | O. Reg. 153/04 Table 1 | O. Reg 179/11 Table 8 | | RSC Filing | | O. Reg. 558/00 | | PWQO | | CCME | | SUB (Storm) | | SUB (Sanitary) Municipality: _____ | | Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: <u>1146048/1146047</u>		Matrix	Air Volume	# of Containers	Sample Taken		Metals	Mercury	C R VI							
Sample ID/Location Name					Date	Time										
1	<u>2011-T#1</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>10:00 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
2	<u>2011-T#1</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>10:00 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
3	<u>2011-T2</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>10:30 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
4	<u>2011-T2</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>10:30 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
5	<u>2011-T3</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>11:00 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
6	<u>2011-T3</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>11:00 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
7	<u>2011-Upstream</u>	<u>SW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>11:30 AM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
8	<u>2011-Downstream</u>	<u>SW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>12:00 PM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
9	<u>2011-T4</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>1:30 PM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>
10	<u>2011-T5</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>1:35 PM</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>/</u>

Comments: Water bottles not preserved or filtered. Full metals for both soil and water. Sub-surface soils. AC

Method of Delivery: Walkin

Relinquished By (Print & Sign):	Received by Driver/Depot: <u>A. Beglar</u>	Received at Lab: <u>SUNDEPORN</u>	Verified By: <u>SCB</u>
Date/Time:	<u>Nov 7, 11 15:27</u>	Date/Time: <u>NOV 08, 11 09:00</u>	Date/Time: <u>Nov 8, 11</u>
Date/Time:	Temperature: _____ °C	Temperature: <u>13.6</u> °C	pH Verified By: <u>SCB</u>

11:03a

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Page 2 of 2

Client Name: <u>Hatch Ltd</u>	Project Reference: <u>337415</u>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day Date Required: _____
Contact Name: <u>Jordan Black</u>	Quote # _____	
Address: <u>4342 Queen St #500 Niagara Fall L2E 7J7</u>	PO # _____	
Telephone: <u>905-374-5200</u>	Email Address: <u>JBlack@hatch.ca</u>	

Criteria: | O. Reg. 153/04 Table | O. Reg 179/11 Table | RSC Filing | O. Reg. 558/00 | PWQO | CCME | SUB (Storm) | SUB (Sanitary) Municipality: _____ | Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: <u>1146048</u>		Matrix	Air Volume	# of Containers	Sample Taken		Metals	Hg	CrVI									
Sample ID/Location Name					Date	Time												
1	<u>2011-T6</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 2011</u>	<u>1:45 PM</u>	<u>X</u>	<u>X</u>	<u>X</u>									
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:			Method of Delivery:		
Relinquished By (Print & Sign): <u>[Signature]</u>	Received by Driver/Depot: <u>[Signature]</u>	Received at Lab: <u>SUNEER PORN</u>	Verified By: <u>[Signature]</u>		
Date/Time: <u>Nov 7/11 15:27</u>	Date/Time: <u>Nov 08, 11 09:00</u>	Date/Time: <u>Nov 8/11</u>			
Date/Time:	Temperature: _____ °C	Temperature: <u>18.1</u> °C	pH Verified By: <u>N/A</u>		

11:03a

E-2 Chemical Laboratory Report
Pore Water and Surface Water
11-Nov-2011





Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Jordan Black

Phone: (905) 374-5200
Fax: (905) 374-1157

Client PO:
Project: 337415
Custody: 91345/91341

Report Date: 11-Nov-2011
Order Date: 7-Nov-2011

Order #: 1146047

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1146047-01	2011-T1
1146047-02	2011-T2
1146047-03	2011-T3
1146047-04	2011-Upstream
1146047-05	2011-Downstream

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent	MOE E3056 - colourimetric	8-Nov-11	8-Nov-11
Mercury	EPA 245.1 - Cold Vapour AA	9-Nov-11	9-Nov-11
Metals, low level	EPA 200.8 - ICP-MS	10-Nov-11	10-Nov-11

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Report Date: 11-Nov-2011

Order Date: 7-Nov-2011

Project Description: 337415

	Client ID:	2011-T1	2011-T2	2011-T3	2011-Upstream
	Sample Date:	07-Nov-11	07-Nov-11	07-Nov-11	07-Nov-11
	Sample ID:	1146047-01	1146047-02	1146047-03	1146047-04
	MDL/Units	Water	Water	Water	Water

Metals

Metals	MDL/Units	2011-T1	2011-T2	2011-T3	2011-Upstream
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	1.1	1.0	<0.5	<0.5
Arsenic	1 ug/L	9	14	6	<1
Barium	1 ug/L	121	78	92	43
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	42	34	29	21
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	8	<1	<1	<1
Chromium (VI)	10 ug/L	<10	<10	<10	<10
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Copper	0.5 ug/L	4.6	1.7	2.6	1.1
Lead	0.1 ug/L	1.2	0.3	0.1	<0.1
Molybdenum	0.5 ug/L	2.9	1.6	1.1	1.2
Nickel	1 ug/L	6	2	3	2
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	46500	38100	32000	29600
Thallium	0.1 ug/L	0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	1.2	1.1	1.2	0.9
Vanadium	0.5 ug/L	2.5	2.3	3.3	2.4
Zinc	10 ug/L	17	<10	<10	<10

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 11-Nov-2011

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Client ID:	2011-Downstream	-	-	-
Sample Date:	07-Nov-11	-	-	-
Sample ID:	1146047-05	-	-	-
MDL/Units	Water	-	-	-

Metals					
Mercury	0.1 ug/L	<0.1	-	-	-
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	<1	-	-	-
Barium	1 ug/L	43	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	21	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Chromium (VI)	10 ug/L	<10	-	-	-
Cobalt	0.5 ug/L	<0.5	-	-	-
Copper	0.5 ug/L	1.2	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Molybdenum	0.5 ug/L	1.2	-	-	-
Nickel	1 ug/L	2	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	28700	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	0.8	-	-	-
Vanadium	0.5 ug/L	2.9	-	-	-
Zinc	10 ug/L	<10	-	-	-

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	10	ug/L						

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	0.11	0.1	ug/L	ND				20	
Antimony	ND	0.5	ug/L	ND				20	
Arsenic	ND	1	ug/L	ND				20	
Barium	ND	1	ug/L	ND				20	
Beryllium	ND	0.5	ug/L	ND				20	
Boron	ND	10	ug/L	ND				20	
Cadmium	ND	0.1	ug/L	ND				20	
Chromium (VI)	ND	10	ug/L	ND				13	
Chromium	1.2	1	ug/L	ND				20	
Cobalt	ND	0.5	ug/L	ND				20	
Copper	1.02	0.5	ug/L	0.98			4.4	20	
Lead	0.37	0.1	ug/L	0.39			5.8	20	
Molybdenum	ND	0.5	ug/L	ND				20	
Nickel	ND	1	ug/L	ND				20	
Selenium	ND	1	ug/L	ND				20	
Silver	ND	0.1	ug/L	ND				20	
Sodium	ND	200	ug/L	ND				20	
Thallium	ND	0.1	ug/L	ND				20	
Uranium	ND	0.1	ug/L	ND				20	
Vanadium	ND	0.5	ug/L	ND				20	
Zinc	ND	10	ug/L	ND				20	

Certificate of Analysis

Report Date: 11-Nov-2011

Client: Hatch Ltd.

Order Date: 7-Nov-2011

Client PO:

Project Description: 337415

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	3.63	0.1	ug/L	ND	121	78-137			
Antimony	53.5		ug/L	ND	107	80-120			
Arsenic	51.1		ug/L	0.007	102	80-120			
Barium	49.9		ug/L	0.1	99.5	80-120			
Beryllium	50.9		ug/L	0.02	102	80-120			
Boron	47		ug/L	1	91.8	80-120			
Cadmium	49.2		ug/L	ND	98.4	80-120			
Chromium (VI)	185	10	ug/L	ND	92.5	75-120			
Chromium	49.5		ug/L	ND	99.0	80-120			
Cobalt	47.5		ug/L	0.06	95.0	80-120			
Copper	49.2		ug/L	0.98	96.4	80-120			
Lead	50.4		ug/L	0.39	100	80-120			
Molybdenum	48.9		ug/L	0.05	97.6	80-120			
Nickel	47.6		ug/L	0.2	94.8	80-120			
Selenium	50.1		ug/L	0.1	100	80-120			
Silver	50.9		ug/L	0.002	102	80-120			
Sodium	938		ug/L	10	92.7	80-120			
Thallium	53.1		ug/L	0.07	106	80-120			
Uranium	47.9		ug/L	0.006	95.9	80-120			
Vanadium	47.6		ug/L	0.13	94.9	80-120			
Zinc	48		ug/L	0.6	94.8	80-120			

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 11-Nov-2011

Order Date: 7-Nov-2011

Sample and QC Qualifiers Notes

1- LG-SMP007 : Sample - Filtered and preserved by Paracel upon receipt at the laboratory

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

OTTAWA • KINGSTON • NIAGARA • MISSISSAUGA • SARNIA

Client Name: <u>Jordan Black</u>	Project Reference: <u>337415</u>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day Date Required: _____
Contact Name: <u>Hatch Ltd.</u>	Quote #	
Address: <u>4342 Queen St #500 Niagara Falls, L2E 7J7</u>	PO #	
Telephone: <u>905-374-5200</u>	Email Address: <u>JBlack@hatch.ca</u>	

Criteria: | | O. Reg. 153/04 Table 10 | | O. Reg. 179/11 Table 8 | | RSC Filing | | O. Reg. 558/00 | | PWQO | | CCME | | SUB (Storm) | | SUB (Sanitary) Municipality: _____ | | Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Parcel Order Number: <u>1146048/1146047</u>		Matrix	Air Volume	# of Containers	Sample Taken		Metals	Mercury	C R V I								
Sample ID/Location Name					Date	Time											
1	<u>2011-T#1</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>10:00 AM</u>	X	X	X								/
2	<u>2011-T#1</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>10:00 AM</u>	X	X	X								/
3	<u>2011-T2</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>10:30 AM</u>	X	X	X								/
4	<u>2011-T2</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>10:30 AM</u>	X	X	X								/
5	<u>2011-T3</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>10:00 AM</u>	X	X	X								/
6	<u>2011-T3</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>11:00 AM</u>	X	X	X								/
7	<u>2011-Upstream</u>	<u>GW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>11:30 AM</u>	X	X	X								/
8	<u>2011-Downstream</u>	<u>SW</u>		<u>3</u>	<u>Nov 7, 11</u>	<u>12:00 PM</u>	X	X	X								/
9	<u>2011-T4</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>1:30 PM</u>	X	X	X								/
10	<u>2011-T5</u>	<u>S</u>		<u>1</u>	<u>Nov 7, 11</u>	<u>1:35 PM</u>	X	X	X								/

Comments: Water bottles not preserved or filtered. Full metals for both soil and water. Sub-surface soils. AC

Method of Delivery: Walkin

Relinquished By (Print & Sign):	Received by Driver/Depot: <u>A. Beglar</u>	Received at Lab: <u>SUNEPPORN</u>	Verified By: <u>[Signature]</u>
Date/Time:	<u>Nov 7, 11 5:27</u>	Date/Time: <u>NOV 08, 11 09:00</u>	Date/Time: <u>NOV 8, 11</u>
Date/Time:	Temperature: _____ °C	Temperature: <u>13.6 °C</u>	pH Verified By: <u>[Signature]</u>

11:03a

E-3 Chemical Laboratory Report
Sediment Composite TCLP
10-Nov-2011



Your C.O.C. #: 31556701, 315567-01-01

Attention: Patrick Ragaz

Hamilton Regional Conservation Authority
 838 Mineral Springs Rd
 PO Box 7099
 Ancaster, ON
 L9G 3L3

Report Date: 2011/11/10

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B1H4726

Received: 2011/11/07, 14:50

Sample Matrix: Soil
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Cyanide (WAD) in Leachates	1	N/A	2011/11/10	CAM SOP-00457	SM 4500 CN-I
Fluoride by ISE in Leachates	1	2011/11/10	2011/11/10	CAM SOP-00448	SM 4500FC
Mercury (TCLP Leachable) (mg/L)	1	N/A	2011/11/09	CAM SOP-00453	EPA 7470
Total Metals in TCLP Leachate by ICPMS	1	2011/11/09	2011/11/09	CAM SOP-00447	EPA 6020
Nitrate(NO3) + Nitrite(NO2) in Leachate	1	N/A	2011/11/10	CAM SOP-00440	SM 4500 NO3/NO2B
Polychlorinated Biphenyl in Leachate	1	2011/11/09	2011/11/10	CAM SOP-00309	SW846 8082
TCLP - % Solids	1	2011/11/08	2011/11/09	CAM SOP-00401	EPA 1311 modified
TCLP - Extraction Fluid	1	N/A	2011/11/09	CAM SOP-00401	EPA 1311 modified
TCLP - Initial and final pH	1	N/A	2011/11/09	CAM SOP-00401	EPA 1311 modified

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

CHRISTINE GRIPTON, Project Manager
 Email: CGripton@maxxam.ca
 Phone# (800) 268-7396 Ext:250

=====
 Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B1H4726
 Report Date: 2011/11/10

RESULTS OF ANALYSES OF SOIL

Maxxam ID		LN5777		
Sampling Date		2011/11/07 11:30		
COC Number		315567-01-01		
	Units	T1,T2,T3, COMPOSITE CROOKS HOLLOW	RDL	QC Batch

Inorganics				
Final pH	pH	5.69		2676130
Leachable Fluoride (F-)	mg/L	0.2	0.1	2677615
Leachable Free Cyanide	mg/L	ND	0.002	2677622
Initial pH	pH	7.92		2676130
TCLP - % Solids	%	100	0.2	2676119
TCLP Extraction Fluid	N/A	FLUID 1		2676128
Leachable Nitrite (N)	mg/L	ND	0.2	2677621
Leachable Nitrate (N)	mg/L	ND	2	2677621
Leachable Nitrate + Nitrite	mg/L	ND	2	2677621
Metals				
Leachable Mercury (Hg)	mg/L	ND	0.001	2676117
ND = Not detected RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B1H4726
 Report Date: 2011/11/10

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LN5777		
Sampling Date		2011/11/07 11:30		
COC Number		315567-01-01		
	Units	T1,T2,T3, COMPOSITE CROOKS HOLLOW	RDL	QC Batch

Metals				
Leachable Arsenic (As)	mg/L	ND	0.2	2676375
Leachable Barium (Ba)	mg/L	0.5	0.2	2676375
Leachable Boron (B)	mg/L	ND	0.1	2676375
Leachable Cadmium (Cd)	mg/L	ND	0.05	2676375
Leachable Chromium (Cr)	mg/L	ND	0.1	2676375
Leachable Lead (Pb)	mg/L	ND	0.1	2676375
Leachable Selenium (Se)	mg/L	ND	0.1	2676375
Leachable Silver (Ag)	mg/L	ND	0.01	2676375
Leachable Uranium (U)	mg/L	ND	0.01	2676375
ND = Not detected RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B1H4726
 Report Date: 2011/11/10

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		LN5777		
Sampling Date		2011/11/07 11:30		
COC Number		315567-01-01		
	Units	T1,T2,T3, COMPOSITE CROOKS HOLLOW	RDL	QC Batch

PCBs				
Leachable Total PCB	ug/L	ND	3	2676249
Surrogate Recovery (%)				
Leachable 2,4,5,6-Tetrachloro-m-xylene	%	104		2676249
Leachable Decachlorobiphenyl	%	110		2676249
ND = Not detected RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B1H4726
Report Date: 2011/11/10

GENERAL COMMENTS

Sample LN5777-01: Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Hamilton Regional Conservation Authority
 Attention: Patrick Ragaz
 Client Project #:
 P.O. #:
 Site Location:

Quality Assurance Report
 Maxxam Job Number: MB1H4726

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2676117 MC	Matrix Spike	Leachable Mercury (Hg)	2011/11/09		92	%	75 - 125
	Leachate Blank	Leachable Mercury (Hg)	2011/11/09	ND, RDL=0.001		mg/L	
	Spiked Blank	Leachable Mercury (Hg)	2011/11/09		101	%	80 - 120
	Method Blank	Leachable Mercury (Hg)	2011/11/09	ND, RDL=0.001		mg/L	
	RPD	Leachable Mercury (Hg)	2011/11/09	NC		%	25
2676249 LPG	Matrix Spike	Leachable 2,4,5,6-Tetrachloro-m-xylene	2011/11/10		95	%	30 - 130
		Leachable Decachlorobiphenyl	2011/11/10		108	%	30 - 130
		Leachable Total PCB	2011/11/10		97	%	30 - 130
	Spiked Blank	Leachable 2,4,5,6-Tetrachloro-m-xylene	2011/11/10		98	%	30 - 130
		Leachable Decachlorobiphenyl	2011/11/10		108	%	30 - 130
		Leachable Total PCB	2011/11/10		101	%	30 - 130
	Method Blank	Leachable 2,4,5,6-Tetrachloro-m-xylene	2011/11/10		99	%	30 - 130
		Leachable Decachlorobiphenyl	2011/11/10		110	%	30 - 130
		Leachable Total PCB	2011/11/10	ND, RDL=3		ug/L	
		RPD	Leachable Total PCB	2011/11/10	NC		%
2676375 JBW	Matrix Spike	Leachable Arsenic (As)	2011/11/09		104	%	75 - 125
		Leachable Barium (Ba)	2011/11/09		NC	%	75 - 125
		Leachable Boron (B)	2011/11/09		102	%	75 - 125
		Leachable Cadmium (Cd)	2011/11/09		105	%	75 - 125
		Leachable Chromium (Cr)	2011/11/09		104	%	75 - 125
		Leachable Lead (Pb)	2011/11/09		101	%	75 - 125
		Leachable Selenium (Se)	2011/11/09		104	%	75 - 125
		Leachable Silver (Ag)	2011/11/09		101	%	75 - 125
		Leachable Uranium (U)	2011/11/09		102	%	75 - 125
		Leachate Blank	Leachable Arsenic (As)	2011/11/09	ND, RDL=0.2		mg/L
	Leachable Barium (Ba)		2011/11/09	ND, RDL=0.2		mg/L	
	Leachable Boron (B)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Cadmium (Cd)		2011/11/09	ND, RDL=0.05		mg/L	
	Leachable Chromium (Cr)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Lead (Pb)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Selenium (Se)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Silver (Ag)		2011/11/09	ND, RDL=0.01		mg/L	
	Leachable Uranium (U)		2011/11/09	ND, RDL=0.01		mg/L	
	Spiked Blank		Leachable Arsenic (As)	2011/11/09		102	%
		Leachable Barium (Ba)	2011/11/09		102	%	75 - 125
		Leachable Boron (B)	2011/11/09		102	%	75 - 125
		Leachable Cadmium (Cd)	2011/11/09		105	%	75 - 125
		Leachable Chromium (Cr)	2011/11/09		105	%	75 - 125
		Leachable Lead (Pb)	2011/11/09		102	%	75 - 125
		Leachable Selenium (Se)	2011/11/09		102	%	75 - 125
		Leachable Silver (Ag)	2011/11/09		98	%	75 - 125
		Leachable Uranium (U)	2011/11/09		101	%	75 - 125
		Method Blank	Leachable Arsenic (As)	2011/11/09	ND, RDL=0.2		mg/L
	Leachable Barium (Ba)		2011/11/09	ND, RDL=0.2		mg/L	
	Leachable Boron (B)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Cadmium (Cd)		2011/11/09	ND, RDL=0.05		mg/L	
	Leachable Chromium (Cr)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Lead (Pb)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Selenium (Se)		2011/11/09	ND, RDL=0.1		mg/L	
	Leachable Silver (Ag)		2011/11/09	ND, RDL=0.01		mg/L	
	Leachable Uranium (U)		2011/11/09	ND, RDL=0.01		mg/L	
	RPD		Leachable Arsenic (As)	2011/11/09	NC		%
		Leachable Barium (Ba)	2011/11/09	NC		%	35
		Leachable Boron (B)	2011/11/09	NC		%	35
		Leachable Cadmium (Cd)	2011/11/09	NC		%	35

Hamilton Regional Conservation Authority
 Attention: Patrick Ragaz
 Client Project #:
 P.O. #:
 Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: MB1H4726

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2676375 JBW	RPD	Leachable Chromium (Cr)	2011/11/09	NC		%	35
		Leachable Lead (Pb)	2011/11/09	NC		%	35
		Leachable Selenium (Se)	2011/11/09	NC		%	35
		Leachable Silver (Ag)	2011/11/09	NC		%	35
		Leachable Uranium (U)	2011/11/09	NC		%	35
2677615 YPA	Matrix Spike	Leachable Fluoride (F-)	2011/11/10		99	%	80 - 120
	Leachate Blank	Leachable Fluoride (F-)	2011/11/10	ND, RDL=0.1		mg/L	
	Spiked Blank	Leachable Fluoride (F-)	2011/11/10		98	%	80 - 120
	Method Blank	Leachable Fluoride (F-)	2011/11/10	ND, RDL=0.1		mg/L	
	RPD	Leachable Fluoride (F-)	2011/11/10	NC		%	25
2677621 HH	Matrix Spike	Leachable Nitrite (N)	2011/11/10		100	%	80 - 120
		Leachable Nitrate (N)	2011/11/10		99	%	80 - 120
	Leachate Blank	Leachable Nitrite (N)	2011/11/10	ND, RDL=0.01		mg/L	
		Leachable Nitrate (N)	2011/11/10	ND, RDL=0.1		mg/L	
		Leachable Nitrate + Nitrite	2011/11/10	ND, RDL=0.1		mg/L	
	Spiked Blank	Leachable Nitrite (N)	2011/11/10		98	%	85 - 115
		Leachable Nitrate (N)	2011/11/10		97	%	85 - 115
	Method Blank	Leachable Nitrite (N)	2011/11/10	ND, RDL=0.01		mg/L	
		Leachable Nitrate (N)	2011/11/10	ND, RDL=0.1		mg/L	
		Leachable Nitrate + Nitrite	2011/11/10	ND, RDL=0.1		mg/L	
	RPD	Leachable Nitrite (N)	2011/11/10	NC		%	25
		Leachable Nitrate (N)	2011/11/10	NC		%	25
		Leachable Nitrate + Nitrite	2011/11/10	NC		%	25
2677622 LHA	Matrix Spike	Leachable Free Cyanide	2011/11/10		107	%	80 - 120
	Leachate Blank	Leachable Free Cyanide	2011/11/10	ND, RDL=0.002		mg/L	
	Spiked Blank	Leachable Free Cyanide	2011/11/10		106	%	80 - 120
	Method Blank	Leachable Free Cyanide	2011/11/10	ND, RDL=0.002		mg/L	
	RPD	Leachable Free Cyanide	2011/11/10	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
 Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
 Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.
 Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
 Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
 Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
 NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
 NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Validation Signature Page

Maxxam Job #: B1H4726

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



CHARLES ANCKER, B.Sc., M.Sc., C.Chem, Senior Analyst



CRISTINA CARRIERE, Scientific Services

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

INVOICE INFORMATION:		REPORT INFO		PROJECT INFO		Client Use Only:	
Company Name: #1913 Hamilton Regional Conservation Authority	Company Name:	Location #: B16405	BOTTLE ORDER #:		315567		
Contact Name: Patrick Ragaz	Contact Name:		PROJECT MANAGER:		CHRISTINE GRIPTON		
Address: 838 Mineral Springs Rd PO Box 7099 Ancaster ON L9G 3L3	Address:		CHAIN OF CUSTODY #:		C#315567-01-01		
Phone: (905)525-2181 x238 Fax: (905)525-2214	Phone:	Fax:	Site #:				
Email: pragaz@conservationhamilton.ca	Email:		Sampled By:				

Regulation 153 (2011)	Other Regulations	SPECIAL INSTRUCTIONS	ANALYSIS REQUESTED (Please be specific):	TURNAROUND TIME (TAT) REQUIRED:
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Medium/Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> Table <input type="checkbox"/> For RSC	<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> Reg. 558 <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> MISA Municipality <input type="checkbox"/> PWQO <input type="checkbox"/> Other			PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS Regular (Standard) TAT: (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details Job Specific Rush TAT (if applies to entire submission) Date Required: <u>Nov. 10, 2011</u> Time Required: <input checked="" type="checkbox"/>

Include Criteria on Certificate of Analysis (Y/N)? _____
 Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	O'Reg 558 TCLP Inorganics + PCBs	# of Bottles	Comments
1	T1, T2, T3 Composite Crooks' Hollow	Nov. 7	11:30				X		
2									
3									
4									
5									
6									
7									
8									
9									
10									

*RELINQUISHED BY: (Signature/Print) Patrick Ragaz	Date: (YY/MM/DD) 11/11/07	Time: 1450	RECEIVED BY: (Signature/Print) E. PRODCEPKUMAR	Date: (YY/MM/DD) 2011/11/07	Time: 1450	# Jars Used and Not Submitted	Laboratory Use Only			
						Time Sensitive	Temperature (°C) on Receipt 15/13/14°C	Custody Seal	Yes	No
								Present	<input checked="" type="checkbox"/>	
								Intact	<input checked="" type="checkbox"/>	

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
 Maxxam Analytics International Corporation o/a Maxxam Analytics

on ice pack

E-4 Chemical Laboratory Report
Imported Fill
9-Dec-2011



Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Warren Hoyle

Phone: (905) 374-0701
Fax: (905) 374-1157

Client PO:

Report Date: 9-Dec-2011

Project: 337415

Order Date: 8-Dec-2011

Custody: 89258

Order #: 1150200

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Parcel ID	Client ID
1150200-01	#1 Pit
1150200-02	#2 Pit
1150200-03	#2 Pit

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 09-Dec-2011

Order Date: 8-Dec-2011

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	9-Dec-11	9-Dec-11
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	8-Dec-11	9-Dec-11
Mercury	EPA 7471A - CVAA, digestion	9-Dec-11	9-Dec-11
Metals	EPA 6020 - Digestion - ICP-MS	9-Dec-11	9-Dec-11
Solids, %	Gravimetric, calculation	9-Dec-11	9-Dec-11

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Ottawa, ON K1G 4J8

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6645 Kitimat Rd. Unit #27
Mississauga, ON L5N 6J3

NIAGARA FALLS
5415 Morning Glory Cr.
Niagara Falls, ON L2J 0A3

SARNIA
123 Christina St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 09-Dec-2011

Client: Hatch Ltd.

Order Date: 8-Dec-2011

Client PO:

Project Description: 337415

Client ID:	#1 Pit	#2 Pit	#2 Pit	-
Sample Date:	07-Dec-11	07-Dec-11	07-Dec-11	-
Sample ID:	1150200-01	1150200-02	1150200-03	-
MDL/Units	Soil	Soil	Soil	-

Physical Characteristics

% Solids	0.1 % by Wt.	93.1	92.7	94.3	-
----------	--------------	------	------	------	---

Metals

Antimony	1 ug/g dry	<1	<1	<1	-
Arsenic	1 ug/g dry	2	2	2	-
Barium	1 ug/g dry	22	20	18	-
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Boron	5.0 ug/g dry	<5.0	<5.0	<5.0	-
Boron, available	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Chromium	5 ug/g dry	7	6	6	-
Chromium (VI)	0.2 ug/g dry dry	<0.2	<0.2	<0.2	-
Cobalt	1 ug/g dry	4	4	3	-
Copper	5 ug/g dry	19	21	18	-
Lead	1 ug/g dry	15	14	14	-
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	-
Molybdenum	1 ug/g dry	<1	<1	<1	-
Nickel	5 ug/g dry	8	8	8	-
Selenium	1 ug/g dry	<1	<1	<1	-
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	-
Thallium	1 ug/g dry	<1	<1	<1	-
Uranium	1 ug/g dry	<1	<1	<1	-
Vanadium	10 ug/g dry	16	15	16	-
Zinc	20 ug/g dry	88	94	85	-

Certificate of Analysis

Report Date: 09-Dec-2011

Client: Hatch Ltd.

Order Date: 8-Dec-2011

Client PO:

Project Description: 337415

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Report Date: 09-Dec-2011

Client: Hatch Ltd.

Order Date: 8-Dec-2011

Client PO:

Project Description: 337415

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g dry	ND				30	
Arsenic	1.0	1	ug/g dry	ND				30	
Barium	22.0	1	ug/g dry	22.5			1.9	30	
Beryllium	ND	0.5	ug/g dry	ND				30	
Boron, available	3.96	0.5	ug/g dry	3.90			1.4	35	
Boron	5.6	5.0	ug/g dry	ND				30	
Cadmium	ND	0.5	ug/g dry	ND				30	
Chromium (VI)	ND	0.2	ug/g dry dry	ND				35	
Chromium	8.5	5	ug/g dry	8.1			4.6	30	
Cobalt	2.9	1	ug/g dry	2.9			1.9	30	
Copper	6.0	5	ug/g dry	5.8			3.6	30	
Lead	7.5	1	ug/g dry	10.3			31.0	30	QR-01
Mercury	ND	0.1	ug/g dry	ND				35	
Molybdenum	ND	1	ug/g dry	ND				30	
Nickel	5.5	5	ug/g dry	5.3			3.8	30	
Selenium	ND	1	ug/g dry	ND				30	
Silver	ND	0.3	ug/g dry	ND				30	
Thallium	ND	1	ug/g dry	ND				30	
Uranium	ND	1	ug/g dry	ND				30	
Vanadium	19.4	10	ug/g dry	19.2			0.9	30	
Zinc	22.6	20	ug/g dry	20.9			7.4	30	
Physical Characteristics									
% Solids	82.9	0.1	% by Wt.	83.7			1.0	25	

Certificate of Analysis

Report Date: 09-Dec-2011

Client: Hatch Ltd.

Order Date: 8-Dec-2011

Client PO:

Project Description: 337415

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	45.8		ug/L	0.1	91.4	70-130			
Arsenic	42.4		ug/L	0.3	84.2	70-130			
Barium	58.8		ug/L	9.0	99.5	70-130			
Beryllium	52.0		ug/L	0.09	104	70-130			
Boron, available	6.42	0.5	ug/g	3.90	50.4	70-122			QS-02
Boron	50.6		ug/L	1.9	97.4	70-130			
Cadmium	42.3		ug/L	0.01	84.6	70-130			
Chromium (VI)	0.2		mg/L	ND	94.5	89-123			
Chromium	50.6		ug/L	3.2	94.6	70-130			
Cobalt	49.4		ug/L	1.1	96.6	70-130			
Copper	51.0		ug/L	2.3	97.4	70-130			
Lead	52.6		ug/L	4.1	97.0	70-130			
Mercury	1.73	0.1	ug/g	ND	115	72-128			
Molybdenum	43.4		ug/L	0.08	86.7	70-130			
Nickel	51.2		ug/L	2.1	98.2	70-130			
Selenium	41.2		ug/L	0.1	82.2	70-130			
Silver	43.3		ug/L	0.01	86.6	70-130			
Thallium	46.9		ug/L	ND	94.0	70-130			
Uranium	44.8		ug/L	0.1	89.3	70-130			
Vanadium	54.0		ug/L	7.7	92.6	70-130			
Zinc	47.8		ug/L	8.4	78.9	70-130			

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 09-Dec-2011

Order Date: 8-Dec-2011

Sample and QC Qualifiers Notes

- 1- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.
- 2- QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.



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Chain of Custody

(Lab Use Only)

Nº 89258

Page ___ of ___

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Client Name: NATCH	Project Reference: # 337415	TAT: <input type="checkbox"/> Regular
Contact Name: WARREN HOYLE	Quote #	<input type="checkbox"/> 2 Day
Address: 4342 QUARRY ST SUITE 500 NIAGARA FALLS	PO #	<input checked="" type="checkbox"/> 1 Day
	Email Address:	<input type="checkbox"/> Same Day
Telephone: 905-374-0701 x5322	warren	Date Required: _____

Samples Submitted Under: O. Reg. 153/04 Table ___ O. Reg 511/09 Table ___ PWQO CCME Sewer Use (Storm) Sewer Use (Sanitary) Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other) Required Analyses

Paracel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		Metals Gr, Hg HWI, BODM (per H2102)	Required Analyses											
1150200					Date	Time													
Sample ID/Location Name																			
1	#1 PIT	S		1	Dec 8/11	14:00	/	/											
2	#2 PIT	S		1	"	"	/	/											
3	#3 PIT	O		1	"	"	/	/											
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: **Reg 179 table 1** Method of Delivery: **Walkin**

Relinquished By (Print & Sign):	Received by Driver/Depot: A. Beaver	Received at Lab:	Verified By:
Date/Time: Dec 8/11 5:24	Date/Time: Dec 9/11	Date/Time: Dec 9/11	Date/Time: Dec 9/11
Date/Time: DEC 8 2011	Temperature: 19.7°C	Temperature: 10.0°C	pH Verified <input type="checkbox"/> By: N/A

8:59a

E-5 Chemical Laboratory Report
Sediment and Soil
03-Jan-2012





Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Warren Hoyle

Phone: (905) 374-0701
Fax: (905) 374-1157

Client PO:
Project: 337915
Custody: 92072/3

Report Date: 3-Jan-2012
Order Date: 28-Dec-2011

Order #: 1153012

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1153012-01	Area D-1
1153012-02	Area D-2
1153012-03	C-11-01
1153012-04	C-11-02
1153012-05	C-11-03
1153012-06	C-11-04
1153012-07	C-11-05
1153012-08	C-11-06
1153012-09	C-11-07
1153012-10	C-11-08
1153012-11	C-11-09
1153012-12	Area A-01
1153012-13	Area A-02
1153012-14	Area A-03
1153012-15	Area A-04
1153012-16	Area C-01
1153012-17	Area C-02

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	3-Jan-12	3-Jan-12
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	30-Dec-11	30-Dec-11
Mercury	EPA 7471A - CVAA, digestion	3-Jan-12	3-Jan-12
Metals	EPA 6020 - Digestion - ICP-MS	3-Jan-12	3-Jan-12
Solids, %	Gravimetric, calculation	3-Jan-12	3-Jan-12

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NIAGARA FALLS
 5415 Morning Glory Cr.
 Niagara Falls, ON L2J 0A3

SARNIA
 123 Christina St. N.
 Sarnia, ON N7T 5T7

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

	Client ID:	Area D-1	Area D-2	C-11-01	C-11-02
	Sample Date:	28-Dec-11	28-Dec-11	28-Dec-11	28-Dec-11
	Sample ID:	1153012-01	1153012-02	1153012-03	1153012-04
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	29.3	73.3	47.1	53.9
----------	--------------	------	------	------	------

Metals

Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	4	7	3	2
Barium	1 ug/g dry	145	107	63	28
Beryllium	0.5 ug/g dry	<0.5	0.5	<0.5	<0.5
Boron	5.0 ug/g dry	9.0	9.1	5.9	<5.0
Boron, available	0.5 ug/g dry	2.0	1.4	1.8	<0.5
Cadmium	0.5 ug/g dry	0.7	0.5	<0.5	<0.5
Chromium	5 ug/g dry	15	23	13	5
Chromium (VI)	0.2 ug/g dry dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	6	6	5	2
Copper	5 ug/g dry	23	30	17	7
Lead	1 ug/g dry	61	85	33	14
Mercury	0.1 ug/g dry	0.3	4.3	0.4	<0.1
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	12	12	9	<5
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	0.3	0.4	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	22	21	16	<10
Zinc	20 ug/g dry	388	334	290	178

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

	Client ID:	C-11-03	C-11-04	C-11-05	C-11-06
	Sample Date:	28-Dec-11	28-Dec-11	28-Dec-11	28-Dec-11
	Sample ID:	1153012-05	1153012-06	1153012-07	1153012-08
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	69.0	68.1	63.3	43.2
----------	--------------	------	------	------	------

Metals

Antimony	1 ug/g dry	<1	<1	<1	2
Arsenic	1 ug/g dry	2	2	3	2
Barium	1 ug/g dry	26	63	73	77
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	<5.0	5.5	7.3
Boron, available	0.5 ug/g dry	<0.5	1.0	0.9	1.4
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5 ug/g dry	<5	11	11	12
Chromium (VI)	0.2 ug/g dry dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	2	5	5	5
Copper	5 ug/g dry	6	14	16	18
Lead	1 ug/g dry	14	25	31	33
Mercury	0.1 ug/g dry	<0.1	0.4	0.2	0.1
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	<5	9	9	11
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	<10	15	16	15
Zinc	20 ug/g dry	158	252	328	332

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

	Client ID:	C-11-07	C-11-08	C-11-09	Area A-01
	Sample Date:	28-Dec-11	28-Dec-11	28-Dec-11	28-Dec-11
	Sample ID:	1153012-09	1153012-10	1153012-11	1153012-12
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	55.8	62.7	52.2	50.2
----------	--------------	------	------	------	------

Metals

Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	3	2	2	5
Barium	1 ug/g dry	55	48	36	106
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	<5.0	<5.0	5.6
Boron, available	0.5 ug/g dry	0.7	1.0	<0.5	0.9
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	0.5
Chromium	5 ug/g dry	10	9	8	15
Chromium (VI)	0.2 ug/g dry dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	5	4	3	6
Copper	5 ug/g dry	16	12	10	25
Lead	1 ug/g dry	34	25	18	64
Mercury	0.1 ug/g dry	<0.1	0.2	<0.1	1.1
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	9	7	6	11
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	16	12	11	16
Zinc	20 ug/g dry	307	321	212	380

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

	Client ID:	Area A-02	Area A-03	Area A-04	Area C-01
	Sample Date:	28-Dec-11	28-Dec-11	28-Dec-11	28-Dec-11
	Sample ID:	1153012-13	1153012-14	1153012-15	1153012-16
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	66.2	81.2	79.6	33.1
----------	--------------	------	------	------	------

Metals

Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	2	7	4	2
Barium	1 ug/g dry	30	45	88	101
Beryllium	0.5 ug/g dry	<0.5	0.6	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	6.3	7.0	14.7
Boron, available	0.5 ug/g dry	0.9	<0.5	<0.5	1.1
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	0.9
Chromium	5 ug/g dry	7	15	14	11
Chromium (VI)	0.2 ug/g dry dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	3	10	7	4
Copper	5 ug/g dry	9	34	31	20
Lead	1 ug/g dry	17	10	38	88
Mercury	0.1 ug/g dry	2.7	<0.1	0.1	0.2
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	6	22	16	12
Selenium	1 ug/g dry	<1	<1	<1	1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	13	20	22	12
Zinc	20 ug/g dry	222	36	279	518

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

Client ID:	Area C-02	-	-	-
Sample Date:	28-Dec-11	-	-	-
Sample ID:	1153012-17	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	68.2	-	-	-
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Metals

Antimony	1 ug/g dry	<1	-	-	-
Arsenic	1 ug/g dry	2	-	-	-
Barium	1 ug/g dry	52	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	<5.0	-	-	-
Boron, available	0.5 ug/g dry	<0.5	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5 ug/g dry	10	-	-	-
Chromium (VI)	0.2 ug/g dry dry	<0.2	-	-	-
Cobalt	1 ug/g dry	4	-	-	-
Copper	5 ug/g dry	16	-	-	-
Lead	1 ug/g dry	30	-	-	-
Mercury	0.1 ug/g dry	0.2	-	-	-
Molybdenum	1 ug/g dry	<1	-	-	-
Nickel	5 ug/g dry	9	-	-	-
Selenium	1 ug/g dry	<1	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1 ug/g dry	<1	-	-	-
Uranium	1 ug/g dry	<1	-	-	-
Vanadium	10 ug/g dry	15	-	-	-
Zinc	20 ug/g dry	329	-	-	-

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g dry	ND				30	
Arsenic	4.8	1	ug/g dry	4.4			7.1	30	
Barium	159	1	ug/g dry	145			9.4	30	
Beryllium	ND	0.5	ug/g dry	ND				30	
Boron, available	1.92	0.5	ug/g dry	1.99			3.6	35	
Boron	8.7	5.0	ug/g dry	9.0			3.8	30	
Cadmium	0.73	0.5	ug/g dry	0.69			6.5	30	
Chromium (VI)	ND	0.2	ug/g dry dry	ND				35	
Chromium	16.3	5	ug/g dry	15.1			7.5	30	
Cobalt	6.3	1	ug/g dry	6.0			5.8	30	
Copper	25.3	5	ug/g dry	23.4			7.9	30	
Lead	66.3	1	ug/g dry	61.2			8.0	30	
Mercury	0.384	0.1	ug/g dry	0.345			10.8	35	
Molybdenum	1.0	1	ug/g dry	ND				30	
Nickel	13.0	5	ug/g dry	12.3			5.1	30	
Selenium	1.2	1	ug/g dry	ND				30	
Silver	ND	0.3	ug/g dry	0.31			0.0	30	
Thallium	ND	1	ug/g dry	ND				30	
Uranium	ND	1	ug/g dry	ND				30	
Vanadium	23.0	10	ug/g dry	21.5			6.7	30	
Zinc	412	20	ug/g dry	388			6.2	30	
Physical Characteristics									
% Solids	101	0.1	% by Wt.	92.3			8.7	25	

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	49.3		ug/L	0.1	98.4	70-130			
Arsenic	47.9		ug/L	1.8	92.3	70-130			
Barium	118		ug/L	58.0	120	70-130			
Beryllium	55.5		ug/L	0.18	111	70-130			
Boron, available	5.84	0.5	ug/g	ND	117	70-122			
Boron	56.4		ug/L	3.6	106	70-130			
Cadmium	45.5		ug/L	0.27	90.4	70-130			
Chromium (VI)	4.9	0.2	ug/g	ND	98.5	89-123			
Chromium	58.2		ug/L	6.0	104	70-130			
Cobalt	54.4		ug/L	2.4	104	70-130			
Copper	60.0		ug/L	9.3	101	70-130			
Lead	79.1		ug/L	24.5	109	70-130			
Mercury	2.04	0.1	ug/g	0.345	113	72-128			
Molybdenum	45.9		ug/L	ND	91.8	70-130			
Nickel	56.0		ug/L	4.9	102	70-130			
Selenium	47.6		ug/L	ND	95.2	70-130			
Silver	44.8		ug/L	0.12	89.4	70-130			
Thallium	55.3		ug/L	0.06	110	70-130			
Uranium	48.8		ug/L	0.4	96.9	70-130			
Vanadium	61.1		ug/L	8.6	105	70-130			
Zinc	202		ug/L	155	94.1	70-130			

Certificate of Analysis

Client: **Hatch Ltd.**

Report Date: 03-Jan-2012

Order Date: 28-Dec-2011

Client PO:

Project Description: 337915

Sample and QC Qualifiers Notes

None

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

E-6 Chemical Laboratory Report
Soil – Area A
23-Jan-2012



Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Jordan Black

Phone: (905) 374-5200
Fax: (905) 374-1157

Client PO:

Report Date: 23-Jan-2012

Project: 337415

Order Date: 17-Jan-2012

Custody: 73258

Order #: 1203066

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID
1203066-01

Client ID
BH11-01 AS#3

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 23-Jan-2012

Order Date: 17-Jan-2012

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	20-Jan-12	20-Jan-12
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	20-Jan-12	20-Jan-12
Mercury	EPA 7471A - CVAA, digestion	19-Jan-12	19-Jan-12
Metals	EPA 6020 - Digestion - ICP-MS	19-Jan-12	19-Jan-12
Solids, %	Gravimetric, calculation	19-Jan-12	19-Jan-12

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 23-Jan-2012

Order Date: 17-Jan-2012

Client PO:

Project Description: 337415

Client ID:	BH11-01 AS#3	-	-	-
Sample Date:	18-Apr-11	-	-	-
Sample ID:	1203066-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	94.4	-	-	-
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Metals

Antimony	1 ug/g dry	<1 [1]	-	-	-
Arsenic	1 ug/g dry	3 [1]	-	-	-
Barium	1 ug/g dry	44 [1]	-	-	-
Beryllium	0.5 ug/g dry	<0.5 [1]	-	-	-
Boron	5.0 ug/g dry	6.3 [1]	-	-	-
Boron, available	0.5 ug/g dry	0.9 [1]	-	-	-
Cadmium	0.5 ug/g dry	<0.5 [1]	-	-	-
Chromium	5 ug/g dry	10 [1]	-	-	-
Chromium (VI)	0.2 ug/g dry dry	<0.2 [1]	-	-	-
Cobalt	1 ug/g dry	4 [1]	-	-	-
Copper	5 ug/g dry	15 [1]	-	-	-
Lead	1 ug/g dry	49 [1]	-	-	-
Mercury	0.1 ug/g dry	<0.1 [1]	-	-	-
Molybdenum	1 ug/g dry	<1 [1]	-	-	-
Nickel	5 ug/g dry	9 [1]	-	-	-
Selenium	1 ug/g dry	<1 [1]	-	-	-
Silver	0.3 ug/g dry	<0.3 [1]	-	-	-
Thallium	1 ug/g dry	<1 [1]	-	-	-
Uranium	1 ug/g dry	<1 [1]	-	-	-
Vanadium	10 ug/g dry	12 [1]	-	-	-
Zinc	20 ug/g dry	174 [1]	-	-	-

Certificate of Analysis

Report Date: 23-Jan-2012

Client: Hatch Ltd.

Order Date: 17-Jan-2012

Client PO:

Project Description: 337415

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 23-Jan-2012

Order Date: 17-Jan-2012

Client PO:

Project Description: 337415

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g dry	ND				30	
Arsenic	ND	1	ug/g dry	ND				30	
Barium	315	1	ug/g dry	282			11.3	30	
Beryllium	0.61	0.5	ug/g dry	0.56			9.8	30	
Boron, available	0.87	0.5	ug/g dry	0.87			0.2	35	
Boron	7.5	5.0	ug/g dry	7.1			6.1	30	
Cadmium	ND	0.5	ug/g dry	ND				30	
Chromium (VI)	ND	0.2	ug/g dry dry	ND				35	
Chromium	62.5	5	ug/g dry	57.3			8.6	30	
Cobalt	16.0	1	ug/g dry	14.7			8.7	30	
Copper	36.8	5	ug/g dry	33.2			10.3	30	
Lead	4.7	1	ug/g dry	4.0			17.5	30	
Mercury	ND	0.1	ug/g dry	ND				35	
Molybdenum	1.4	1	ug/g dry	1.3			6.7	30	
Nickel	38.6	5	ug/g dry	35.5			8.3	30	
Selenium	ND	1	ug/g dry	ND				30	
Silver	ND	0.3	ug/g dry	ND				30	
Thallium	ND	1	ug/g dry	ND				30	
Uranium	1.0	1	ug/g dry	ND				30	
Vanadium	73.6	10	ug/g dry	67.2			9.1	30	
Zinc	69.9	20	ug/g dry	62.1			11.7	30	
Physical Characteristics									
% Solids	77.7	0.1	% by Wt.	78.5			1.1	25	

Certificate of Analysis

Report Date: 23-Jan-2012

Client: Hatch Ltd.

Order Date: 17-Jan-2012

Client PO:

Project Description: 337415

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	42.2		ug/L	0.02	84.4	70-130			
Arsenic	38.8		ug/L	0.3	76.8	70-130			
Barium	163		ug/L	113	100	70-130			
Beryllium	46.1		ug/L	0.22	91.8	70-130			
Boron, available	4.67	0.5	ug/g	0.87	75.9	70-122			
Boron	45.0		ug/L	2.8	84.4	70-130			
Cadmium	38.1		ug/L	0.02	76.2	70-130			
Chromium (VI)	5.1	0.2	ug/g	ND	102	89-123			
Chromium	66.6		ug/L	22.9	87.3	70-130			
Cobalt	51.6		ug/L	5.9	91.5	70-130			
Copper	57.7		ug/L	13.3	88.9	70-130			
Lead	48.6		ug/L	1.6	94.0	70-130			
Mercury	1.54	0.1	ug/g	ND	103	72-128			
Molybdenum	39.4		ug/L	0.5	77.8	70-130			
Nickel	59.7		ug/L	14.2	90.9	70-130			
Selenium	37.9		ug/L	0.3	75.4	70-130			
Silver	36.6		ug/L	0.09	73.0	70-130			
Thallium	49.3		ug/L	0.1	98.4	70-130			
Uranium	45.2		ug/L	0.4	89.7	70-130			
Vanadium	69.6		ug/L	26.9	85.5	70-130			
Zinc	58.1		ug/L	24.8	66.5	70-130			

Certificate of Analysis

Client: **Hatch Ltd.**

Client PO:

Project Description: 337415

Report Date: 23-Jan-2012

Order Date: 17-Jan-2012

Sample and QC Qualifiers Notes

1- H-01 : Holding time had been exceeded upon sample receipt.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.



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800-749-1947
f: 613-731-9064
e: paracel@paracellabs.com

Chain of Custody
(lab use only)
Nº 73258

Client Name: <i>Hatch Ltd</i>	Project Ref: <i>337415</i>	Waterworks Name:	Page <u> </u> of <u> </u>
Contact Name: <i>Jordan Black</i>	Quote #	Waterworks Number:	Sample Taken by:
Address: <i>4342 Queen St w. Ste 500 Niagara Falls, L2E 7J7</i>	PO #	Address:	Print Name: <i>Jordan Black</i>
	E-mail Address: <i>JBlack@hatch.ca</i>	After hours Contact:	Signature: <i>[Signature]</i>
Telephone: <i>905-374-5200</i>	Fax:	Public Health Unit:	TAT: [] 1-day [] 2-day [X] Reg.

Matrix Types: S-Soil/Sed. GW-Ground Water SW-Surface Water SS-Storm/Sanitary Sewer DW-Drinking Water RDW-Regulated Drinking Water P- Paint A-Air O-Other

Samples submitted under: (Indicate ONLY one)		Type of DW Sample: R = Raw; T = Treated; D = Distribution		Location Types: S = Surface Water; G = Ground Water		Required Analyses														
<input checked="" type="checkbox"/> O. Reg 153 (511) Table ___ <input type="checkbox"/> O. Reg 170/03 <input type="checkbox"/> O. Reg 318/08 <input type="checkbox"/> Private well <input type="checkbox"/> CCME ___ <input type="checkbox"/> O. Reg 243/07 <input type="checkbox"/> O. Reg 319/08 <input type="checkbox"/> Other: ___																				
Parcel Order Number	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken		Free / Combined Chlorine Residual mg/L	Metals												
Sample ID / Location Name					Date	Time														
<i>1203066</i>																				
<i>1 BH11-01 AS#3</i>	<i>S</i>			<i>1</i>	<i>April 18/11</i>	<i>10:00 AM</i>		<i>X</i>												
<i>2</i>																				
<i>3</i>																				
<i>4</i>																				
<i>5</i>																				
<i>6</i>																				
<i>7</i>																				
<i>8</i>																				
<i>9</i>																				
<i>10</i>																				

Comments: *Metals to include Available B, Hg + Cr 6, past hold time called to confirm - Please "go ahead" as per. Jordan.*

Preservation Verification: pH Temperature *21.0*
Verified by: *B. Momeniek*

Relinquished By (Print & Sign): <i>[Signature]</i>	Lab Use Only:		
Received By Driver/Depot: <i>B. Momeniek</i>	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>	
Date/Time: <i>Jan 17, 2012</i>	Date/Time: <i>17-Jan-12 1300</i>	Date/Time: <i>Jan 18/12</i>	Date/Time: <i>Jan. 18/12</i>

8:46a *9:19a*
2.7°C

E-7 Chemical Laboratory Report
Sediment
24-Feb-2012



Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Warren Hoyle

Phone: (905) 374-0701
Fax: (905) 374-1157

Client PO:

Project: 337415

Custody: 92845

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Order #: 1208089

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1208089-01	CII-7
1208089-02	CII-8
1208089-03	CII-9a
1208089-04	CII-10
1208089-05	CII-11
1208089-06	CII-12
1208089-07	CII-13
1208089-08	CII-14
1208089-09	CII-15
1208089-10	CII-16
1208089-11	CII-17
1208089-12	CII-18
1208089-13	CII-19
1208089-14	CII-20

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	24-Feb-12	24-Feb-12
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	24-Feb-12	24-Feb-12
Mercury	EPA 7471A - CVAA, digestion	24-Feb-12	24-Feb-12
Metals	EPA 6020 - Digestion - ICP-MS	24-Feb-12	24-Feb-12
Solids, %	Gravimetric, calculation	24-Feb-12	24-Feb-12

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Client PO:

Project Description: 337415

	Client ID:	CII-7	CII-8	CII-9a	CII-10
	Sample Date:	20-Feb-12	20-Feb-12	20-Feb-12	20-Feb-12
	Sample ID:	1208089-01	1208089-02	1208089-03	1208089-04
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	65.0	53.5	55.1	66.1
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Metals

Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	3	6	3	2
Barium	1 ug/g dry	77	62	74	70
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	5.6	8.6	6.4	6.2
Boron, available	0.5 ug/g dry	0.7	1.3	1.2	1.0
Cadmium	0.5 ug/g dry	0.7	0.5	0.7	0.5
Chromium	5 ug/g dry	13	9	11	9
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	6	4	5	4
Copper	5 ug/g dry	23	13	16	13
Lead	1 ug/g dry	53	25	29	24
Mercury	0.1 ug/g dry	0.5	0.1	0.7	0.6
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	11	8	10	8
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	18	14	15	13
Zinc	20 ug/g dry	436	406	476	362

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Project Description: 337415

	Client ID:	CII-11	CII-12	CII-13	CII-14
	Sample Date:	20-Feb-12	20-Feb-12	20-Feb-12	20-Feb-12
	Sample ID:	1208089-05	1208089-06	1208089-07	1208089-08
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	42.4	74.6	77.0	43.3
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Metals

Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	3	2	1	2
Barium	1 ug/g dry	77	64	21	83
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	7.1	5.1	<5.0	6.2
Boron, available	0.5 ug/g dry	1.5	0.7	0.5	1.1
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	0.6
Chromium	5 ug/g dry	12	10	<5	11
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	5	4	2	5
Copper	5 ug/g dry	17	14	6	15
Lead	1 ug/g dry	28	25	15	28
Mercury	0.1 ug/g dry	0.5	0.2	0.1	0.1
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	10	9	<5	10
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	15	14	<10	16
Zinc	20 ug/g dry	322	251	140	455

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Client PO:

Project Description: 337415

	Client ID:	CII-15	CII-16	CII-17	CII-18
	Sample Date:	20-Feb-12	20-Feb-12	20-Feb-12	20-Feb-12
	Sample ID:	1208089-09	1208089-10	1208089-11	1208089-12
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	42.5	58.0	54.8	76.7
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Metals

Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	2	2	4	1
Barium	1 ug/g dry	52	89	112	57
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	6.9	7.2	<5.0
Boron, available	0.5 ug/g dry	1.0	2.0	0.7	<0.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	0.6	<0.5
Chromium	5 ug/g dry	8	13	13	6
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1 ug/g dry	3	5	5	3
Copper	5 ug/g dry	10	17	18	5
Lead	1 ug/g dry	22	30	35	14
Mercury	0.1 ug/g dry	0.1	0.3	0.4	<0.1
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	8	11	11	<5
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	12	17	18	10
Zinc	20 ug/g dry	338	333	433	187

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Project Description: 337415

	Client ID:	CII-19	CII-20	-	-
	Sample Date:	20-Feb-12	20-Feb-12	-	-
	Sample ID:	1208089-13	1208089-14	-	-
	MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	46.2	52.7	-	-
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Metals

Antimony	1 ug/g dry	<1	<1	-	-
Arsenic	1 ug/g dry	2	4	-	-
Barium	1 ug/g dry	90	83	-	-
Beryllium	0.5 ug/g dry	<0.5	<0.5	-	-
Boron	5.0 ug/g dry	7.3	6.3	-	-
Boron, available	0.5 ug/g dry	2.2	0.7	-	-
Cadmium	0.5 ug/g dry	<0.5	0.8	-	-
Chromium	5 ug/g dry	12	13	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	-	-
Cobalt	1 ug/g dry	5	6	-	-
Copper	5 ug/g dry	15	21	-	-
Lead	1 ug/g dry	25	39	-	-
Mercury	0.1 ug/g dry	0.2	0.2	-	-
Molybdenum	1 ug/g dry	<1	<1	-	-
Nickel	5 ug/g dry	10	12	-	-
Selenium	1 ug/g dry	<1	<1	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1 ug/g dry	<1	<1	-	-
Uranium	1 ug/g dry	<1	<1	-	-
Vanadium	10 ug/g dry	17	19	-	-
Zinc	20 ug/g dry	359	522	-	-

Certificate of Analysis

Report Date: 24-Feb-2012

Client: Hatch Ltd.

Order Date: 21-Feb-2012

Client PO:

Project Description: 337415

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Client PO:

Project Description: 337415

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g dry	ND			0.0	30	
Arsenic	3.9	1	ug/g dry	3.4			12.6	30	
Barium	86.4	1	ug/g dry	77.5			10.9	30	
Beryllium	ND	0.5	ug/g dry	ND			0.0	30	
Boron, available	ND	0.5	ug/g dry	0.51			0.0	35	
Boron	ND	5.0	ug/g dry	5.6			0.0	30	
Cadmium	0.73	0.5	ug/g dry	0.72			1.4	30	
Chromium (VI)	ND	0.2	ug/g dry	ND				35	
Chromium	14.9	5	ug/g dry	13.2			11.7	30	
Cobalt	6.4	1	ug/g dry	5.7			11.6	30	
Copper	25.7	5	ug/g dry	23.5			9.3	30	
Lead	58.1	1	ug/g dry	53.2			8.9	30	
Mercury	0.374	0.1	ug/g dry	0.491			27.2	35	
Molybdenum	1.2	1	ug/g dry	ND			0.0	30	
Nickel	13.0	5	ug/g dry	11.4			12.9	30	
Selenium	1.5	1	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1	ug/g dry	ND			0.0	30	
Uranium	ND	1	ug/g dry	ND			0.0	30	
Vanadium	20.6	10	ug/g dry	18.1			12.9	30	
Zinc	456	20	ug/g dry	436			4.6	30	
Physical Characteristics									
% Solids	76.5	0.1	% by Wt.	76.3			0.2	25	

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	43.7		ug/L	0.1	87.3	70-130			
Arsenic	42.9		ug/L	1.4	83.1	70-130			
Barium	87.6		ug/L	31.0	113	70-130			
Beryllium	44.7		ug/L	0.12	89.1	70-130			
Boron, available	4.69	0.5	ug/g	0.51	83.6	70-122			
Boron	52.8		ug/L	2.2	101	70-130			
Cadmium	42.1		ug/L	0.29	83.6	70-130			
Chromium (VI)	5.1	0.2	ug/g	ND	102	89-123			
Chromium	52.2		ug/L	5.3	93.8	70-130			
Cobalt	49.0		ug/L	2.3	93.5	70-130			
Copper	54.5		ug/L	9.4	90.2	70-130			
Lead	71.1		ug/L	21.3	99.7	70-130			
Mercury	1.65	0.1	ug/g	ND	110	72-128			
Molybdenum	42.7		ug/L	0.1	85.2	70-130			
Nickel	50.7		ug/L	4.6	92.3	70-130			
Selenium	45.1		ug/L	0.3	89.6	70-130			
Silver	42.6		ug/L	0.02	85.2	70-130			
Thallium	50.7		ug/L	0.02	101	70-130			
Uranium	48.9		ug/L	0.1	97.5	70-130			
Vanadium	55.2		ug/L	7.2	95.9	70-130			
Zinc	224		ug/L	174	99.4	70-130			

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Sample and QC Qualifiers Notes

None

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

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Client Name: <u>Hatch Ltd.</u>	Project Reference: <u>337415</u>	TAT: <input type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> 1 Day Date Required: _____
Contact Name: <u>Warren Hoyle</u>	Quote #	
Address: <u>4342 Queen St. Suite 500 Niagara Falls, ON</u>	PO #	
Telephone: <u>905-374-0701 x 5322</u>	Email Address: <u>W.Hoyle@Hatch.ca</u>	

Criteria: O. Reg. 153/04 Table X O. Reg. 153/11 (Current) Table 1 RSC Filing O. Reg. 558/00 PWQO CCME SUB (Storm) SUB (Sanitary) Municipality: _____ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other) Required Analyses

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS		CrVI	B (HWS)	Inorganic Lead, Pb, PCBs						
				Date	Time				Hg	Cd									
1 C11-7	S		1	Feb. 20/12	2 pm				✓	✓	✓								250mL
2 C11-8	S		1	Feb. 20/12	2:15 pm				✓	✓	✓								
3 C11-9A	S		1	Feb. 20/12	2:30 pm				✓	✓	✓								
4 C11-9B	S		1	Feb. 20/12	2:45 pm								✓						
5 C11-10	S		1	Feb. 20/12	3 pm				✓	✓	✓								
6 C11-11	S		1	Feb. 20/12	3:15 pm														
7 C11-12	S		1	Feb. 20/12	3:30 pm														
8 C11-13	S		1	Feb. 20/12	3:45 pm														
9 C11-14	S		1	Feb. 20/12	4 pm														
10 C11-15	S		1	Feb. 20/12	4:15 pm				✓	✓	✓								✓

Comments: *metals, inorganics, and PCB's only for TCLP as per Bev. SC. Method of Delivery: Walk in

Relinquished By (Print & Sign): <u>Joe Vizek</u>	Received by Driver/Depot: <u>Blomemelk</u>	Received at Lab: <u>SCB</u>	Verified By: <u>SCB</u>
Date/Time: <u>21-Feb-12 9:07</u>	Date/Time: <u>Feb 23/12</u>	Date/Time: <u>Feb 23/12</u>	Date/Time: <u>Feb 23/12</u>
Date/Time: <u>9:07 am Feb. 21/12</u>	Temperature: <u>12</u> °C	Temperature: <u>0.8</u> °C	pH Verified By: <u>N/A</u>

8:52a

E-8 Chemical Laboratory Report
Sediment TCLP
24-Feb-2012



Certificate of Analysis

Hatch Ltd.

4342 Queen Street, Suite 500
Niagara Falls, ON L2E 6W1
Attn: Warren Hoyle

Phone: (905) 374-0701
Fax: (905) 374-1157

Client PO:
Project: 337415
Custody: 92845

Report Date: 24-Feb-2012
Order Date: 21-Feb-2012

Order #: 1208090

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1208090-01	CII-9b

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, leachate	EPA 6020 - ICP-MS, digestion	24-Feb-12	24-Feb-12
REG 558 - Cyanide	MOE E3015- Auto Colour	24-Feb-12	24-Feb-12
REG 558 - Fluoride	EPA 340.2 - ISE	24-Feb-12	24-Feb-12
REG 558 - Mercury	EPA 7471A - Cold Vapour AA	24-Feb-12	24-Feb-12
REG 558 - NO3/NO2	EPA 300.1 - IC	24-Feb-12	24-Feb-12
REG 558 - PCBs	EPA 608 - GC-ECD	24-Feb-12	24-Feb-12
Solids, %	Gravimetric, calculation	24-Feb-12	24-Feb-12
TCLP Metals/SVOCs - Extraction	EPA 1311 TCLP Extraction Procedure	23-Feb-12	24-Feb-12

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Client PO:

Project Description: 337415

Client ID:	CII-9b	-	-	-
Sample Date:	20-Feb-12	-	-	-
Sample ID:	1208090-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	55.5	-	-	-
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EPA 1311 - TCLP Leachate Inorganics

Arsenic	0.05 mg/L	<0.05	-	-	-
Barium	0.05 mg/L	0.83	-	-	-
Boron	0.05 mg/L	0.84	-	-	-
Cadmium	0.01 mg/L	<0.01	-	-	-
Chromium	0.05 mg/L	<0.05	-	-	-
Lead	0.05 mg/L	<0.05	-	-	-
Mercury	0.005 mg/L	<0.005	-	-	-
Selenium	0.05 mg/L	<0.05	-	-	-
Silver	0.05 mg/L	<0.05	-	-	-
Uranium	0.05 mg/L	<0.05	-	-	-
Fluoride	0.05 mg/L	0.20	-	-	-
Nitrate as N	1 mg/L	<1	-	-	-
Nitrite as N	1 mg/L	<1	-	-	-
Cyanide, free	0.02 mg/L	<0.02	-	-	-
Initial pH	0.05 pH Units dry	7.98	-	-	-
Final pH	0.05 pH Units dry	6.34	-	-	-

EPA 1311 - TCLP Leachate Organics

PCBs, total	0.003 mg/L	<0.003	-	-	-
Decachlorobiphenyl	Surrogate	102%	-	-	-

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Project Description: 337415

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	ND	0.05	mg/L						
Barium	ND	0.05	mg/L						
Boron	ND	0.05	mg/L						
Cadmium	ND	0.01	mg/L						
Chromium	ND	0.05	mg/L						
Lead	ND	0.05	mg/L						
Mercury	ND	0.005	mg/L						
Selenium	ND	0.05	mg/L						
Silver	ND	0.05	mg/L						
Uranium	ND	0.05	mg/L						
Fluoride	ND	0.05	mg/L						
Nitrate as N	ND	1	mg/L						
Nitrite as N	ND	1	mg/L						
Cyanide, free	ND	0.02	mg/L						
EPA 1311 - TCLP Leachate Organics									
PCBs, total	ND	0.003	mg/L						
Surrogate: Decachlorobiphenyl	0.00721		mg/L		72.1	62-138			

Certificate of Analysis

Client: Hatch Ltd.

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Client PO:

Project Description: 337415

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	ND	0.05	mg/L	ND			0.0	29	
Barium	0.421	0.05	mg/L	0.433			2.9	34	
Boron	0.080	0.05	mg/L	0.560			150.0	33	QR-01
Cadmium	ND	0.01	mg/L	ND			0.0	33	
Chromium	ND	0.05	mg/L	ND			0.0	32	
Lead	ND	0.05	mg/L	ND			0.0	32	
Mercury	ND	0.005	mg/L	ND			0.0	20	
Selenium	ND	0.05	mg/L	ND			0.0	28	
Silver	ND	0.05	mg/L	ND			0.0	28	
Uranium	ND	0.05	mg/L	ND			0.0	27	
Fluoride	1.02	0.05	mg/L	0.96			5.8	20	
Nitrate as N	ND	1	mg/L	ND				20	
Nitrite as N	ND	1	mg/L	ND				20	
Cyanide, free	ND	0.02	mg/L	ND				20	
EPA 1311 - TCLP Leachate Organics									
PCBs, total	ND	0.003	mg/L	ND				30	
Surrogate: Decachlorobiphenyl	0.00956		mg/L	ND	95.6	62-138			
Physical Characteristics									
% Solids	76.5	0.1	% by Wt.	76.3			0.2	25	

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	46.9		ug/L	0.177	93.4	83-119			
Barium	94.8		ug/L	43.3	103	83-116			
Boron	49.1		ug/L	ND	98.2	71-128			
Cadmium	43.1		ug/L	0.042	86.0	78-119			
Chromium	41.7		ug/L	1.61	80.2	80-124			
Lead	41.2		ug/L	0.090	82.1	77-126			
Mercury	0.0335	0.005	mg/L	ND	112	78-134			
Selenium	49.7		ug/L	0.111	99.2	81-125			
Silver	45.5		ug/L	ND	91.0	70-128			
Uranium	42.2		ug/L	0.130	84.0	70-131			
Fluoride	1.43	0.05	mg/L	0.96	92.9	0-200			
Nitrate as N	1		mg/L	ND	105	81-112			
Nitrite as N	1		mg/L	ND	104	76-107			
Cyanide, free	0.027	0.02	mg/L	ND	91.4	60-136			
EPA 1311 - TCLP Leachate Organics									
PCBs, total	0.035	0.003	mg/L	ND	87.0	86-145			
Surrogate: Decachlorobiphenyl	0.0080		mg/L		80.3	62-138			

Certificate of Analysis

Client: Hatch Ltd.

Client PO:

Project Description: 337415

Report Date: 24-Feb-2012

Order Date: 21-Feb-2012

Sample and QC Qualifiers Notes

1- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

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Client Name: Hatch Ltd.	Project Reference: 337415	Page ___ of ___
Contact Name: Warren Hoyle	Quote #	
Address: 4342 Queen St. Suite 500 Niagara Falls, ON	PO #	
Telephone: 905-374-0701 x 5322	Email Address: W.Hoyle@Hatch.ca	
Criteria: <input type="checkbox"/> O. Reg. 153/04 Table X <input checked="" type="checkbox"/> O. Reg. 153/11 (Current) Table <input type="checkbox"/> RSC Filing <input type="checkbox"/> O. Reg. 558/00 <input type="checkbox"/> PWQO <input type="checkbox"/> CCME <input type="checkbox"/> SUB (Storm) <input type="checkbox"/> SUB (Sanitary) Municipality: _____ <input type="checkbox"/> Other: _____		TAT: <input type="checkbox"/> Regular <input type="checkbox"/> 13 Day <input type="checkbox"/> 12 Day <input checked="" type="checkbox"/> 11 Day
		Date Required: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1208089- 1208090-TCLP		Matrix	Air Volume	# of Containers	Sample Taken		PHCs: F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)	Inorganic Leachate, PCBs					
Sample ID/Location Name					Date	Time													
1	C11-7	S		1	Feb. 20/12	2 pm				✓	✓	✓	✓						
2	C11-8	S		1	Feb. 20/12	2:15 pm				✓	✓	✓	✓						
3	C11-9A	S		1	Feb. 20/12	2:30 pm				✓	✓	✓	✓						
4	C11-9B	S		1	Feb. 20/12	2:45 pm								✓					
5	C11-10	S		1	Feb. 20/12	3 pm				✓	✓	✓	✓						
6	C11-11	S		1	Feb. 20/12	3:15 pm													
7	C11-12	S		1	Feb. 20/12	3:30 pm													
8	C11-13	S		1	Feb. 20/12	3:45 pm													
9	C11-14	S		1	Feb. 20/12	4 pm													
10	C11-15	S		1	Feb. 20/12	4:15 pm				✓	✓	✓	✓						

Comments: *metals, inorganics, and PCB's only for TCLP as per Bev. RC.

Method of Delivery: Walk in

Relinquished By (Print & Sign): Joe Visek Joe Visek	Received by Driver/Depot: Blomemelk	Received at Lab: Scot	Verified By: Scot
Date/Time: 9:07 am Feb. 21/12	Date/Time: 21-Feb-12 9:07	Date/Time: Feb 23/12	Date/Time: Feb 23/12
Temperature: 12 °C	Temperature: 12 °C	Temperature: 10.8 °C 8:45a	pH Verified By: N/A

Suite 500, 4342 Queen Street
Niagara Falls, Ontario, Canada L2E 7J7
Tel 905 374 5200 ♦ Fax 905 374 1157



Suite 500, 4342 Queen Street
Niagara Falls, Ontario, Canada L2E 7J7
Tel 905 374 5200 ♦ Fax 905 374 1157