Appendix 1

Background Studies and Reports

APPENDIX 1

BACKGROUND STUDIES AND REPORTS

1A	Preliminary Master Stormwater Management Strategy Report (Sernas 2009)
1B	Assessment of Potential Natural Impacts from the Construction of One New SWM Facility and the Removal of an Existing SWM Facility – Savanta Inc.
1C	Phase I Environmental Site Assessment, 7100 Keele Street – Pinchin Environmental Ltd.
1D	Phase I Environmental Site Assessment, Part of Lot 1, Concession 4 - Pinchin Environmental Ltd.
1E	Phase II Environmental Site Assessment, Part of Lot 1, Concession 4 - Pinchin Environmental Ltd.
1F	Environmental Risk Database Search – ERIS
1G	Cost Estimates – Water Projects
1H	Cost Estimates – Wastewater Collection System
1I	Cost Estimates – Stormwater Management System

Appendix 1A

Preliminary Master Stormwater Management Strategy Report (Sernas 2009)

THE SERNAS GROUP
A Member of The Sernas Group Inc.

PRELIMINARY MASTER STORMWATER MANAGEMENT STRATEGY REPORT

Geomorphic Solutions
Nexgen Utilities
Sernas Associates
Sernas Transtech
SRM Associates

OFFICIAL PLAN AMENDMENT (OPA) 620 STEELES CORRIDOR – JANE TO KEELE LANDS CITY OF VAUGHAN

PREPARED FOR:

City of Vaughan
The City Above Toronto

August 2009
06452

EXECUTIVE SUMMARY

INTRODUCTION

The City of Vaughan is continuing to pursue a vision of urban intensification in a manner that will accommodate sustainable growth and a diversified economic base within its boundaries. The adoption of the amendment number 620 to the Official Plan will assist the City in the consideration of development applications within the 43ha Steeles Avenue Corridor between Jane Street and Keele Street. In its ultimate built out urban form, the Corridor is envisioned as a beautified "live-work" area housing 11,000 people and providing jobs for 4,000 employees. Moreover, the importance of this particular tract is underscored by several key elements unique to this area.

To facilitate this exercise moving forward a stormwater management plan is required to ensure that infrastructure is satisfactorily planned for. This report, prepared by The Sernas Group Inc. will outline alternatives and the selection of a preferred preliminary stormwater management strategy for the OPA 620 corridor. The recommendations and conclusions of this report will be explored further through a Municipal Class Environmental Assessment (EA) to be undertaken following circulation of this report.

BACKGROUND

The majority of the drainage area within OPA 620 is captured by a trunk storm sewer that runs within an easement on the north side of Steeles Avenue, where there is also a trunk sanitary sewer. This trunk storm sewer was designed in the late 1980's by Andrew Brodie Associates Inc. exclusively for the subject lands whereas an older existing storm sewer under Steeles Avenue captures the roadway drainage. The OPA 620 trunk sewer outlets to an existing municipal SWM facility that discharges under Jane Street into the Black Creek valley. The Black Creek valley also contains an existing SWM facility that is a quantity facility treating industrial lands on the west side of Black Creek.

SELECTION OF BEST MANAGEMENT PRACTICES / SUSTAINABLE TECHNOLOGIES

Based on a review of a range of Best Management Practices, the development of the stormwater management strategy for the OPA620 lands will thus include the consideration of:

- Soakaway pits
- Rainwater Harvesting
- Green roofs
- Porous pavement / permeable pavers
- Bioretention Areas
- Wet pond

DERIVATION OF STORMWATER MANAGEMENT STRATEGY

There are three different stormwater management strategies contemplated:

- Three-Pond Scenario
- Two-Pond Scenario
- One-Pond Scenario

CONCLUSIONS

The preferred strategy is a 2-pond approach that will include a SWM facility on ORC lands and an expansion of the existing SWM facility within TRCA lands that will involve marginal encroachment onto tableland while not affecting any existing structures.

The final determination for the extent of implementation of green technologies will be arrived at following the Municipal Class EA process.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

PAGE

TABLES

FIGURES

APPENDICES

Cover graphic: ©J.D. Barnes Limited, 2005 Orthophotography
Concept plan provided by Urban Strategies Inc.

1.0 INTRODUCTION

1.1 RATIONALE

The City of Vaughan is continuing to pursue a vision of urban intensification in a manner that will accommodate sustainable growth and a diversified economic base within its boundaries. The adoption of the amendment number 620 to the Official Plan will assist the City in the consideration of development applications within the 43ha Steeles Avenue Corridor between Jane Street and Keele Street. In its ultimate built out urban form, the Corridor is envisioned as a beautified "live-work" area housing 11,000 people and providing jobs for 4,000 employees. Moreover, the importance of this particular tract is underscored by several key elements unique to this area:

- There is an opportunity for carefully planned redevelopment that would include commercial and potential high-density residential land uses abutting a major educational institution. The mix of proposed land uses is ideally complemented to the goal of a pedestrian-friendly transit based environment.
- The central portion of the study area will be a transportation hub utilized by York Region and the Toronto Transit Commission providing a crucial transit linkage into Toronto via the Spadina Subway extension.
- The transit hub will be an entry point to the future Vaughan downtown core area referred to as the Vaughan Corporate Centre and a gateway to the Region of York's transit network.
- Imminent development applications within the Steeles Corridor will include the expansion of the UPS main distribution facility for Canada.

To facilitate this exercise moving forward a stormwater management plan is required to ensure that infrastructure is satisfactorily planned for.

1.2 PURPOSE OF THE PROJECT

The Sernas Group Inc. has been retained by the City of Vaughan to produce a Preliminary Master Stormwater Management Strategy. This preliminary report will outline alternatives and the selection of a preferred stormwater management strategy for the OPA 620 corridor. Following circulation of this report the City will commence a Municipal Class EA for the Master Stormwater Management Strategy for the OPA 620 lands.

The report structure is outlined below:

Section 1 – Introduction, Purpose & Summary of Background Reports
Section 2 – Summary of Geotechnical Conditions, Topography & Existing Infrastructure
Section 3 – Design Criteria for Water Quality, Quantity & Infiltration
Section 4 – Derivation of Best Management Practices suitable for OPA 620
Section 5 – Stormwater Management Analysis of Varying Levels of Green Technologies
Section 6 – Consideration of Various SWM Facility Opportunities
Section 7 – Discussion of Conservation Authority Concerns
Section 8 – Determination of Preferred Strategy
Section 9 – Conclusion

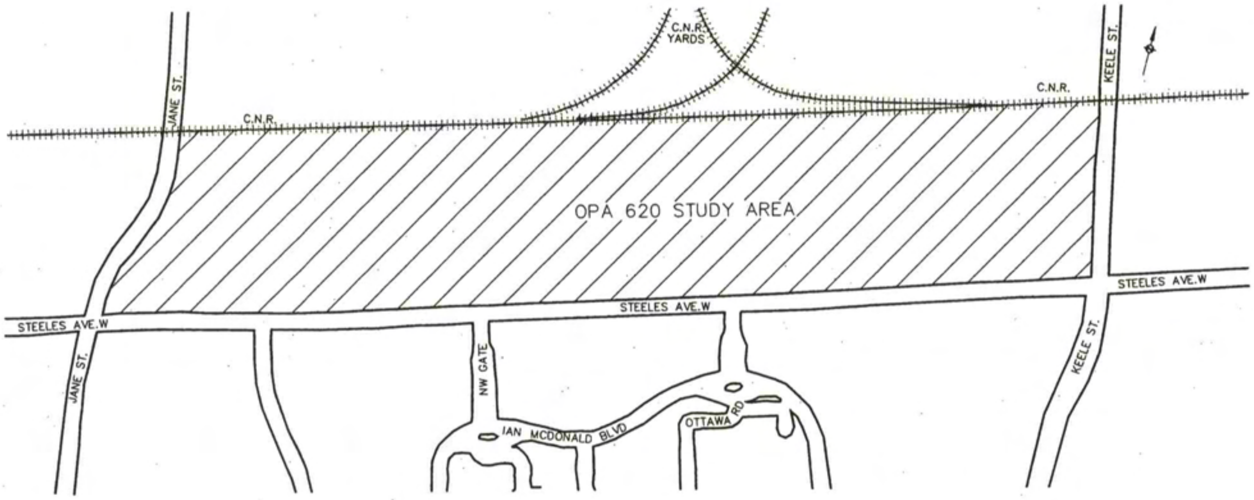
1.3 BACKGROUND

The OPA 620 Steeles Corridor is bounded by Steeles Avenue to the south, the CN Rail York Subdivision to the north, Jane Street to the west and Keele Street to the east. **Figure 1** shows the OPA 620 study area relative to adjacent major streets. Within the study area there is a variety of existing land uses that are briefly described below from west to east:

- Immediately east of Jane Street are lands that have been Site Plan Approved for use as a crematorium. These lands are also referred to by the individual landowner's name as the "Damiani" lands.
- The City owns the existing stormwater management (SWM) facility block located immediately east of the proposed crematorium. This SWM block was originally designed to service the entire OPA 620 area.
- United Parcel Service Canada Ltd. (UPS) maintains their main distribution facility north and east of the SWM facility. At the time of this report, there is an application from UPS to undertake an expansion of this facility eastward within a vacant portion of their lands.
- Immediately to the east and adjacent to the UPS site are lands slated for the future transportation hub that will consist of the York Region transit terminal and Steeles West subway station. This subway station would be the new terminus of the Spadina Subway Extension. It is noted that a portion of the lands along the eastern edge of UPS ownership have been indicated to be used for the future transportation hub as a result of the Environmental Assessment (EA) reports undertaken for the Spadina Subway and Regional Transit terminal. It is also noted that a 3,000 space parking lot, to accommodate the transit hub, is proposed just north of the transit hub within lands owned by Ontario Realty Corporation (ORC) that are leased to Hydro One.
- East of the transit terminal are lands owned by the Glen Corporation that contain two existing industrial buildings. A small vacant parcel still exists on these lands immediately adjacent to the transit hub.
- Two multi-unit industrial buildings are next to the Glen Corporation Land.
- The remaining tract of the land in the study area is owned by the Milestone Group where one existing four-storey office building exists at the northwest corner of Keele Street and Steeles Avenue. The Milestone Group has an imminent application for another similar building that would be just west of their existing four-storey building.

Beyond the study area is Black Creek Pioneer Village which is located southwest of the study area on the south side of Steeles Avenue, just east of Jane Street. York University occupies the remaining majority of land south of Steeles Avenue opposite the site. There is largely industrial development to the east and southeast of OPA 620. ORC owns lands that are leased to Hydro One for a transmission corridor just north of the study area, which separate it from a CN rail line. To the west of Jane Street are lands owned by the Toronto and Region Conservation Authority (TRCA) where the tablelands are being used by Black Creek Pioneer Village. The Black Creek valley is immediately west of the tablelands. **Figure 2** illustrates Land Ownership through OPA 620 and land uses beyond the study area.

The site is tributary to the Black Creek, which is a part of the Humber River watershed. The most recent report addressing this watershed is the "Humber River Watershed Hydrology/Hydraulics and Stormwater Management Study" by Aquafor Beech Ltd., updated November 1997.



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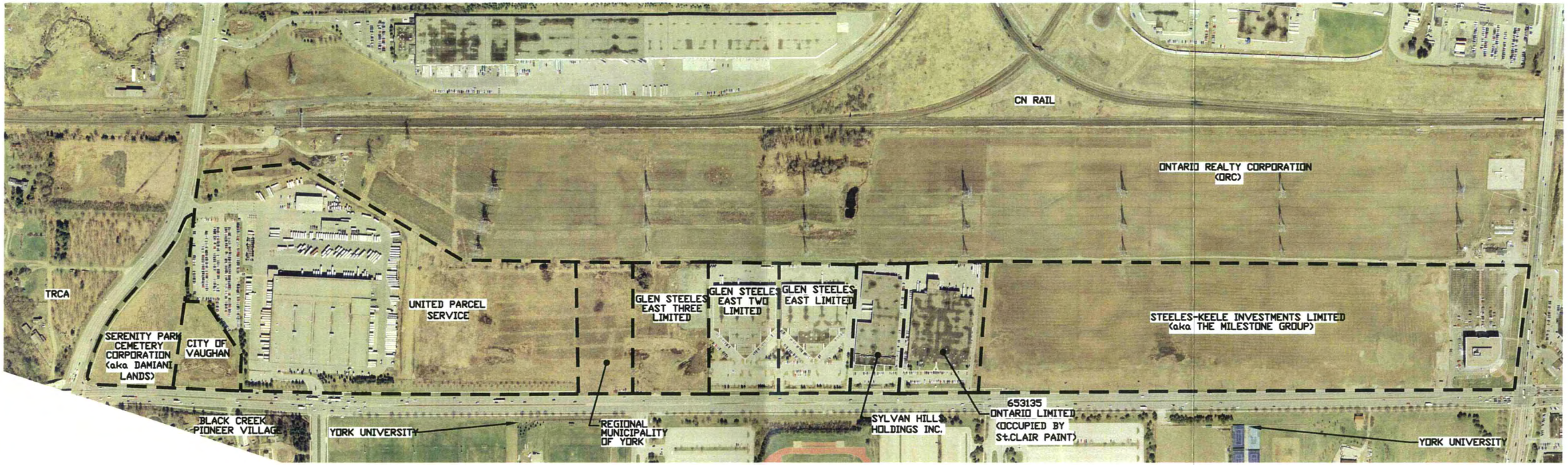
OPA 620
KEY PLAN

PROJECT No.
06452

DRAWING No.
FIG-1



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LAND OWNERSHIP

OPA 620

SCALE N.T.S. DATE: AUGUST 2009 DRAWN BY : S.Y.	PROJECT No. 06452	FIGURE No. 2

1.3.1 BACKGROUND REPORTS

HYDROLOGICAL ANALYSES OF PREDEVELOPMENT AND POSTDEVELOPMENT DIRECT RUNOFF AND THE METHODLOGY OF ROUTING POSTDEVELOPMENT DIRECT RUNOFF TO THE BLACK CREEK INCLUDING STORM WATER DETENTION FACILITIES FOR THE PROPOSED INDUSTRIAL PLAN OF SUBDIVISION BY ADESSO LIMITED IN LOT 1, CONCESSION 5, TOWN OF VAUGHAN, REGIONAL MUNICIPALITY OF YORK (ANDER ENGINEERING & ASSOCIATES LIMITED, MARCH 1982)

This report addresses stormwater management needs for a 22ha industrial development to the west of Black Creek, north of Steeles Avenue. In order to address post-development flows from the 22ha industrial development, a stormwater management facility was proposed to mitigate flows to pre-development levels for the 1:2 and 1:5-year storm events. While the March 1982 version of this report outlines a proposed pond on tableland to address this issue, the facility was actually constructed within the Black Creek valley on the east side of the watercourse. The quantity pond contains approximately 6,500m3 of storage volume and is fed by a storm sewer that goes under the Black Creek from the industrial tributary area.

UNITED PARCEL SERVICES LIMITED – DRAINAGE ITEMS LETTER (ANDREW BRODIE ASSOCIATES INC., JANUARY 26, 1987)

The drainage issues for the existing UPS building are documented in this report however the relevance of this document is within the storm drainage assumptions provided for the OPA 620 lands that relate to the trunk sewer design as well as drainage area delineation. The roof and asphalt area release rates of 40l/s/ha and 250l/s/ha are documented respectively as well as the analysis of the City pond adjacent to the UPS site.

STEELES CORRIDOR STUDY FINAL REPORT – TRANSPORTATION ASSESSMENT (MARSHALL MACKLIN MONAGHAN, AUGUST 2004)

This report documents the transit-related opportunities and constraints associated with intensification of uses along Steeles Avenue between Jane Street and Keele Street. It identifies that delays at either of the existing major boundary intersections of Steeles Avenue with Jane and Keele Streets can result in significant delays through the area. The report notes the existing GO Transit connections to York University where GO estimates that 80% of the ridership along the routes linking to York are destined to/from York University. Other transit connections are provided by TTC and York Region Transit (YRT). It is recognized that transit needs for the OPA 620 and immediate vicinity would be well served by an east-west road through OPA 620 that would relieve traffic to/from the north serving commuter needs and that there is great opportunity to promote alternative transportation modes that capitalize on the imminent transit investments in the area.

HIGHWAY 7 CORRIDOR AND VAUGHAN NORTH-SOUTH LINK PUBLIC TRANSIT IMPROVEMENTS ENVIRONMENTAL ASSESSMENT (REGIONAL MUNICIPALITY OF YORK, AUGUST 2005)

The Region of York finalized an Environmental Assessment (EA) for the improvement of public transit infrastructure along its primary east-west corridor, Highway 7, and key north-south corridor in August 2005. This study was driven by the growth of York Region as well as the ongoing development of major regional centres such as Vaughan Corporate Centre, Richmond Hill Centre and Markham Centre. Amongst other goals was the need for coordinated transit improvements that will link to carriers such as GO Transit and the TTC. The study identifies a regional transit hub to be serviced by bus rapid transit (BRT) at the Steeles West Station sited centrally in the OPA 620 Steeles Corridor. This station would represent the southerly limit of the "Vaughan North-South Link" and is coincident with the station location determined in the TTC's EA discussed below. The EA determined that a subway extension is needed from Steeles Avenue to Highway 7 but until such time the BRT will use an interim median transitway. A Public Meeting was held in November 2006 to address the final subway alignment determined in the TTC's EA to ensure that the requirements of the EA process were met.

SPADINA SUBWAY EXTENSION – DOWNSVIEW STATION TO STEELES AVENUE ENVIRONMENTAL ASSESSMENT (TORONTO TRANSIT COMMISSION AND CITY OF TORONTO, FEBRUARY 2006)

The Toronto Transit Commission (TTC) and City of Toronto (former Metro Toronto) completed an EA in 1994 for the Yonge-Spadina Subway Loop that would connect the Spadina and Yonge subway lines via Steeles Avenue. Whereas Phase 2 of the project involving the Steeles Avenue link was in the distant future, Phase 1 of the project involved the Downsview to York University subway extension and was not pursued due to a lack of funding. A 2001 Rapid Transit Expansion Study undertaken by the TTC found that the Steeles Avenue link would not be needed prior to 2016 and when it was needed, could potentially be moved further north. Key recommendations were to extend the Spadina line to the future Vaughan Corporate Centre (at Highway 7 and Jane Street) and determine the best route from Downsview Station to Steeles Avenue. The Spadina Subway EA was the culminating study that describes the route alignment and location for the Steeles West Station located centrally within the OPA 620 Steeles Corridor.

UNITED PARCEL SERVICE TORONTO HUB FACILITY EXPANSION – STORMWATER MANAGEMENT REPORT – FINAL REPORT (TOTTEN SIMS HUBICKI, APRIL 2007)

In support of the expansion of the UPS main distribution facility this report was prepared to address the stormwater management elements of the proposed expansion. The existing City owned dry pond was proposed for a retrofit to a wet pond providing water quality and active storage meeting the discharge rates of the existing pond. At the time of release of this Master Stormwater Management Master Plan, this report is ongoing whereas comments from TRCA are outstanding while the City is in support of the proposal as an interim measure to allow Phase I of the UPS expansion to proceed. The stormwater management approach taken in this report has been considered as part of this study and in ongoing discussions with the Study Team. It should be noted that the City owned dry pond provides quantity control to predevelopment rates only. The "Humber River Watershed Hydrology/Hydraulics and Stormwater Management Study" by Aquafor Beech Ltd., updated November 1997, recommends the use of unit rates for quantity control. As such, the measures proposed by UPS for their Phase I expansion are interim measures only.

1.4 NEEDS AND JUSTIFICATION

The "need" and "justification" to provide a master stormwater management strategy has been laid out and identified in the OPA 620 document. Excerpts from sub-section 6.2 – Water, Wastewater and Stormwater Management Services and sub-section 8.2 – Development Concept Report and Phasing Plan are included in **Appendix A**. These sections outline the importance and priority basis upon which this study shall be completed in order to address the servicing requirements comprehensively and to enable the consideration of development approvals.

The former section noted above alludes to the inclusion of innovative, sustainable water management practices such as green roofs and underground storage. Within this context, sub-section 6.1 – Energy and Environment has also been included in Appendix A. This section clearly lays the foundation for sustainable practices and green technologies for implementation in the OPA 620 Steeles Avenue Corridor. These measures will be investigated and implemented where practical. The inclusion of innovative, sustainable water management practices will only be possible if they are feasible and can be implemented in a cost-effective means.

2.0 EXISTING CONDITIONS

2.1 GEOTECHNICAL CONDITIONS

The soil conditions through the study area are considered to be clayey silts to silty sand tills associated with low permeability coefficients. While there may be localized pockets of fill material on vacant areas the surficial geology is taken as relatively homogenous. This conclusion has been determined based on the following points:

- The Humber River Watershed Study outlined the soils in the Black Creek Subwatershed as a C/D type soil under the SCS hydrologic soil group classification. The groups range from A to D starting with the most permeable soils and decreasing accordingly.
- A geotechnical investigation entitled Geotechnical Investigation, Proposed Development York University, prepared by Trow Consulting Engineers Ltd. (July, 2002) for lands just south of York University indicates that surface soils in that location are comprised of a layer of silt till to clayey silt till, which agrees with the C/D hydrologic soil group classification.
- The UPS Report (TSH, 2006) contains a geotechnical investigation undertaken by Terraprobe Limited (January, 1987) that documents native clayey silt tills to dense silty sand tills.
- Golder Associates has undertaken geotechnical investigations involving field work and desktop review components relating to both the Region of York and TTC EA's. Their work indicates the presence of clayey silt to silty clay tills on the Steeles West Station lands.

Given the above comments relating to the overall nature of the surficial geology for the purposes of this study, further geotechnical investigations may take place to verify site-specific conditions and these assumptions during subsequent detailed design activities.

2.2 TOPOGRAPHY & DRAINAGE

The study area generally drains in a south-westerly direction toward Steeles Avenue and Jane Street. The two exceptions to this include a portion of the lands at the north-east corner that drains toward Keele Street and a central portion of the ORC lands that drains northerly and is captured by the CN rail ditch. This latter area of approximately 9ha is conveyed westerly in the CN ditch and then directed southerly through a culvert under the UPS site access road and into a storm sewer that crosses under Jane Street discharging to the Black Creek. **Figure 3** depicts the general existing drainage trends and areas.

Topographically, there is a local low point in the lower central portion of the study area however any overflow would continue to follow the general drainage trend to the southwest. Overall, surface gradients range from approximately 1.5-3.5% going up to higher slopes exceeding 10% in some of the westerly parts of the study area.

2.3 INFRASTRUCTURE

The majority of the drainage area is captured by a trunk storm sewer that runs within an easement on the north side of Steeles Avenue, where there is also a trunk sanitary sewer. This trunk storm sewer was designed in the late 1980's by Andrew Brodie Associates Inc. exclusively for the subject lands whereas an older existing storm sewer under Steeles Avenue captures the roadway drainage.

Figure 4 shows the design drainage areas assumed for the existing storm sewer. It is noted that this sewer has been extended easterly from its original terminus approximately midway between Jane Street and Keele Street. It is presumed that this extension took place to service the Milestone Group building at the northwest corner of Keele Street and Steeles Avenue.

2.3.1 TRUNK STORM SEWER

The sewer design was based on the following assumptions for the subject lands:

- 30% Roof area taken at 100% imperviousness, released at 40l/s/ha
- 55% asphalt parking lot areas taken at 82% imperviousness, released at 250l/s/ha
- 15% roadways/boulevards taken at 65% imperviousness, captured uncontrolled

The design of the trunk sewer also stipulated that no overland flow shall enter Steeles Avenue up to the 1:100-year storm event.

2.3.2 CITY OWNED POND

The trunk sewer outlets to an existing dry pond (i.e. no quality control provided) designed to control flows to pre-development levels for the 1:2-year and 1:100-year storms of 1.42cms and 5.31cms respectively for the entire OPA 620 lands that are tributary to the dry pond. The existing characteristics of the pond are shown in Table 2.3.2 below, as summarized from the Andrew Brodie Associates Inc. (Jan. 1987) report. Flow values noted below were originally derived from the OTTHYMO hydrologic model.

TABLE 2.3.2: EXISTING UPS SWM FACILITY CHARACTERISTICS

STORM EVENT	UNCONTROLLED FLOW (cms)	CONTROLLED FLOW (cms)	AVAILABLE VOLUME (m^3)
1:2-year	5.82	1.44	7,200
1:100-year	10.47	5.20	16,000

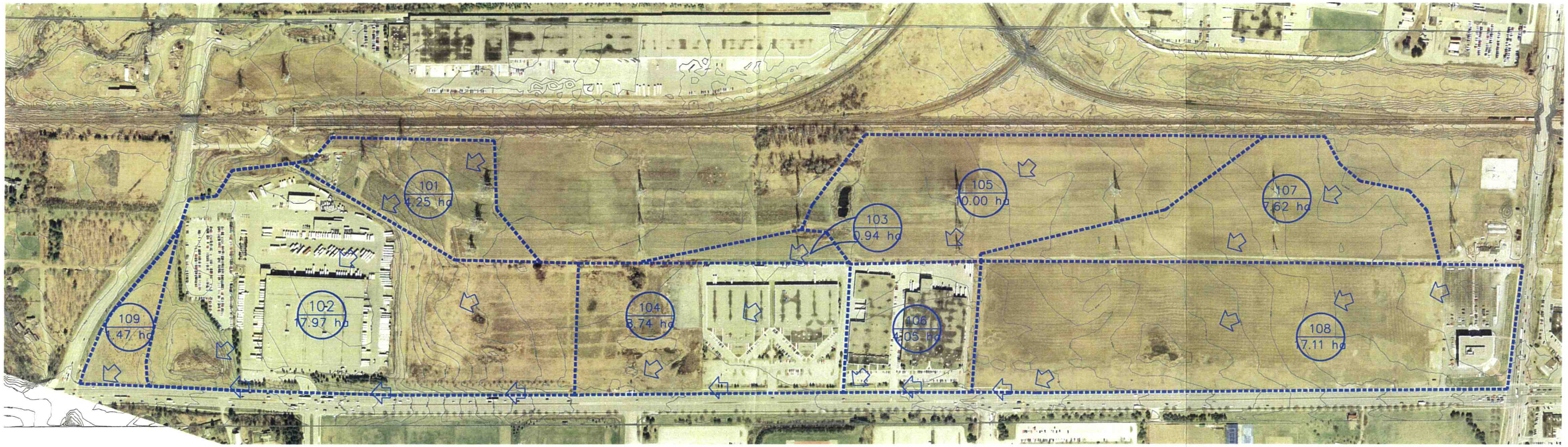
2.3.3 EXISTING SWM FACILITY IN BLACK CREEK VALLEY

As indicated in Section 1.3.1 above, there is an existing stormwater management facility just east of Black Creek within the valley lands owned by the Toronto and Region Conservation Authority (TRCA) that are north-west of Jane Street and Steeles Avenue. The design brief indicates the intent of the quantity pond is to provide post-to-predevelopment controls for the 1:2 and 1:5-year storm events for the contributing 22ha industrial area immediately west of the Black Creek valley lands. The characteristics outlined in the Ander Engineering report (Mar. 1982) are summarized in Table 2.3.3 below. Flow values noted below were derived by hand calculation using an approach described by the U.S. Soil Conservation Service.

TABLE 2.3.3: EXISTING BLACK CREEK SWM FACILITY CHARACTERISTICS

STORM EVENT	UNCONTROLLED FLOW (cms)	TARGET FLOW (cms)	REQUIRED VOLUME (m^3)
1:2-year	1.7	0.3	1,950
1:5-year	2.8	0.8	2,820

Based on verbal discussions with TRCA staff, there is a desire to have the City of Vaughan maintain this pond. However, at the present time there are no easements to allow the City to undertake such maintenance works.



Legend

▬ ▬ ▬ DRAINAGE BOUNDARY

101 —AREA I.D.
0.09 ha —AREA (HECTARES)

⇦ FLOW DIRECTION

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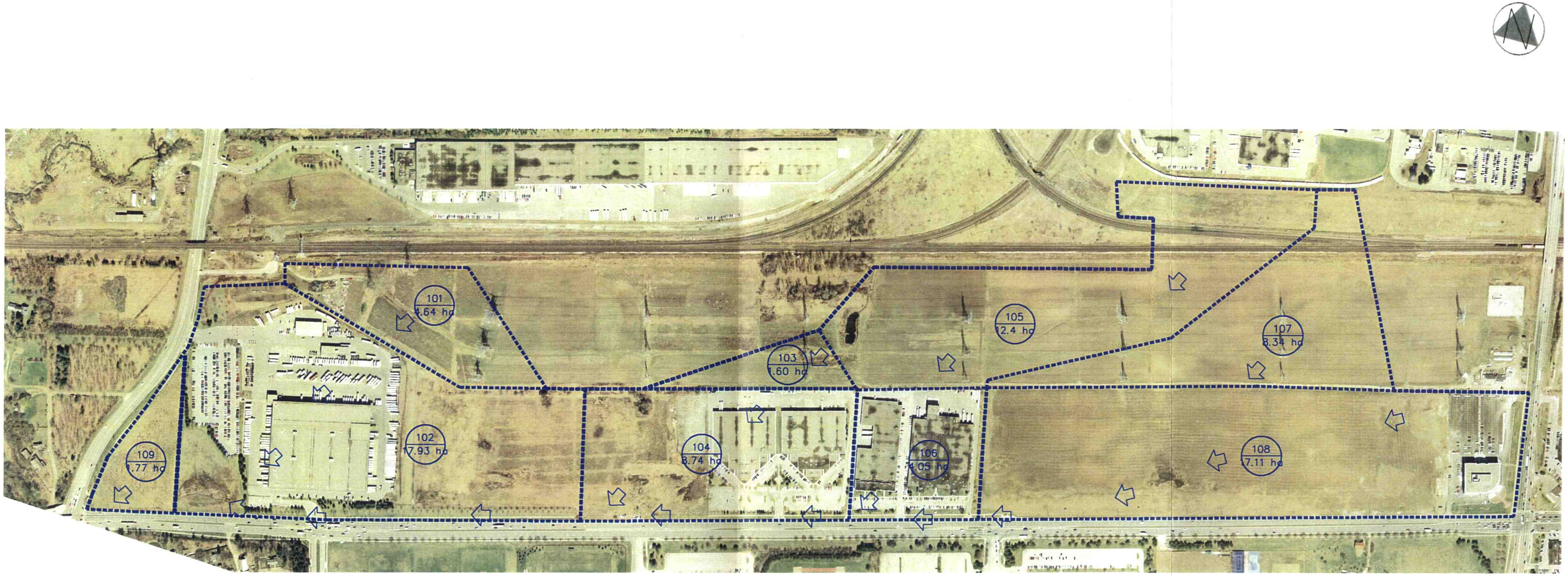
EXISTING DRAINAGE AREAS

OPA 620

SCALE N.T.S.	PROJECT No. 06452	FIGURE No. 3
DATE: AUG 2009		
DRAWN BY : I.M.		

R/P Date - MAR. 02, 2007 File: 06452-FIGURES-EX.DWG



Legend

▬ ▬ ▬ DRAINAGE BOUNDARY

101 — AREA I.D.
0.09 ha — AREA (HECTARES)

⇦ FLOW DIRECTION

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STM SEWER DRAINAGE AREAS

OPA 620

SCALE N.T.S. DATE: AUG 2009 DRAWN BY : I.M.	PROJECT No. 06452	FIGURE No. 4

R/P Date - MAR. 02, 2007 File: 06452-FIGURES-EX.DWG

3.0 DESIGN CRITERIA

Stormwater management design criteria for erosion, quality and quantity control have been established for this study area by the City of Vaughan, Toronto and Region Conservation Authority (TRCA) and the Ontario Ministry of the Environment (MOE) Stormwater Management Planning and Design Manual (2003) and includes the following:

QUALITY CONTROL

- For stormwater quality control, the MOE Stormwater Management Planning and Design Manual (2003) requires a permanent pool volume based on the need to protect the fish habitat. The protection levels outlined in the manual are Basic, Normal, and Enhanced; with Enhanced representing the greatest amount of protection for more sensitive aquatic habitat. For the purposes of this report, Enhanced quality protection will be required for the Black Creek for fish habitat.

- For water quality erosion control, the Toronto and Region Conservation Authority requires the runoff from a 25mm storm to be detained for 48 hours.

QUANTITY CONTROL

- Control of post-development peak flow rates to predevelopment levels utilizing the Unit Flow Equations established in the Humber River Watershed Study, prepared by Aquafor Beech (1997).

INFILTRATION TARGETS

- Provision of groundwater recharge, to the best extent possible, with the intent of matching pre-development infiltration levels.

GREEN TECHNOLOGIES

- Consideration of innovative source and conveyance controls, where feasible, in accordance with the principle of sustainable water management practices laid out in the OPA 620 document. These practices shall include, but not be limited to, the consideration of practices such as green roofs, rainwater harvesting, underground storage and permeable pavements.

A key consideration in the development of the stormwater management strategy is the possibility of reducing land requirements for any end-of-pipe facilities at the south-west corner of the study area, at Jane Street and Steeles Avenue. This area will be the gateway to the OPA 620 lands and the placement of a stormwater management facility at this location was not envisioned in the adoption of Amendment No. 620 to the Official Plan. It is envisioned that this goal will be facilitated in part through the implementation of sustainable technologies to reduce quality, erosion and quantity control requirements.

4.0 BEST MANAGEMENT PRACTICES / SUSTAINABLE TECHNOLOGIES

The stormwater management approach endorsed by the Ministry of the Environment (MOE) is to preserve the natural hydrologic cycle. However, the strategy acknowledges that individual development plans cannot explicitly address cumulative effects. The trend in resource management is for the promotion of the "treatment train approach" as well as "sustainable practices". These concepts are encouraged in particular by the Toronto and Region Conservation Authority (TRCA), the agency having jurisdiction within the Black Creek subwatershed, through their involvement with the Sustainable Technologies Evaluation Program (STEP).

The "treatment train approach" advocates for assessment of stormwater management measures in the following order:

1) stormwater lot level controls,
2) stormwater conveyance controls, and
3) end-of-pipe stormwater management facilities.

Lot level controls would include such measures as: rainwater leaders discharging to infiltration areas; rainwater leaders discharging to a subsurface soakaway pit; reducing grassed site grading to a minimum of 0.5%; separate foundation drains and routing of storm runoff along grassed swales. Additional lot level measures that can be considered as part of the treatment train may include rainwater harvesting, green roofs, porous pavement, and/or bioretention areas.

Conveyance controls would include perforated storm sewers, pervious catchbasins, and grassed swales. The selection of conveyance control is very much dependent on municipal requirements. It must be an acceptable form of servicing for a municipality and the municipality must be willing to implement and maintain these controls.

End-of-pipe facilities receive water from the conveyance system and discharge water to the receiving system. The March 2003 MOE Stormwater Management Planning and Design (SWMPD) Manual includes nine categories of end-of-pipe facilities as follows; wet ponds, wetlands, dry ponds, infiltration basins, infiltration trenches, filter strips, buffer strips, sand filters, and oil/grit separators.

"Sustainability" is a philosophy by which actions are undertaken in a manner considerate of natural and social resources. With this approach it is advanced that development can take place with reduced ecological strain such that future generations may also benefit from the resources at hand. The Toronto Waterfront "Sustainability Framework" (July 2005) references a widely cited definition that says "sustainability is about meeting the needs of people today without jeopardizing the flexibility of future generations to meet their needs." Stormwater management on the whole is within the realm of sustainability as it embodies resource management and of late emphasizes the principles of conservation through the focus on lot-level controls.

There are a number of Best Management Practices (BMPs) available to meet the various aspects of water quality control. However, site characteristics and the nature of the development will determine the applicability and possible usage of many of the different BMPs. The practices are discussed below.

4.1 LOT LEVEL CONTROLS

The March 2003 Stormwater Management Planning and Design (SWMPD) manual and STEP website (www.sustainabletechnologies.ca) were reviewed for suggestions on lot level controls that assist in natural infiltration and water quality improvement. A summary list is provided below.

i.) Roof leader to ponding area and/or soakaway pit
ii.) Reduced lot grading
iii.) Rainwater harvesting
iv.) Green roofs
v.) Porous pavement
vi.) Bioretention areas
vii.) Vegetative filter strips

4.1.1 ROOF LEADER TO PONDING AREAS AND/OR SOAKAWAY PIT

The March 2003 manual has recommended that runoff from roof leaders be directed to a depressed ponding area or to a soakaway pit behind the building. In order for this to be possible, a soil percolation rate of greater than 15mm/hr. (4.2 x 10^{-4} cm/s) would be required and it must also be acceptable to the municipality. A swale/ditch can be constructed to allow drainage capture and the outlet can be set high enough to store some water for infiltration, prior to being picked up by the road system. The soils in this area are not inherently conducive to infiltration as the fine-grained materials through the study area are apt to infiltration rates in the order of 1 x 10^{-6} cm/s. However, due to the strong desire to promote and utilize green technologies within the OPA 620 Steeles Corridor and optimize the opportunity to reduce any end-of-pipe facility footprint, this practice will not be excluded outright. Rather, it will be considered in the context of the stormwater management strategy development.

4.1.2 REDUCED LOT GRADING

Reducing the minimum grade from 2.0% to 0.5% would promote groundwater recharge and reduce flooding and erosion potential. This reduction in grade would be possible if the land is naturally flat, groundwater recharge is a requirement and if this is acceptable to the Municipality.

This site slope varies considerably, making reduced lot grades difficult. In lieu of soils that are not consistent with this approach, a change in the City of Vaughan's design standards would be required before 0.5% slopes are accepted. In addition, a 0.5% slope may leave the site wetter than what is normally expected, which may not be acceptable to the future residents.

Due to soil conditions on-site, variable slopes and the need to change City Standards, reduced minimum lot grading is not considered feasible.

4.1.3 RAINWATER HARVESTING

Prevention of stormwater runoff is clearly advantageous in terms of reducing the quality impacts and the need to treat against erosion. This practice that has gained popularity due to its positive effects in retrofit scenarios where loads to existing combined sewers was a concern. However the importance, practicality and ease of implementing rain barrels has provided a viable option for stormwater re-use and reduction of runoff volumes to relieve storm sewers, downstream stormwater management facilities and hydraulic structures while also reducing demand loads on water supply.

Rainwater harvesting is a key element in sustainable development that has the possibility of greater success partially due to the ease of implementation but also because it provides a social "grassroots" link to the environment where the users are hands-on involved with stormwater management solutions. However the hands-on public involvement is more relevant to low-rise development as opposed to the high-rise development anticipated with the OPA620 development concept. In this case the implementation of rainwater harvesting would be done through cisterns out of the sight of the public. This practice is highly recommended for further consideration.

4.1.4 GREEN ROOFS

Runoff reduction is targeted at the main hard surface areas with this practice that promotes pervious cover for regularly impervious surfaces. The pervious surface areas are typically a combination of grassed and treed areas on the roof that can be combined with gardens and rooftop patios to promote passive interaction. The key element is runoff reduction due to infiltration and evaporation but there are also fringe benefits in terms of reduced heating loads and also mitigation of the urban "heat island" effect. The implementation of green roofs will require additional reinforcement and thus costs that must be weighed when considering implementation. This practice has been implemented on a range of commercial and residential buildings that have flat roof areas. This practice is highly recommended for further consideration.

4.1.5 POROUS PAVEMENT / PERMEABLE PAVERS

Given the necessity of the conventional paved access (i.e. driveways), an opportunity exists for the implementation of porous pavement or permeable pavers. These systems can be incorporated into patios, walkways, driveways and parking areas and rely on the provision of void spaces underneath the surface for infiltration that are accessed through the porous surface medium. Like all systems that aim to promote infiltration, underlying soil types and groundwater proximity to surface are key factors that may restrict its effectiveness.

This measure can be used in conjunction with other measures as part of the "treatment-train" to provide the added potential for infiltration. The key concerns with this practice, beyond installation costs, are the maintenance costs if the effort is made to ensure that the system continues to function. Although the soil types are restrictive in the study area, this application will be considered in the context of the stormwater management strategy development given the previously mentioned desire to promote and utilize green technologies.

4.1.6 BIORETENTION AREAS

The incorporation of a sand filter component with lot-level landscaping practices allows for water quality treatment that can provide overall net benefits to the system. In this suggested application, maintenance concerns are less of an issue as the overall stormwater management system is not reliant on the bioretention areas functioning. Conventional lot grading for low-rise development is conducive to this application as many homes, whether townhome or single-family, will have a garden of some sort and this technique can be meshed into these passive recreational areas. The possibility of annual garden re-planting in bioretention areas also aids in the maintenance component in terms of maintaining void spaces and preventing or relieving clogging of the sand filter component. This style of stormwater treatment is typically used for small commercial sites or parking lots. In this context it will be considered in the stormwater management strategy development.

4.1.7 VEGETATIVE FILTER STRIPS

As opposed to conventional sheet flow or swale conveyance, the implementation of enhanced plantings at the lot-level can promote both quality improvements and infiltration. Primarily used in areas with good infiltration characteristics the vegetated filter strip is a 10-20m wide vegetated area with the length parallel to the direction of flow.

Similar to bioretention areas, the possibility of incorporating this strategy into passive recreational areas and/or landscaping allows for a possible improvement to water quality and quantity however the standard implementation may be restrictive given the expected widths and required lengths to be effective. This practice may be more applicable to lots backing onto open spaces or watercourses as there may be more depth to implement such a solution and this practice is effective in reducing flow velocities and restricting erosion. There would appear to be limited application for this measure.

4.2 STORMWATER CONVEYANCE CONTROLS

Stormwater conveyance controls deal with improving water quality and reducing runoff quantity along the road network between the lot discharge and the end of pipe system. The March 2003 manual and STEP lists various alternative conveyance measures as indicated below:

i.) pervious pipe systems;
ii.) pervious catchbasins;
iii.) grassed swales (curbless roads)

Each of the above measures were investigated as they relate to this development and are discussed in detail in the following sections:

4.2.1 PERVIOUS PIPE SYSTEM

A pervious pipe system is comprised of a piped system capable of allowing exfiltration (perforated pipes) combined with pre-treatment of stormwater prior to entering the system or within the system. Ideally, this system is suitable for retrofit situations where the surrounding soils have been stabilized and the site is not prone to erosion.

The manual indicates several major concerns regarding this type of system for new developments.

i.) Clogging – Since the storm sewer system is one of the first items constructed in a new development which is used to convey silt laden runoff, there is a high potential for the system to become clogged during the construction phase and become ineffective. Since the pipes will be submerged after a rainfall event, clogging would be more prevalent.

ii.) MOE Reasonable Use Policy – If exfiltration from this system was to recharge a ground water aquifer system, there is a potential for the contamination of the groundwater system with pollutants that are present within the storm runoff.

iii.) Pre-treatment – Since this system is prone to long-term clogging, pre-treatment of storm runoff prior to entering the system is essential to minimize this possibility. Pre-treatment of runoff prior to entering the storm sewer system during the construction stage is very difficult.

Because of the above concerns, the manual does not encourage the widespread use of pervious pipe systems in new developments. This system, although applicable for certain applications, will not be used for this development for the following reasons:

i.) Since this is a new development, with potential for significant sediment runoff, clogging of the system would be expected during construction.

ii.) This type of system has been discouraged for new developments in the March 2003 manual.

iii.) The design standards for the City of Vaughan would have to be revised which may require approval of Council.

iv.) A pre-treatment system of curbless roads and surface ponding would be preferred to make this option possible. The proposed intense urbanization of the development area would be inconsistent with a curbless road section.

v.) We believe the increased cost of this system over conventional systems would be very significant and given the above concerns, would provide minimal overall benefit.

4.2.2 PERVIOUS CATCHBASINS

Pervious catchbasins are standard catchbasins with an enlarged sump connected to an exfiltration storage area located below or adjacent to the catchbasin. They are intended to treat road runoff. The use of the pervious catchbasins is discouraged in this development for the following reasons:

i.) Since this is a new development, there would be a significant amount of sediment in the runoff, which would clog the sump and exfiltration storage areas.

ii.) In order for this method to be effective, there has to be long-term maintenance of both the sump and the catchbasin, and the exfiltration area. This would likely be considered as additional maintenance and costs that the City would not normally incur in their typical development.

4.2.3 CURBLESS ROADS

Curbless roads consist of a standard paved road without curbs and with depressed swales to take runoff from the road and lot areas. The road cross-section would be similar to that of a rural road cross-section with the exception that the swales would not be as deep as ditches and the catchbasins would be spaced to pick up the swale drainage. Upstream of the catchbasins, pre-treatment of runoff would be provided via surface storage prior to entering the storm sewer system. This roadway cross-section type could be less costly than the conventional curb and gutter systems.

The proposed urban nature and design of the development area would be inconsistent with a curbless road section.

4.3 END-OF-PIPE STORMWATER MANAGEMENT PRACTICES

End-of-pipe facilities receive runoff from the conveyance system as well as overland flows, which are then treated and discharged to the receiving stream. The consideration of end-of-pipe facilities includes a review of the following factors: physical suitability, technical effectiveness, conformity to plan and cost.

Physical suitability is affected by topography, soils, depth to bedrock, depth to high water table and sizing of drainage area. Table 4.3.1 shows a list of end-of-pipe stormwater management practices and their limiting physical criteria reproduced from the MOE manual. Table 4.3.2 notes the technical effectiveness and longevity of different SWM practices.

TABLE 4.3.1: PHYSICAL CRITERIA FOR END-OF-PIPE SWM PRACTICES

SWMP	TOPOGRAPHY	SOILS	BEDROCK	GROUNDWATER	AREA
Wet pond	None	None	None	None	> 5 ha
Dry pond	None	None	None	None	> 5 ha
Wetland	None	None	None	None	> 5 ha
Infiltration Basin	None	loam (min. inf. rate ≥ 60 mm/h)	> 1m below bottom	> 1m below bottom	< 5 ha
Infiltration Trench	None	loam (min. inf. rate ≥ 15mm/h)	> 1m below bottom	> 1m below bottom	< 2 ha
Filter strips	< 10%	None	None	> 0.5m below bottom	< 2 ha
Sand filters	None	None	None	> 0.5m below bottom	< 5 ha
Oil/Grit separators	None	None	None	None	< 2 ha

TABLE 4.3.2: TECHNICAL EFFICIENCY OF END-OF-PIPE SWM PRACTICES

SWMP	EFFICIENCY
Extended Detention Wet Ponds	10
Extended Detention Constructed Wetlands	9
Sand Filters	8
Extended Detention Dry Ponds	7
Filter Strip	5
Infiltration Trenches	4
Dry Weather/Manhole Oil/Grit Separator	4
Infiltration Basins	2
3 Chamber Oil/Grit Separator	2

* Rating is out of 10 (10 signifies excellent performance, 1 signifies poor performance)
Obtained from Table 4.5 MOEE, June 1994, Stormwater Management Practices, Planning, and Design Manual

Although the implementation of lot-level practices that include infiltration are being considered, soil permeability is too restrictive to warrant a similar end-of-pipe approach given the need for confidence in the operation of the facility. As such, this eliminates the use of infiltration facilities. On the macro-scale, the drainage areas considered will be larger than 5 hectares and this eliminates several practices such as filter strips, sand filters and oil/grit separators.

The remaining available end-of-pipe SWM facilities would be wet pond, dry pond and wetland. Based on a review of Tables 4.3.1 and Table 4.3.2, an extended detention wet pond would be the preferred end-of-pipe SWMP for further consideration.

4.4 SUMMARY OF BMPS / SUSTAINABLE TECHNOLOGIES

Based on a review of a range of Best Management Practices, the development of the stormwater management strategy for the OPA620 lands will thus include the consideration of:

- Soakaway pits
- Rainwater Harvesting
- Green roofs
- Porous pavement / permeable pavers
- Bioretention Areas
- Wet pond

The following sections of the report shall outline the process of considering stormwater management options, and further refining a stormwater management strategy that will assess which of the above elements are recommended for implementation. Use of some of the end-of-pipe systems that have been excluded as standalone elements may be considered for pre-treatment in the SWM strategy. As well, an element not discussed above that may be considered solely for quantity control within the stormwater management strategy is the inclusion of:

- Underground storage

5.0 STORMWATER MANAGEMENT ANALYSIS

This section of the report describes the stormwater management analysis options explored and the resultant volume requirements. The next section of the report explores strategies to achieve the volume requirements.

The OPA 620 fabric is reflected on **Figure 5**. While landownership was laid out in the previous sections, the approach to analyzing stormwater management options will involve discretizing the study area into segments independent of the detailed landownership. Table 5.0.1 below provides background on the subcatchment areas that are shown on **Figure 6**.

TABLE 5.0.1: SUBCATCHMENT AREA DESCRIPTION (ha)	
OPA620	49.5
TTC & Regional Transit Hub parking lots	12.9
ORC lands (undeveloped)	16.8
Vacant lands west of parking lots	1.2
Total:	80.4

The consideration of stormwater management options necessitates a review of quality and quantity requirements for the study area. To do so a review of progressively more stringent controls is taken. A number of best management practices have been carried forward for further consideration from Section 5 and are thus incorporated through the review of the following stormwater management options:

- Base Conditions (Standard Practices)
- Green Roofs / Greywater Re-Use (Rainwater Harvesting)
- Green Roofs / Greywater Re-Use + Source Controls

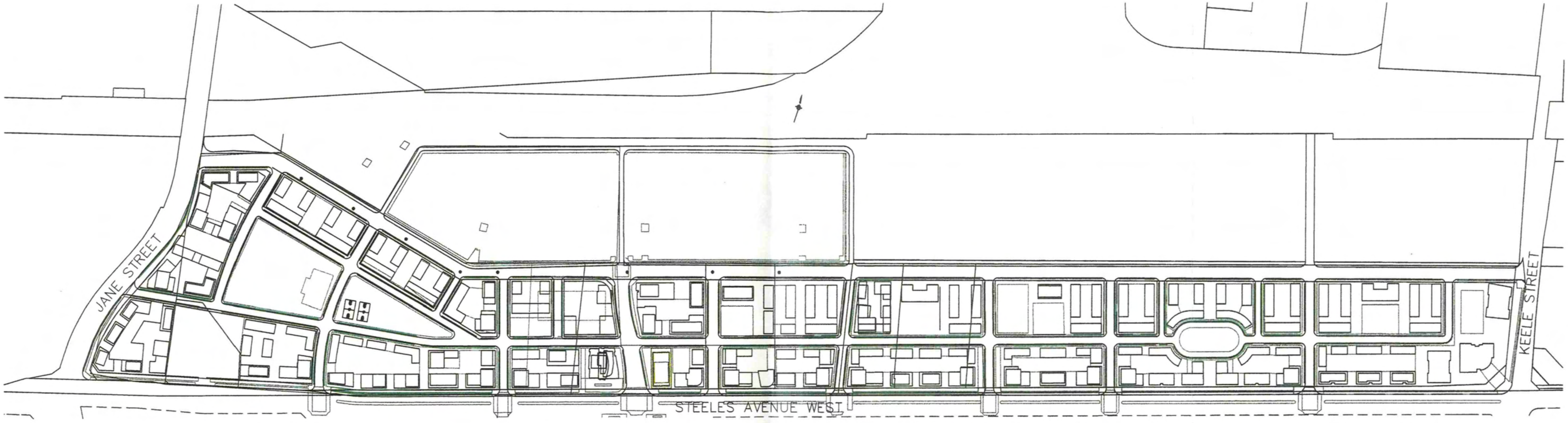
The OPA620 subcatchment was further broken down, as summarized in Table 5.0.2, to facilitate the review of the above options:

TABLE 5.0.2: OPA 620 AREA BREAKDOWN (ha)	
Roof area	10.9
Road area	9.9
"Site" (lot) area	24.4
Open space area*	4.3
Total:	49.5

*Open space grouped with lot area in modelling to be conservative

5.1 WATER QUALITY CONTROL

Design criteria for water quality includes the need for 'enhanced' level of protection meaning that 80% of Total Suspended Solids (TSS) are to be removed from the storm effluent stream to protect receiving watercourses. Additionally, runoff from the 25mm storm is to be detained to protect for erosion in the watercourses. The implementation of on-site controls could, to a certain degree, reduce or eliminate these requirements for the areas affected and this will be discussed in the presentation of options below. The conventional approach to addressing these quality requirements is through the use of end-of-pipe facilities and as such the sizing method is described below.



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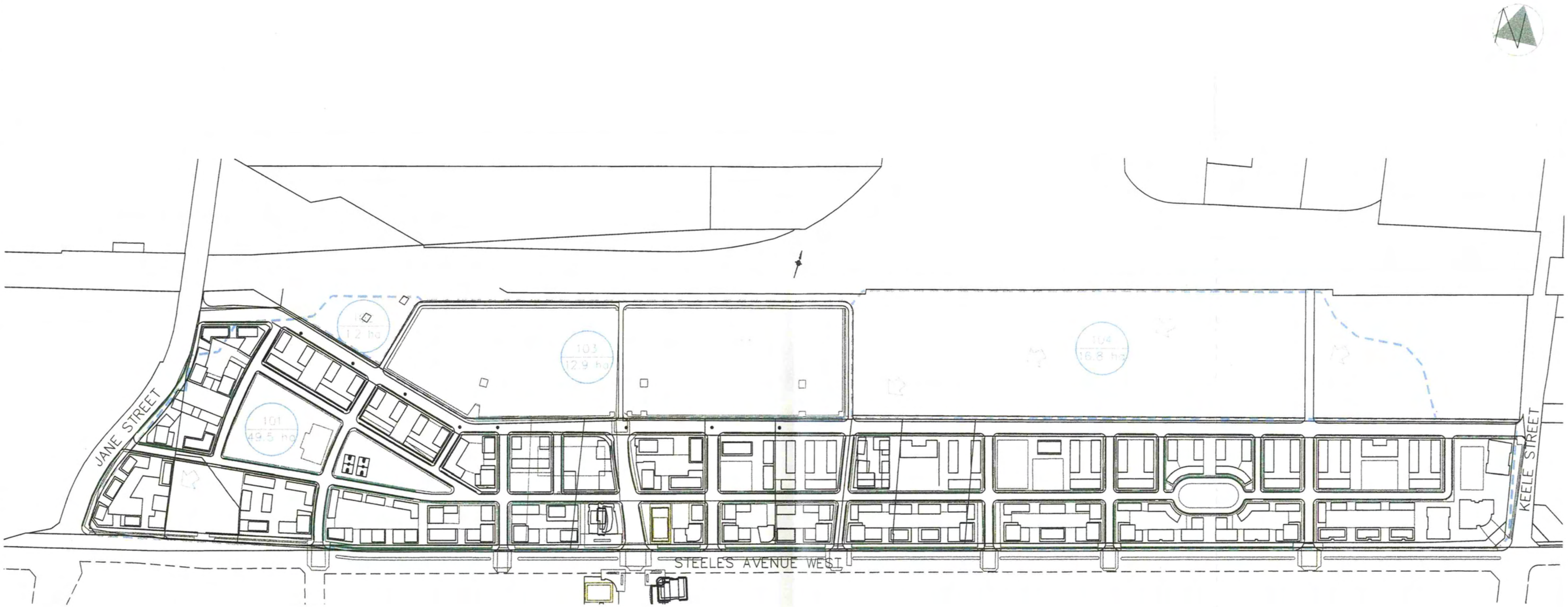
OPA 620

SCALE N.T.S.
DATE: AUG 2009
DRAWN BY : S.Y.
PROJECT No. 06452
FIGURE No. 5



Legend

▬ ▬ ▬ DRAINAGE BOUNDARY

101 —AREA I.D.
0.9 ha —AREA (HECTARES)

⇨ FLOW DIRECTION

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PROPOSED STORM
DRAINAGE AREAS

OPA 620

SCALE N.T.S.	PROJECT No.	FIGURE No.
DATE: AUG 2009	06452	6
DRAWN BY : S.Y.		

Wet ponds have been brought forward from the short-listing in Section 4 for end-of-pipe applications. Water quality storage requirements for wet ponds to achieve 80% TSS removal are given in Table 3.2 of the 2003 MOE manual. The storage volumes are calculated based on total imperviousness within the contributing drainage area and on the size of the contributing area. An 85% imperviousness value is being applied to the OPA620 lands and the MOE manual indicates a water quality storage requirement of 250m^3/ha for 'enhanced' protection. It is noted that 40m^3/ha of the overall 250m^3/ha requirement represents extended detention storage, which leaves 210m^3/ha as the permanent pool storage requirement.

Two methods are used to determine the required quality/erosion control pond volume. The first is a short duration 25 mm rainfall event distributed over the entire site. A 4 hour-25 mm rain event is modeled for the proposed options using Visual OTTHYMO. The resulting runoff volume from the area is then used as the erosion control volume. The second method uses the MOE guidelines for stormwater management ponds as specified in the Stormwater Management Planning and Design Manual (SWPDM - 2003). The MOE manual guidelines found in Table 3.2 recommend a storage volume of 40 m3/ha for extended detention water quality control. The larger of the two storage volumes is used to size the extended detention portion of the facility but in most cases is governed by the first method.

5.2 WATER QUANTITY CONTROL

Design criteria for water quantity control require that post-development peak flows be controlled to pre-development levels using Unit Flow Equations. Hydrologic modeling will be undertaken with the Visual OTTHYMO2 (VO2) hydrologic model with the Humber River 6hr-AES storms prescribed by TRCA. For reference, the total rainfall for these storms is shown in Table 5.2.1 below.

TABLE 5.2.1: HUMBER RIVER AES STORM RAINFALL

STORM EVENT	TOTAL RAINFALL (mm)
1:2-year	36
1:5-year	48
1:10-year	56
1:25-year	66
1:50-year	73
1:100-year	80

For each alternative, the VO2 computer model will be utilized to generate the post-development flows and required storage volumes for the 1:2-year through 1:100-year return period storms to meet the required flow targets. As stated above, the site has been analyzed with an imperviousness of 85%. A rationale for the use of 85% imperviousness has been provided in **Appendix B**. Given the geotechnical conditions described in Section 2.1 a modified curve number (CN*) of 78 has been selected for the pervious areas. This has been determined assuming agricultural use with fair ground cover on grassland.

The allowable release rate for the OPA 620 lands is established by applying the unit rate equations to the 80.4ha drainage area. The resulting target flows are shown in Table 5.2.2 below. The stormwater management options will provide the total storage requirements needed to achieve the target release rates.

TABLE 5.2.2: OPA 620 TARGET FLOWS			
STORM EVENT		Q (l/s/ha)	UNIT FLOW RATES (cms)
1:2-year	Q=7.745-0.762ln(A)	4	0.35
1:5-year	Q=11.468-1.123ln(A)	7	0.53
1:10-year	Q=13.877-1.342ln(A)	8	0.64
1:25-year	Q=17.381-1.690ln(A)	10	0.80
1:50-year	Q=20.164-1.973ln(A)	12	0.93
1:100-year	Q=22.973-2.256ln(A)	13	1.05

It has been recognized that the existing development on OPA 620 that drains to the existing City pond adjacent to UPS, inclusive of the Phase I expansion that UPS is undertaking concurrently with this report, will exceed unit rate targets until such time as the City pond is removed, redevelopment occurs or the drainage patterns are redirected away from the existing City SWM facility.

5.3 VOLUMETRIC REQUIREMENTS

Table 5.3.1 below summarizes the applicable area for quality control, based on the implementation of green technologies, as well as the volumetric requirements for each option. Each option is described in the following sections and VO2 model output for each option is included in **Appendices C, D & E**.

TABLE 5.3.1:VOLUMETRIC REQUIREMENTS FOR SWM OPTIONS				
SWM OPTION	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL (m^3)	EXTENDED DETENTION (m^3)	QUANTITY STORAGE (m^3)
BASE CONDITIONS	62.4	13,105	10,360 (16.6mm)	42,500
GREEN ROOFS / GREYWATER (GRG)	51.5	10,900	7,780 (15.1mm)	42,300
GRG + SOURCE CONTROLS	17.4	3,650	1,900 (10.9mm)	36,500

5.3.1 BASE CONDITIONS

The base conditions scenario represents the conventional development approach with no green technologies implemented. With the exception of the 16.8ha undeveloped ORC lands, quality control will be required for the entire development area (80.4ha total area – 16.8ha ORC lands – 1.2ha vacant lands), or an area of 62.4ha.

5.3.2 GREEN ROOFS / GREYWATER RE-USE (GRG)

This scenario includes the possibility of implementing Green Roofs and Greywater re-use (i.e. rainwater harvesting). In so doing, the runoff from the 25mm event is assumed to be either captured by the green roof and/or a cistern system that will recirculate the water for non-potable uses such as irrigation. The 10.9ha OPA 620 roof area is considered to be treating itself for quality therefore no permanent pool or extended detention is required for this area. Since this approach is considered in addition to the base conditions, the quality requirements will apply to 51.5ha (62.4ha base condition area – 10.9ha roof area).

*The reader is referred to **Appendix K** and the final note in Section 5.4 below for a revision to roof runoff capture volume.*

The hydrologic modelling has accounted for this approach by considering the roof imperviousness to be 50% and by adjusting depression storage for the pervious and impervious areas to 25mm. This assumes that green roofs will be implemented on 50% of the total roof area within OPA 620 and that buildings will be capturing and reusing the runoff from the first 25mm of a given storm event.

5.3.3 GRG + SOURCE CONTROLS

The next iteration of additional green technologies considered will include measures such as: soakaway pits, porous pavement / permeable pavers and bioretention areas. In other words, "source controls" that will apply to the "site" and "open space" areas taken collectively as 28.7ha (24.4ha OPA 620 site area + 4.3ha open space area). There is also an opportunity to implement this approach on the west portion of the parking lot (5.4ha). A 10mm capture has been assumed for these areas which will be an infiltration volume not to leave the site. On this basis, quality control is also assumed to be taken care of at the site level through the implementation of these practices. In comparison to the previous options there is a remaining 17.4ha in need of quality control (51.5ha option 2 area – 28.7ha site/open space area – 5.4ha west parking lot) that is reflective of the road areas and east subway parking area.

The modelling has accounted for the proposed 10mm capture by adjusting the depression storage for the pervious and impervious areas to 10mm for the site/open space areas.

The reader is referred to ***Appendix K*** *and the final note in Section 5.4 below for a revision to the site storage value.*

5.4 GREEN / SUSTAINABLE TECHNOLOGIES – WATER QUALITY

On-site capture and re-use of storm runoff through sustainable technologies such as green roofs, grey water systems and/or site infiltration has been investigated for a number of reasons including:

- Encouragement through OPA 620 policies
- Trend for development is moving in this direction
- Strongly advanced by TRCA
- High-density development proposed in OPA 620 is conducive to green technologies from a cost and practicality perspective
- Reduction or elimination of end-of-pipe quality control

In the establishment of the above scenarios, particularly Option 3, the use of 25mm of roof runoff capture and 10mm of site storage is reflected. This approach has been taken as a means of eliminating the need for end-of-pipe quality control for the areas treated with these approaches. An infiltration volume balance can be achieved with 5mm of capture from the site areas, as shown later in Section 7.2.1. As such, the increased site infiltration is to eliminate the need for end-of-pipe quality control.

Investigation took place subsequent to the above conclusions, as documented in a letter to TRCA of December 12 2008 included in ***Appendix K****, that re-visited the volumes noted above and concluded that the roof runoff capture and site storage values for sustainable measures shall be 15mm and 7.5mm respectively.*

6.0 DERIVATION OF STORMWATER MANAGEMENT STRATEGY

The derivation of a stormwater management strategy is primarily aimed toward meeting the technical objectives however other considerations (i.e. economic, terrestrial) will be discussed in later sections of the report in order to validate the selection of a preferred strategy. The broad based criteria were laid out in Section 3 of this report, followed by a derivation of suitable Best Management Practices in Section 4. Section 5 distilled this information to a quantifiable form by setting out target volumes that need to be met through the consideration of progressively more stringent forms of quality/quantity controls. This section of the report will outline the process of deriving alternative strategies that will meet the target volumes.

It should be noted that while on-site green / sustainable technologies provide a significant benefit with respect to quality and water balance and are therefore recommended for the OPA 620 lands, they are limited in their ability to address water quantity control. Given that water quantity control storage requirements are the limiting factor governing the footprint of the end of pipe stormwater management facilities and given that the details of the sustainable technologies to be implemented on each site will not be finalized until a later stage, the evaluation of end-of-pipe facilities in the following Section 6.0 of this report was undertaken based on the base conditions option of no green technologies.

6.1 PROPOSED SERVICING

The first step toward deriving a stormwater management strategy was to layout a servicing scheme that would be functional and flexible. The following two critical factors were recognized in developing a servicing scheme:

1.) Existing infrastructure in the form of the trunk storm sewer running along the north side of Steeles Avenue provides an opportunity toward this goal. As outlined in Section 2.3.1, the trunk sewer design was based on the following assumptions for OPA 620:
    - 30% Roof area taken at 100% imperviousness, released at 40l/s/ha
    - 55% asphalt parking lot areas taken at 82% imperviousness, released at 250l/s/ha
    - 15% roadways/boulevards taken at 65% imperviousness, captured uncontrolled
    - No overland flow shall enter Steeles Avenue up to the 1:100-year storm event
2.) While it is evident from the volumetric requirements documented in Section 5 that the implementation of various green technologies and source controls would reduce the quality requirements, there is still a need for a substantial quantity volume even with a full complement of these technologies implemented. Thus the need for end-of-pipe facilities would be warranted. The servicing scheme should provide the greatest flexibility for the implementation of efficient end-of-pipe facilities where land space can be optimized without compromising potential land use.

Having understood the above constraints a servicing strategy was developed for three separate stormwater management strategies. Each strategy incorporates the use of potential intermediate outlets for end-of-pipe facilities in conjunction with an ultimate storm outlet within the Black Creek valley.

6.2 END-OF-PIPE FACILITIES

Based on the proposed servicing scheme, a number of end-of-pipe facility locations were deemed possible and were investigated for incorporation into feasible stormwater management strategies. The facility locations are described below and a summary of the characteristics of each is provided in Table 6.2.1. Facilities on ORC lands are cited to maintain a 30m clearance from the base of any adjacent hydro tower.

6.2.1 EAST

Located east of the subway parking lot this facility has a footprint of approximately 1.3ha and can capture approximately half of the development lands from OPA 620. Quantity volumes noted in Table 6.2.1 for this facility are based on an active storage depth of 3m given the intent of maximizing the benefit of the facility for peak flow reduction. This depth exceeds the normal maximum depth of both the City and MOE. However the facility location (being far from the centre) makes it more palatable.

6.2.2 WEST

The west SWM facility is within the western portion of the subway parking lot and consists of underground storage within a maximum area of 1.1ha. This storage would utilize proprietary products such as the Storm Chamber or Cultec stormwater management systems to maximize the capacity within the available area. While the facility is primarily quantity treatment the quality component would be provided through the infiltration of stormwater and/or the provision of oil-grit separators upstream of the underground system. Initially some surface storage was provided to complement the underground storage but was ultimately determined to be impractical due to the proximity of the hydro towers.

6.2.3 CITY

Located adjacent to the UPS development the City SWM facility design concept is based on the proposed facility outlined by TSH for the UPS expansion. This facility had the possibility of being optimized as other facilities are constructed through the disconnection of upstream drainage areas directed by the Steeles Avenue trunk storm sewer and re-direction of flows from the OPA 620 lands. However, since the notion of this report deals with the built-out condition in which the City facility would no longer exist the facility was not integrated into any of the stormwater management strategies.

6.2.4 BLACK CREEK A

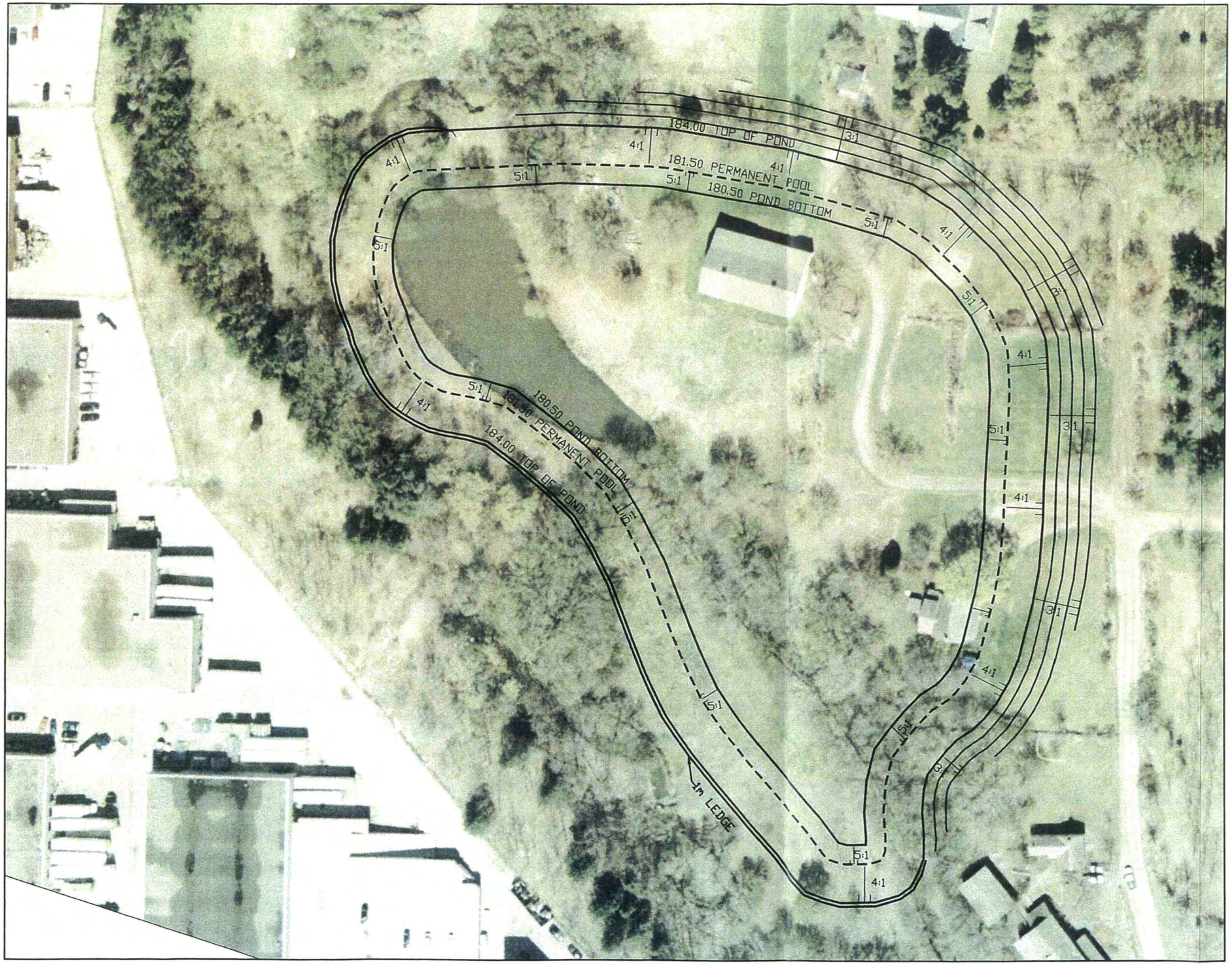
Several pond concepts are considered within the Black Creek valley that all involve the expansion of the existing pond within the valley lands. Each concept maintains the grading along the west side of the facility to minimize impacts to the adjacent Black Creek. Facility A is an expansion that creeps into tableland and would require relocation of an existing dwelling as well as the barn structure presently on TRCA lands. The footprint approaches 3.0ha and is being advanced as an ultimate pond location for the future build out of OPA 620. A sketch of the facility is shown on Figure 7.

6.2.5 BLACK CREEK B

Black Creek B is a reduced version of Black Creek A whereby the existing building structures on the TRCA lands would remain but could be affected by re-grading works within proximity to the structures. The facility footprint is approximately 1.5ha and is considered as a facility that could ultimately replace the City SWM facility and potentially the proposed west SWM facility.

6.2.6 BLACK CREEK C

Black Creek C would utilize the existing Black Creek valley lands with no intrusion onto the tableland. The pond reduction is just over 1.0ha. The facility would be considered for any merit to OPA 620 potentially in lieu of the City SWM facility.



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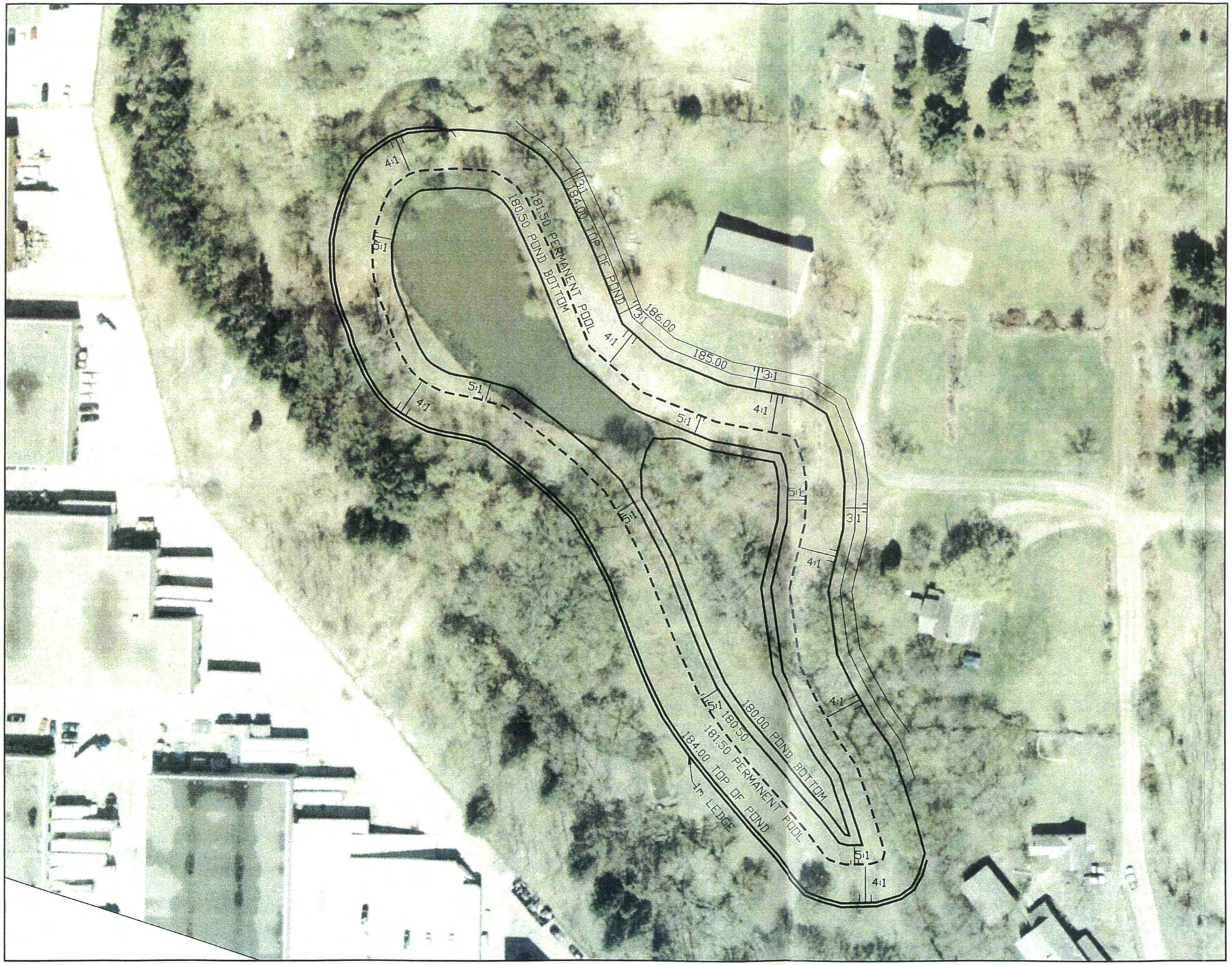
BLACK CREEK 'A'
SWM FACILITY

OPA 620

SCALE 1:1000
DATE: AUG 2009
DRAWN BY : S.Y.

PROJECT No. 06452

FIGURE No. 7



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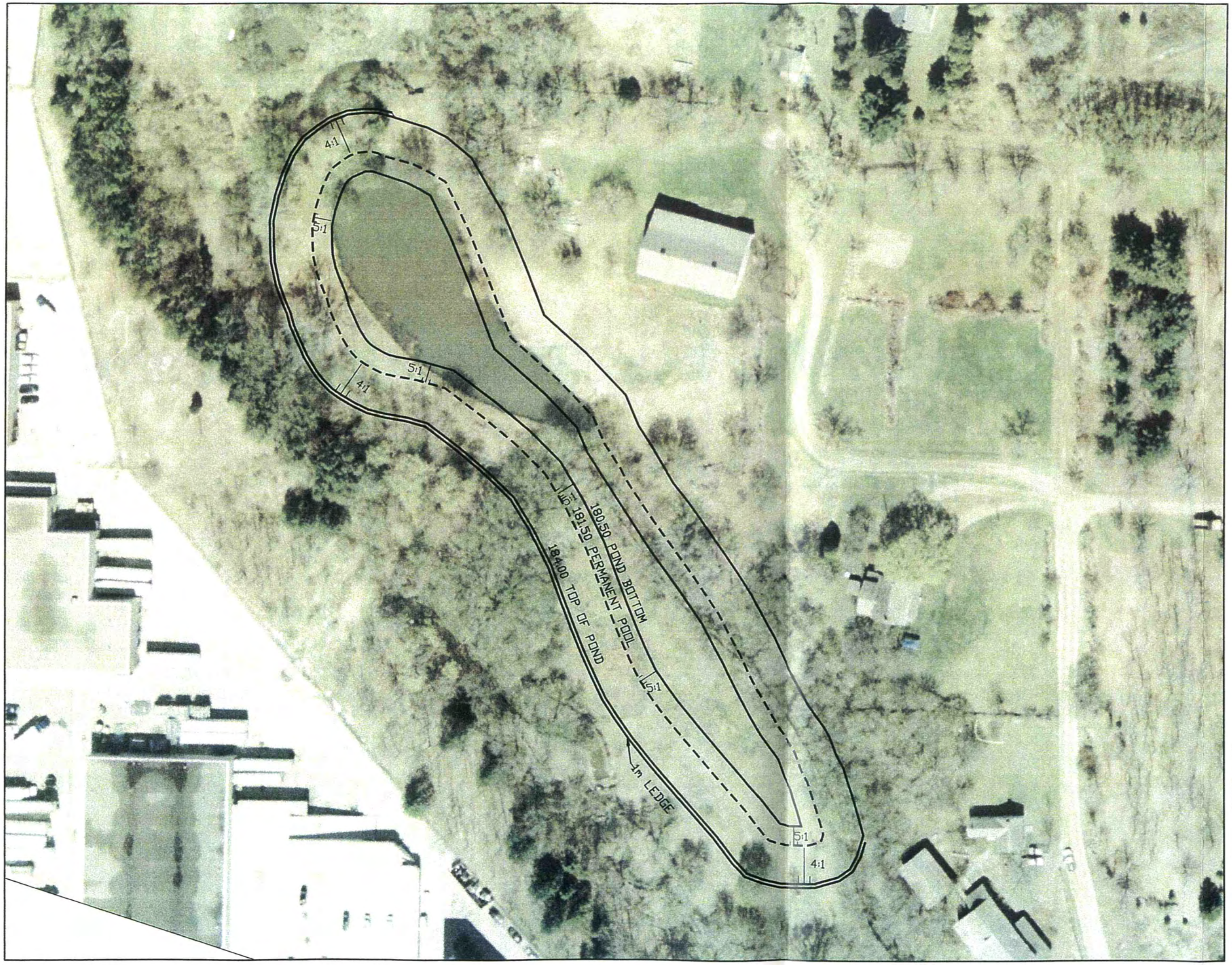
BLACK CREEK 'B'
SWM FACILITY'

OPA 620

SCALE 1:1000
DATE: AUG 2009
DRAWN BY : S.Y.
PROJECT No. 06452
FIGURE No. 8



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BLACK CREEK 'C'
SWM FACILITY

OPA 620

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DATE: AUG 2009
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PROJECT No. 06452

FIGURE No. 9

TABLE 6.2.1: SUMMARY OF VOLUMES FOR POTENTIAL SWM FACILITIES			
SWM FACILITY	PERMANENT POOL PROVIDED (m^3)	EXTENDED DETENTION PROVIDED (m^3)	QUANTITY STORAGE PROVIDED (m^3)
EAST	5,670 (194.5 – 195.5m)	7,490 (195.5 – 196.5m)	29,460 (195.5 – 198.5m)
WEST	0	0	10,300 (190.0 – 191.0m)
CITY	3,750 (181.0 – 183.0m)	2,590 (183.0 – 183.8m)	14,965 (183.0 – 186.5m)
BLACK CREEK A	16,060 (180.5 – 181.5m)	18,560 (181.5 – 182.5m)	47,915 (181.5 – 184.0m)
BLACK CREEK B	7,485 (180.0 – 181.5m)	8,070 (181.5 – 182.5m)	21,195 (181.5 – 184.0m)
BLACK CREEK C	4,140 (180.5 – 181.5m)	6,230 (181.5 – 182.5m)	16,410 (181.5 – 184.0m)

6.3 STORMWATER MANAGEMENT STRATEGIES

There are three different stormwater management strategies contemplated:

- Three-Pond Scenario
- Two-Pond Scenario
- One-Pond Scenario

Each of the above strategies can be implemented in the context of any of the three options. In order to illustrate the relative effectiveness of each strategy in terms of stormwater management goals while providing clarity, the targets for water quality and quantity have been compared to the provided volumes for each strategy in Tables 6.3.1-6.3.3. To avoid confusion the required volumes for the most conservative option, which is 'Base Conditions' is illustrated in these Tables since the adoption of any other option would only decrease the required volumes.

TABLE 6.3.1: OPTION 1 (BASE CONDITIONS) SWM STRATEGY#F1 – 3 POND SCENARIO

SWM FACILITY	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL REQUIRED (m³)	PERMANENT POOL PROVIDED (m³)	EXTENDED DETENTION REQUIRED (m³)	EXTENDED DETENTION PROVIDED (m³)	APPLICABLE AREA FOR QUANTITY CONTROL (ha)	QUANTITY STORAGE REQUIRED (m³)	QUANTITY STORAGE PROVIDED (m³)
EAST	32.0	6,720	10,545	5,315	7,490	48.8	26,400	29,460
WEST	13.9	2,920	0	2,305	0	15.1	5,700	10,300
BLACK CREEK C	16.5	3,465	4,140	2,740	6,230	16.5	10,300	16,410
TOTAL:	62.4	13,105	14,685	10,360	13,720	80.4	42,400	53,950

TABLE 6.3.2: OPTION 1 (BASE CONDITIONS) SWM STRATEGY#F2 – 2 POND SCENARIO

SWM FACILITY	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL REQUIRED (m³)	PERMANENT POOL PROVIDED (m³)	EXTENDED DETENTION REQUIRED (m³)	EXTENDED DETENTION PROVIDED (m³)	APPLICABLE AREA FOR QUANTITY CONTROL (ha)	QUANTITY STORAGE REQUIRED (m³)	QUANTITY STORAGE PROVIDED (m³)
EAST	32.0	6,720	10,545	5,315	7,490	48.8	26,400	29,460
BLACK CREEK B	30.4	6,385	7,485	5,045	8,070	31.6	15,700	21,195
TOTAL:	62.4	13,105	18,030	10,360	15,560	80.4	42,100	50,655

TABLE 6.3.3: OPTION 1 (BASE CONDITIONS) SWM STRATEGY#F3 – 1 POND SCENARIO

SWM FACILITY	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL REQUIRED (m³)	PERMANENT POOL PROVIDED (m³)	EXTENDED DETENTION REQUIRED (m³)	EXTENDED DETENTION PROVIDED (m³)	APPLICABLE AREA FOR QUANTITY CONTROL (ha)	QUANTITY STORAGE REQUIRED (m³)	QUANTITY STORAGE PROVIDED (m³)
BLACK CREEK A	62.4	13,105	16,060	10,360	18,560	80.4	42,500	47,915

TABLE 6.3.1: OPTION 1 (BASE CONDITIONS) SWM STRATEGY#F1 – 3 POND SCENARIO

SWM FACILITY	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL REQUIRED (m^3)	PERMANENT POOL PROVIDED (m^3)	EXTENDED DETENTION REQUIRED (m^3)	EXTENDED DETENTION PROVIDED (m^3)	APPLICABLE AREA FOR QUANTITY CONTROL (ha)	QUANTITY STORAGE REQUIRED (m^3)	QUANTITY STORAGE PROVIDED (m^3)
EAST	32.0	6,720	10,545	5,315	7,490	48.8	26,400	29,460
WEST	13.9	2,920	0	2,305	0	15.1	5,700	10,300
BLACK CREEK C	16.5	3,465	4,140	2,740	6,230	16.5	10,300	16,410
TOTAL:	62.4	13,105	14,685	10,360	13,720	80.4	42,400	53,950

TABLE 6.3.2: OPTION 1 (BASE CONDITIONS) SWM STRATEGY#F2 – 2 POND SCENARIO

SWM FACILITY	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL REQUIRED (m^3)	PERMANENT POOL PROVIDED (m^3)	EXTENDED DETENTION REQUIRED (m^3)	EXTENDED DETENTION PROVIDED (m^3)	APPLICABLE AREA FOR QUANTITY CONTROL (ha)	QUANTITY STORAGE REQUIRED (m^3)	QUANTITY STORAGE PROVIDED (m^3)
EAST	32.0	6,720	10,545	5,315	7,490	48.8	26,400	29,460
BLACK CREEK B	30.4	6,385	7,485	5,045	8,070	31.6	15,700	21,195
TOTAL:	62.4	13,105	18,030	10,360	15,560	80.4	42,100	50,655

TABLE 6.3.3: OPTION 1 (BASE CONDITIONS) SWM STRATEGY#F3 – 1 POND SCENARIO

SWM FACILITY	APPLICABLE AREA FOR QUALITY CONTROL (ha)	PERMANENT POOL REQUIRED (m^3)	PERMANENT POOL PROVIDED (m^3)	EXTENDED DETENTION REQUIRED (m^3)	EXTENDED DETENTION PROVIDED (m^3)	APPLICABLE AREA FOR QUANTITY CONTROL (ha)	QUANTITY STORAGE REQUIRED (m^3)	QUANTITY STORAGE PROVIDED (m^3)
BLACK CREEK A	62.4	13,105	16,060	10,360	18,560	80.4	42,500	47,915

7.0 DISCUSSION

This section of the report will address some technical and non-technical issues relating to the stormwater management strategy for the OPA 620 lands.

7.1 COMPLIANCE WITH ONGOING ENVIRONMENTAL ASSESSMENTS

The following Environmental Assessments (EA's) were reviewed during the preparation of this report and have been summarized in Section 1.3.1:

- Highway 7 Corridor And Vaughan North-South Link Public Transit Improvements Environmental Assessment, prepared for Regional Municipality Of York (August 2005)
- Spadina Subway Extension – Downsview Station To Steeles Avenue Environmental Assessment, prepared for Toronto Transit Commission & City Of Toronto (February 2006)

These reports were crucial to establishing the land use within OPA 620 and certainly in the development of the concept plan. In the context of water resources, the Region's EA dealt more with hydraulic analysis for water crossings along the study corridor than with stormwater management while the TTC's EA included a stormwater management plan for the subway and parking lot in the absence of a master strategy. The TTC's interim stormwater management strategy (i.e. prior to development of a master plan) included measures such as exfiltration trenches, oil-grit separators and "super-pipes".

The strategy that will be advanced as a result of this report will supersede any of the EA stormwater management strategies as it addresses the stormwater management needs of the OPA 620 lands inclusive of the joint parking lot, Regional Transit Hub and TTC's subway station. Thus the pertinent elements of these EA's are considered to be appropriately incorporated.

7.2 TRCA REQUIREMENTS

7.2.1 INFILTRATION TARGETS

The implementation of green roofs/greywater re-use as well as source controls has been presented in Section 5.3 with respect to the reduction of volumetric requirements in terms of water quality as well as water quantity on a design-storm event basis. However, the interest of TRCA is to target pre-development infiltration volumes on an annual basis. To address this concern a water budget was completed that identified a moisture surplus of 279mm/year whereas the total rainfall is 893mm/year. The water budget was completed using the Thornthwaite & Mather method with data from the Richmond Hill climate station (Reference no. 6157012). This station was found to be the closest reliable station to the study area, having precipitation records from 1971 to 2000 which meets the 'consecutive 30-year' World Meteorological Organization standards for establishing climate normals.

The pre-development infiltration volume, calculated in Appendix F, is quantified as 74,660m^3 per year based on:

- Moisture surplus of 279mm
- an area of 62.4ha with 17.8ha of existing development
- Infiltration factor of 0.6 based on the MOE manual method

Precipitation occurring for depths of up to 5mm represents 35% of total rainfall. If this volume of water was infiltrated in post-development conditions, a depth of 313mm (893mm * 0.35) would be achieved on an annual basis, exceeding the pre-development water surplus depth. A strategy to meet the pre-development infiltration target would need to be reasonable and feasible. The infiltration of up to 10mm is considered feasible for the OPA 620 site areas (i.e. block plan areas exclusive of the building footprints) and further discussion on this matter is provided in Appendix F.

Based on 85% imperviousness the post-development infiltration volume without additional measures would be 15,670m^3 leaving a deficit of 58,990m^3 (74,660-15,670). If the site area of 28.7ha (exclusive of roof areas) incorporated infiltration techniques such as infiltration trenches and porous pavements, a 5mm infiltration volume could be targeted. To quantify this benefit 35% of the total rainfall, or 313mm, is applied to the site area to arrive at an annual volume of approximately 89,830m^3.

The above demonstrates that 5mm of site infiltration would meet pre-development infiltration targets.

7.2.2 GUIDELINES FOR USE OF AUTHORITY LANDS FOR SWM FACILITIES

Through discussions with TRCA, it was noted that the use of Authority lands is subject to staff review following the MTRCA Staff Review Guidelines: Use of Authority Owned Lands for Stormwater Management Facilities, dated January 18 1993. A copy of the document is included in **Appendix G**.

*Further discussion that relates to a revised concept for a SWM facility within the TRCA valleylands is provided in **Appendix K.***

The spirit of the document recognizes that in order to meet watershed management objectives, in certain instances, SWM facilities may be considered permissible on Authority lands provided that the proposal complements other Authority objectives and achieves a greater conservation benefit. The use of the Authority lands, as presented in the various stormwater management strategies being considered, is in compliance with this principle as the concepts expand on existing valley land use for similar purposes (i.e. flood control) but will allow for supplemental provision of water quality and quantity control for a larger area, being OPA 620.

The Review Guidelines are organized into three phases, of which the first two will be addressed here:

- Phase I: Conceptual Level
- Phase II: Preliminary Design
- Phase III: Detailed Design, Maintenance and Monitoring

PHASE I

The purpose of Phase I is to determine if the proposed SWM facility and its proposed location on Authority land is reasonable, based on a review of fundamental Authority water and related land management objectives. The rationale for using the Authority lands was discussed with TRCA where staff indicated that the use of tablelands, particularly at the immediate northwest corner of Jane Street and Steeles Avenue, was not preferred. However, there was an opportunity for the potential expansion of the existing SWM facility in the valley which the Authority hoped that the Municipality could maintain in the future. In effect, the TRCA lands provide a unique opportunity to supplement the stormwater management strategy through strategy #1 or 2, or provide full stormwater management through strategy # 3 (i.e. 1-pond scenario) for OPA 620. It is recognized that strategy #3 involves the disturbance of the existing barn structure and an existing house on the TRCA lands whereas strategy #2 involves marginal intrusion into the valleyland and some beyond the valleyland.

PHASE II

The purpose of Phase II is to evaluate whether the specific proposal can meet Authority performance standards and criteria. In response to this matter the modelling results summarized in Section 6 and included in this report are provided to illustrate that unit rate targets will be met in compliance with watershed targets. Best Management Practices have been explored and quantified with respect to their potential benefits in Sections 4 & 5.

With respect to location, the strategy has provided three different alternatives in order to optimize facility performance and is not solely relying on or considering simply a SWM facility on Authority lands as a solution. The northeast corner of Jane Street and Steeles Avenue on the OPA 620 lands was not considered an optimal location for an equivalent SWM facility due to the planning intent for this area which is slated for redevelopment.

Slope stability along the east wall of the proposed expansion of the existing SWM facility would be addressed by maintaining a minimum 3:1 slope which would be considered geotechnically stable for the soil types through this area. This approach could be confirmed at the detailed design stage through a geotechnical investigation that would complement the SWM facility expansion design.

In terms of a compensation package the City would undertake long-term maintenance of the SWM facility in accordance with conventional SWM facility maintenance protocols followed by the City. The initial land cost involved for the expansion would be subject to negotiation between the City and TRCA but the SWM facility design would incorporate a rehabilitation plan for the facility including native and non-invasive species, as well as a restoration plan for the disturbed areas and construction zone.

The City would need to acknowledge and agree to monitor the effectiveness of the facility for a two-year period following its construction and would carry out and design modifications to improve facility performance that involve items such as control structure revisions or replacement of plantings. On this basis however substantial elements such as grading, forebay and facility footprint would be agreed upon at the design stage and would not be altered following construction.

The Phase II: Preliminary Design works will continue during the Municipal Class EA to be undertaken once this report has been submitted to the City. TRCA has noted that an archaeology investigation, a terrestrial natural heritage system study and a habitat impact assessment will need to be undertaken concurrently with the Municipal Class EA process.

7.3 STRATEGIES ELIMINATED FROM CONSIDERATION

Two approaches raised during the SWM strategy derivation strategies were not pursued.

ISOLATION OF ROAD DRAINAGE: Was considered as a possibility by providing a separate sewer for just the roads where a pervious pipe would be installed to provide water quality treatment through linear infiltration. As discussed in the BMP derivation in Section 4.2.1, the development style is not the most appropriate for such a technique as it is best coupled with appropriate pre-treatment. Catchbasin goss traps would need to be installed on every catchbasin and maintained on a regular basis by the City to ensure large particles that could clog the pervious pipes are not entering the system. The relative cost of the required maintenance associated with the catchbasin cleanout and pervious pipe was not considered beneficial relative to the overall stormwater management strategy.

ON-SITE STORAGE TO ACHIEVE VOLUMETRIC REQUIREMENTS: OPA 620 requires that site controls be employed such that maximum flows to the storm sewer do not exceed 250l/s/ha. To eliminate end-of-pipe facilities for quantity control would require on-site storage such that site releases do not exceed the unit rate requirements. In the case of OPA 620 this would mean site release rates could be in the order of ~15-25l/s/ha.

In this scenario a sample site of 1.7ha could require storage exceeding 800m^3. Such a storage requirement could only be achieved through very costly underground storage which may not necessarily fit into the restricted space on the block plans. Thus it is concluded that the requirement to meet TRCA unit flow rates is generally best served by communal facilities and that the imposition of this requirement to the site level would be too onerous.

8.0 COST APPROXIMATIONS, PREFERRED STRATEGY & IMPLEMENTATION

8.1 COST APPROXIMATIONS

Cost approximations have been derived based on the proposed servicing for the various stormwater management strategies and are included in **Appendix H**. A summary of the construction cost approximations, inclusive of 15% contingency, is provided in Table 8.1.1. These values have not accounted for any land costs that would be associated with the SWM facility on TRCA lands nor the facility on ORC lands within the hydro corridor. The third column of Table 8.1.1 outlines the corresponding approximate cost per developable hectare based on a developable area of 62.4ha. This cost would likely be considered by the City as a special area charge (SAC). These charges are inclusive of the required large-scale trunk infrastructure associated with each strategy.

TABLE 8.1.1: SUMMARY OF COST APPROXIMATIONS

SWM STRATEGY	APPROXIMATE COST ($ MILLION)	APPROXIMATE COST PER HA ($)
#F1: 3-POND SCENARIO	6.5	104,700
#F2: 2-POND SCENARIO	4.5	72,000
#F3: 1-POND SCENARIO	4.2	66,500

8.2 PREFERRED STRATEGY

Table 8.2.1 presents the three stormwater management strategies being considered in the context of criteria that would be pertinent to the affected parties. Each strategy is then rated as negative, neutral or positive in comparison to one another or the criteria.

DISCUSSION:

- The premise of the water quality results relates to the "Base Conditions" option. The adoption of green technologies would improve the water quality benefits through the implementation of source controls to meet TRCA's criteria for water balance.
- The minimal terrestrial impact caused by Strategy #1 is seen as neutral since a restoration plan for the SWM facility would likely offset the terrestrial loss expected.
- Land impacts are all ranked neutral as no costs have been associated with any of the required parcels to date.
- Strategy # 1 and #2 are tied with two positives and two negatives.
- The substantial cost advantage of Strategy #2 versus Strategy #1 leads this to be the preferred SWM strategy. In addition this strategy fits in much better with TRCA's strategy of not using their tableland for SWM facilities.

TABLE 8.2.1: SUMMARY OF IMPACTS ON THE ENVIRONMENT

EVALUATION	STORMWATER MANAGEMENT STRATEGY		
	#1: 3-POND SCENARIO	#2: 2-POND SCENARIO	#3: 1-POND SCENARIO
NATURAL ENVIRONMENT			
WATER QUALITY	Improvement to water quality meeting MOE's 'enhanced' level of treatment	Improvement to water quality meeting MOE's 'enhanced' level of treatment	Improvement to water quality meeting MOE's 'enhanced' level of treatment
WATER QUANTITY	Achieves unit rate targets in accordance with TRCA requirements	Achieves unit rate targets in accordance with TRCA requirements	Achieves unit rate targets in accordance with TRCA requirements
TERRESTRIAL	Minimal terrestrial impacts due to TRCA pond expansion only in valley	Some terrestrial impacts as TRCA pond will slightly encroach onto tablelands but can be compensated with restoration plan	Terrestrial impacts due to TRCA pond expansion onto tablelands. Compensation with restoration plan would be challenging.
LAND IMPACTS	Land required from ORC, within parking lot and minimally in TRCA lands.	Land required from ORC, and in TRCA lands.	Substantial land required from TRCA.
SOCIAL ENVIRONMENT			
ECONOMIC	Construction cost approximated at $6.5-M (exclusive of related land costs)	Construction cost approximated at $4.5-M (exclusive of related land costs)	Construction cost approximated at $4.2-M (exclusive of related land costs)
SOCIAL	Negligible social impact	Negligible social impact	Removal of heritage barn structure and demolition of existing house not favourable to TRCA

Colour key:
Negative
Neutral
Positive

8.3 IMPLEMENTATION

The preferred strategy incorporates the use of two end-of-pipe SWM facilities, each of which captures and treats approximately half of the development lands. Thus the implied construction procedure will involve two major construction activities that are, the construction of the west SWM facility on TRCA lands and the construction of the east pond on ORC lands. It is important to note that this construction could commence at any time but would necessitate that the trunk sewer upstream of the City's SWM facility be disconnected and routed to the ultimate servicing alignment into the Black Creek Valley. This has been factored into the cost approximation. The construction procedure would involve the construction of the Black Creek SWM facility expansion and associated infrastructure as well as the construction of the east SWM facility and associated infrastructure. Each of the two facilities, with its associated infrastructure, can be constructed independently of one another.

8.3.1 SERVICING REQUIREMENTS

Drawing SWM-101 in **Appendix I** outlines the proposed servicing scheme for the preferred strategy including required downstream improvements from the location where the existing trunk sewer outlets into the City's SWM facility. These downstream improvements take advantage of the existing trunk sewer for most of its length. **Figure 10** shows the general drainage area boundaries associated with each SWM facility.

8.3.2 BUDGETING

While the cost approximation for the preferred strategy is $4,494,200 (2007 CDN), to facilitate budget implementation for the City, the construction cost estimate has been extrapolated into 5, 10-year and 15-year potential build-out horizons and translated in terms of 2007 (CDN) dollars. The costs are based on the construction of each SWM facility and associated infrastructure occurring at different times within each horizon and factors in a 3.9% construction cost increase for each year away from 2007. Based on the cost approximation the costs for the Black Creek "B" SWM facility and East SWM facility inclusive of associated infrastructure and 15% contingency are $2.4-M and $2.1-M respectively. Each horizon is shown below with the corresponding assumptions and rationale for each. A summary of the net present value for each horizon is included in Table 8.3.1.

<u>5-YEAR HORIZON</u> (2007-2012)

- Construct Black Creek 'B' SWM facility in 2007 in preparation for imminent OPA 620 construction
- Construct East SWM facility in 2012 in anticipation of OPA 620 build-out

<u>10-YEAR HORIZON</u> (2007-2017)

- Construct Black Creek 'B' SWM facility in 2009 once full engineering, by-laws & zoning are completed
- Construct East SWM facility in 2014 in anticipation of OPA 620 build-out

<u>15-YEAR HORIZON</u> (2007-2022)

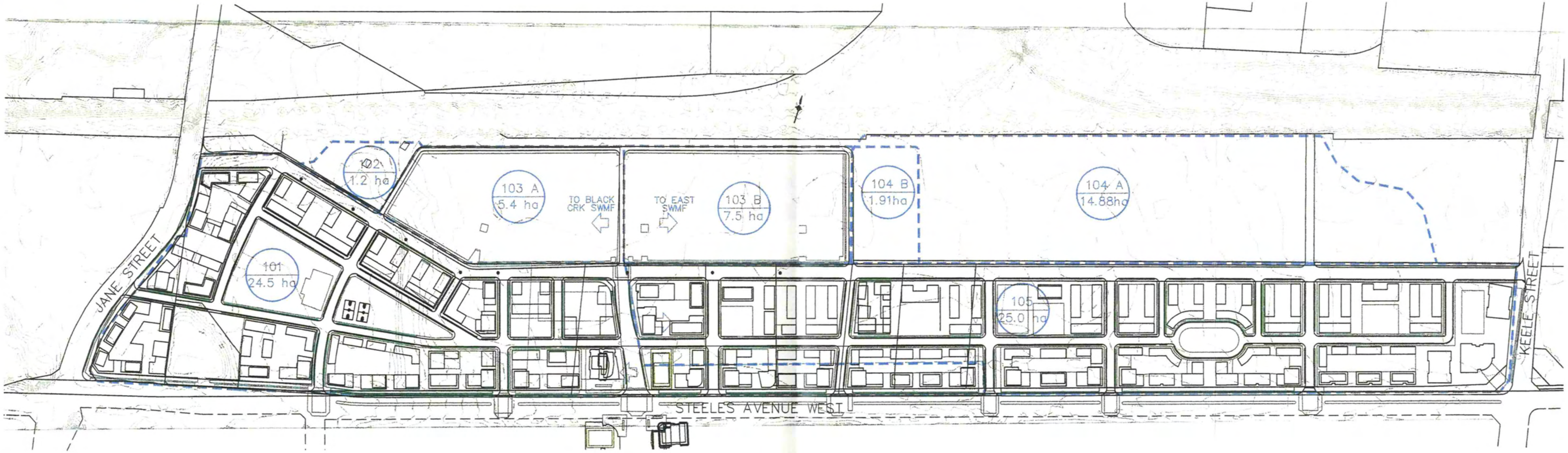
- Construct Black Creek 'B' SWM facility in 2009 once full engineering, by-laws & zoning are completed
- Construct East SWM facility in 2017 to accommodate OPA 620 build-out

TABLE 8.3.1: PREFERRED STRATEGY EXTRAPOLATED COSTS

BUILD-OUT HORIZON	2007 PRESENT VALUE ($ MILLION)
5-YEAR (2007-2012)	4.9
10-YEAR (2007-2017)	5.3
15-YEAR (2007-2022)	5.7

8.3.3 TRCA

Based on preliminary discussions with TRCA it is noted that they would require assurance that the east pond would remain in perpetuity. Thus assurances would need to be provided by the Region of York, TTC, ORC and Hydro that the SWM facility does not compromise any long-term plans.



Legend

▬ ▬ DRAINAGE BOUNDARY

101 —AREA I.D.
0.9 ha —AREA (HECTARES)

⇦ FLOW DIRECTION

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PREFERRED STRATEGY
DRAINAGE AREAS

OPA 620

SCALE N.T.S.	PROJECT No.	FIGURE No. 10
DATE: AUG 2009	06452	
DRAWN BY : S.Y.		

9.0 CONCLUSIONS

- The City of Vaughan is pursuing a Master Stormwater Management Strategy that would accommodate the development of the Steeles Avenue Corridor - Jane to Keele Street on a holistic basis. Once this Preliminary Master Stormwater Management Strategy Report has been submitted to the City a Municipal Class EA will be undertaken to finalize the strategy.

- Three stormwater management strategies were considered to address the water quality and quantity targets for the study area.

- The preferred strategy is a 2-pond approach that will include a SWM facility on ORC lands and an expansion of the existing SWM facility within TRCA lands that will involve marginal encroachment onto tableland while not affecting any existing structures.

- The final determination for the extent of implementation of green technologies will be arrived at following the Municipal Class EA process. At this time it is recommended that the following on-site water quality and water balance criteria be established in the Master Stormwater Management Strategy; capture/re-use/infiltration of 15mm of rainfall from 50% of the total developments roof areas and capture/infiltration of 7.5mm of rainfall for the remaining site area. These criteria will allow for specific green technologies to be required at the detailed design phase of development.

Respectfully submitted,

SERNAS ASSOCIATES

Ken Chow, P.Eng.
Principal, Manager – Water Resources

Muneef Ahmad, P. Eng.
Associate, Water Resources Engineer

APPENDIX A
“NEEDS AND JUSTIFICATION”

5.7 TRANSPORTATION IMPROVEMENTS

5.7.1 General

a) Full implementation of this Plan requires the following improvements to the transportation system:

i. Region of York:
   - construction of the road widenings for Keele Street and Jane Street
   - construction of a transit station and dedicated bus rapid transit lanes connecting north to the Highway 7 corridor
   - construction of the subway station and connection to the Vaughan Corporate Centre and Highway 7 Rapid Transit corridor.

ii. City of Toronto:
   - construction of dedicated bus rapid transit lanes connecting south to the Spadina subway line
   - construction of the subway connection from Downsview Station on the Spadina Subway Line to the vicinity of Steeles Avenue
   - streetscaping improvements to Steeles Avenue including the centre median

iii. City of Vaughan:
   - construction of the north-south road connection to Snidercroft Road
   - construction of the easterly extension of the east-west primary road east of Keele Street and south to Steeles Avenue.

iv. Region of York/City of Vaughan:
   - Securing and construction of the continuous east-west primary road connecting from Keele Street to Jane Street

v. City of Vaughan/City of Toronto/York University
   - the alignment of the north-south local roads with driveways, roads or pedestrian connections on the south side of Steeles Avenue.

b) It is the policy of Council to assist the Region of York and City of Toronto in protecting and obtaining lands required for the rights-of-way and for the widening of roads for the provision of public transit services through the development approval process.

c) Where lands have been identified as required for the construction of the local and primary road network, and where such lands are the subject of a development application, it is the policy of Council to require the dedication of such lands before permitting the development of the site. Alternatively, lands may be provided in accordance with policies in Section 5.3.1.h).

d) From time to time, at the discretion of Council, lands for planned road or transit improvements may be directly purchased or expropriated by the City, in order to foster the planned and orderly development of the Corridor. It is Council's intention that the funds for such acquisition of land and for the construction of planned road or transit improvements be provided to the greatest extent practical through a charge against development in the Secondary Plan and/or the City and/or the Region under the provisions of the Development Charges Act, or by other means available to the City.

e) To enable the development of the Secondary Plan to proceed as expeditiously as possible, it is Council's intention that the planned transportation improvements be reflected in the capital works forecasts and any Development Charges By-law, in such a fashion as to permit development without delay. As such, the City will urge other levels of government to proceed likewise in circumstances where the jurisdiction for a transportation network improvement is not with the City. The specific need and timing for these improvements will be determined based on the monitoring program set out in Section 8.8. of this Plan.

6.0 ENVIRONMENTAL AND SERVICING POLICIES

6.1 ENERGY AND THE ENVIRONMENT

a) Development shall recognize the significance of the Black Creek valley system to the health of the local and regional environment. Impacts on the valley system and the larger Black Creek watershed shall be managed following best practices in sustainability.

Impacts from development in the Amendment Area on downstream water quality shall be positive or neutral.

b) The use of permeable materials for parking areas is encouraged.

c) The design of rooftops and parking areas should minimize the heat island effect, through rooftop gardens, green roofs and the planting of shade trees between parking aisles.

d) Streetscaping shall include irrigation systems for street trees where appropriate and feasible.

e) The City shall support and encourage the development of district energy, heating and cooling systems.

f) Solar power shall be considered for street lighting.

g) The City may require that development applications include a Sustainability Plan. Sustainability Plans shall consider the following techniques to reduce stormwater runoff, improve water quality and conserve energy:
   - rain barrels or cisterns to capture rainwater for reuse in landscape irrigation and other non-potable water applications;
   - vegetated swales to filter and detain stormwater;
   - porous surfaces for pathways, patios and parking lots to allow infiltration of stormwater;
   - greywater systems that capture stormwater runoff and other greywater for reuse in toilets and industrial operations;
   - the use of renewable energy sources for building systems and exterior lighting, such as solar, wind and geothermal;
   - cogeneration, i.e., capturing and using heat from power generation;
   - green roofs;
   - other techniques encouraged by the policies of this Plan, and which may be identified by City staff.

6.2 WATER, WASTEWATER AND STORMWATER MANAGEMENT SERVICES

a) Development within the Amendment Area shall be on the basis of the full forecasts of development within this Secondary Plan and on the basis of full urban water, wastewater and stormwater management facilities.

b) A comprehensive approach to address the servicing requirements of the Amendment Area is needed. As these requirements must be addressed prior to consideration of development approvals, completion of the necessary studies is a priority. The City will undertake a study to comprehensively address the Amendment Area's storm water management requirements. A Master Environmental Servicing Strategy outlining preliminary functional water distribution, wastewater collection and stormwater management facilities, including designs and costs, will be prepared by the City in consultation with the Region, TRCA or, alternatively, by proponents to the satisfaction of the City, the Region and the TRCA as a condition of approval of development applications. The MESP should include a comprehensive storm water management strategy identifying the development-related storage requirements and storage locations, including innovative, sustainable water management practices (e.g., 'green roof' storage, underground storage).

c) Development may be phased to coincide with the availability of all the necessary services being available for development, subject to the Phasing Policies of this Plan.

d) Stormwater management practices shall be designed and implemented to the satisfaction of the City and the Toronto and Region Conservation Authority, based on overall stormwater management criteria for Steeles Avenue within this corridor. The overall Master Servicing Strategy should include a comprehensive stormwater management strategy that sets out criteria for the entire area.

e) The integration of stormwater management and water recycling facilities in the design of buildings, open spaces and parking areas is encouraged. Where public stormwater management facilities, in addition to those identified on Schedule C, are required, they shall be designed as publicly-accesible, park-like open spaces.

f) Development shall provide for the management of stormwater runoff, and the promotion of water quality treatment on a comprehensive watershed basis. On-site storage of stormwater (e.g. parking lots and rooftop controls) will also be considered as an option for the treatment of stormwater.

g) New infrastructure or improvements to existing infrastructure, including roads, sanitary and storm sewers, stormwater management facilities, municipal water and electricity for extension or enlargement of the existing use, especially where public health and welfare are directly affected.

8.0 IMPLEMENTATION

8.1 GENERAL

a) This Secondary Plan shall be implemented using some or all of the following:

   i. the approval of individual draft plans of subdivision/condominium submitted pursuant to Section 51 of the Planning Act, and part lot control exemptions pursuant to Section 50 of the Planning Act;
   ii. the enactment of zoning by-laws pursuant to Section 34 of the Planning Act;
   iii. the use of bonusing provisions under Section 37 of the Planning Act;
   iv. the registration of site development agreements pursuant to Section 41 of the Planning Act;
   v. the use of the holding zone provisions of the Planning Act in accordance with Amendment No. 200 to the Vaughan Official Plan;
   vi. the dedication of parkland or cash-in-lieu of parkland in accordance with the provisions of the Planning Act; and
   vii. the execution of collateral development agreements designed to achieve municipal objectives related to development and the provision of services.

b) A Steeles Corridor Coordinating Committee, including staff from the City of Vaughan, the City of Toronto and York Region, York University Development Corporation, Black Creek Pioneer Village, Hydro One, CN Railway Properties, UPS, TRCA and the various transit providers will be established to oversee and facilitate the coordinated implementation of the plans north and south of Steeles Avenue and address, on an ongoing basis, specific issues related to road and pedestrian connections, land use and built form compatibility, transit facilities, community services, noise and streetscaping.

c) The initiation and completion of an Environmental Assessment for the proposed east-west road adjacent to, and potentially within, the Hydro Corridor is a critical early step in implementing this Plan. Upon approval of this Plan, the City will initiate the EA in cooperation with Ontario Realty Corporation, the Region of York and the transit providers.

8.2 DEVELOPMENT CONCEPT REPORT AND PHASING PLAN

a) To provide a context for coordinated development, and to demonstrate conformity with the policies of this Plan, each development application, in particular those applications intended to develop over a number of phases, shall include a Development Concept Report, providing a detailed description of the proposed development, and the manner in which it addresses the policies of this Plan. The Development Concept Report will form part of the plan of subdivision application and address the following matters:

   i. phasing of development, from initial construction to ultimate completion, as envisioned by this Plan and as required by Section 8.2 f);
   ii. achievement of the transit-supportive and pedestrian-oriented uses;
   iii. how the development has regard for the land use and design policies of the York University Secondary Plan that are applicable to the Steeles Avenue corridor;
   iv. height and massing of buildings;
   v. views from Black Creek Pioneer Village (where applicable);
   vi. distribution of land uses, lot sizes and densities;
   vii. relationship between streets and buildings, including how the proposed development and subsequent phases address the policies in this Plan respecting build-to lines;
   viii. how the street-related commercial uses are being provided in the current phase of the application in accordance with the phasing policies of this plan;
   ix. integration of development with transit services;
   x. pedestrian and vehicular circulation networks;
   xi. parks and open space system;
   xii. location, dimensions and character of publicly accessible private open spaces and pedestrian routes, showing their continuity and complementary relationship to adjacent public spaces, pedestrian routes and streets;
   xiii. general location, size and treatment of surface parking facilities and vehicular access points, including the potential for shared parking, parking ramps and loading facilities;
   xiv. location, size and design of stormwater management facilities;

- xv. identification and design of streetscape and pedestrian route improvements for the entire property including the area from the building face to the curb, with respect to the provision of street trees (including a double row on Steeles Ave), signage, street furniture, landscaping, street and pedestrian scale, and lighting;
- xvi. location of street-related uses and principal pedestrian building entrances to street frontages, and how the role of the public street and pedestrian movement along the street are supported;
- xvii. micro-climatic conditions, modifications or enhancements; and
- xviii. protection and enhancement of significant views and landscape focal points;
- xix. energy conservation and other proposed sustainability features of the development.

b) In evaluating development applications throughout the Secondary Plan Area, the City shall consider:

- i. the support the proposed use provides to the operation of the local, regional and inter-regional transit network in both the short and long term;
- ii. the availability of water and sewer services and related Regional Allocation Capacity;
- iii. the suitability of the proposed stormwater management facilities;
- iv. that all interested utility and telecommunication providers confirm if services can be provided to support the proposed development; and shall determine appropriate locations for large utility equipment or utility cluster sites to the satisfaction of the City;
- v. the degree of compatibility with adjacent approved land use designations in proximity to the proposed use;
- vi. the compatibility of the proposal with the urban design policies and principles described in this Plan and the zoning bylaw.
- vii. the proposed parking areas and access points; and,
- viii. the traffic impacts on adjacent existing and/or approved land uses, including the York University campus, and the short and long -term impact of the proposed use on the operation of the regional and local road network.

c) Prior to the approval of any development application, the City may require the preparation of any or all of the following studies:

- i. traffic and transit impact study, including traffic demand management initiatives;
- ii. storm water management plan;
- iii. master servicing study;
- iv. development concept report and phasing plan;
- v. open space and streetscape master plan;
- vi. community services needs assessment and delivery strategy;
- vii. Noise Impact Analysis Report and/or Vibration Impact Analysis Report; and,
- viii. archaeological survey of the lands.

The City shall establish specific requirements for studies addressing the foregoing concerns with development proponents. The costs associated with the conduct of these studies shall be the responsibility of the landowners and be shared equitably among benefiting landowners on a pro-rata basis.

d) Within each block of the Secondary Plan, development applications should co-ordinate neighbouring development proposals in a mutually complementary fashion. Non-participating lands in the block shall be shown conceptually in the Development Concept Report and Phasing Plan.

e) Development shall be phased to provide for the orderly development of the Corridor and Amendment Area, and to ensure the most efficient and economical use of existing and proposed infrastructure. The following phasing criteria shall be considered in the review of all development applications:

- i. the development contributes to, or can be appropriately integrated within the logical sequence of construction of all required sewer, water, stormwater and transportation facilities;
- ii. the development satisfies all requirements regarding the provision of parkland and other public facilities including streetscaping and landscaping;
- iii. traffic from the proposed development can be accommodated on the existing and planned road network, and,

iv. phasing may be addressed through the appropriate use of the policies of this Plan respecting the application of the holding zone provisions of the zoning by-law .

f) As a component of the Development Concept Report, development applications shall provide a Phasing Plan, which:

i. describes and illustrates how existing and proposed development can be incorporated into the site to achieve the full development potential of the site;
ii. considers existing neighbouring uses and the potential need to buffer or stage particular uses;
iii. identifies the public infrastructure and facilities required to serve the development, including water, sewer, stormwater management, roads, transit, parks and open spaces, and other community facilities and services, and their proposed phased construction; and
iv. describes the expected financial requirements for such public infrastructure, and the appropriate financial contributions from benefiting landowners.

g) Phases are to be based upon the existence of, or commitment to construct, the following infrastructure elements:

i. Components of the local road network, including the continuous east-west primary road;
ii. bus-rapid transit;
iii. the subway; and,
iv. public and community services.

8.3 ZONING BYLAW

a) To implement all new development in the Steeles Corridor – Jane to Keele- Plan, Council may enact amendments to By-law 1-88 providing zoning categories and standards specific to this Plan.

b) The City may, when enacting implementing zoning by-laws, apply a holding zone with the suffix 'H' and specify the future uses of these lands that, at the present time, are considered premature or inappropriate for development for any one or more of the following reasons:

i. the Development Concept Report, submitted in support of a development application has not been finalized to the City's satisfaction;
ii. community services and facilities such as sanitary sewers, stormwater management facilities, water supply, parks, recreation facilities and schools are insufficient to serve the proposed development;
iii. transportation facilities are inadequate or inappropriate based on planned road capacities and anticipated traffic, or planned transit capacities and anticipated ridership;
iv. the number and location of access points to the site are inadequate to function safely and efficiently;
v. where development relies upon other matters occurring first, such as the consolidation of land ownership or completion of a development agreement, to ensure the orderly development of the project, and/or to secure funding and/or to equitably cost-share among benefiting landowners, for sewer, water, stormwater, roads, parks, community services and facilities, or outstanding application processing fees;
vi. a site plan agreement is required;
vii. supporting studies are required on matters related to traffic, soils, stormwater management, protection of any site features, environmental constraints or design features.

8.4 SUBDIVISION CONTROL

a) Subdivision Control encompasses draft plans of subdivision/condominium, consents and part lot control exemptions.

b) To secure the related infrastructure improvements required, all new development in the Secondary Plan area shall, as part of its initial development application process, proceed by way of the subdivision approval process that includes the full extent of property ownership, and includes a Development Concept Report and Phasing Plan. Plans of subdivision/condominium shall only be draft approved which:

i. conform with the policies and designations of this Secondary Plan;
ii. can be provided with adequate services and facilities as required by the policies of this Plan; and,

APPENDIX B
OPA 620 IMPERVIOUSNESS

SUMMARY OF IMPERVIOUSNESS ESTIMATION

A reasonable estimation of an imperviousness value associated with a development can be undertaken through the analysis of a detailed development plan. In this manner an overall imperviousness value is arrived at through composite weighting of the various elements in a development plan. At this stage, the OPA 620 layout will undergo further refinement through the establishment of by-laws and the submission of detailed block plans. For the estimation of an impervious value upon which to complete the stormwater management analysis, the following assumptions were used:

DEVELOPMENT AREA BREAKDOWN & ASSOCIATED IMPERVIOUS VALUES

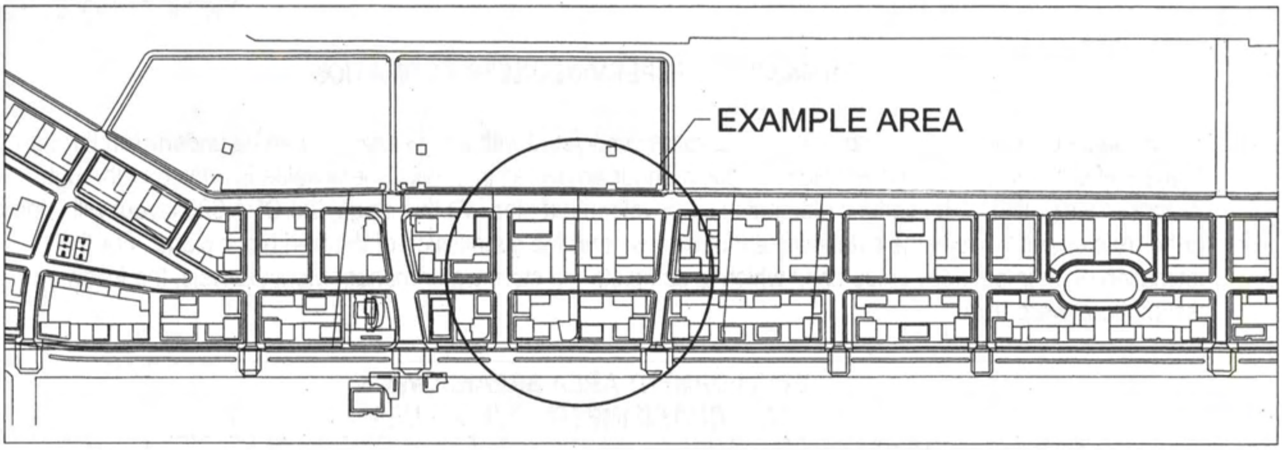
AREA DESCRIPTION	RELATIVE AREA (%)	IMPERVIOUSNESS (%)
OPEN SPACE	10	10
ROADS	20	85
BLOCK AREAS	70	80
TOTAL:	100	

NOTES:

- 'Relative area' percentages are based on a review of the OPA 620 concept
- Open space refers to defined open space parcels laid out in the OPA 620 fabric
- Road area imperviousness is based on the right-of-way concepts provided in the OPA620 document as shown in this Appendix
- Block area imperviousness is the value applied to the majority of the development lands and was considered in two ways. A sample parcel was reviewed and determined to represent an imperviousness ranging from 60-70%. The second approach considered some elements laid out in Section 4.0 – 'Urban Design Policies' of the OPA 620 relating to:
    - 3m minimum build-to-lines along the boundaries
    - Maximum building depths of 50m
    - Pedestrian paths and courtyards incorporated to the block areas

  A sample block was laid out taking into account the above factors. The result is a concept that would likely incorporate underground parking rather than surface parking. Although the specific sample may not be reflective of the final building fabric it provides a range of impervious values that can be expected. The second approach yielded an imperviousness of 70-80%.

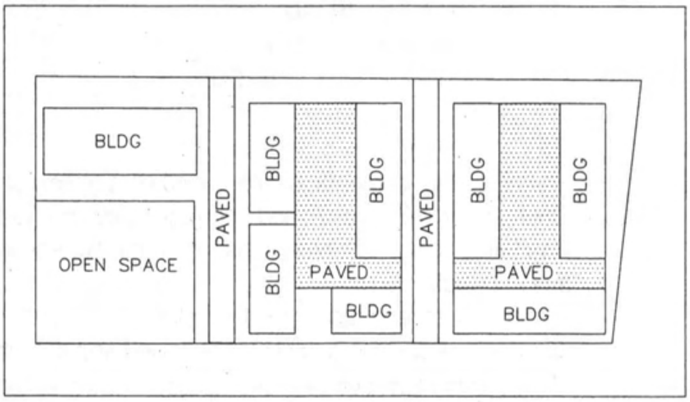
Based on the above, the composite imperviousness for the OPA 620 lands approaches 80%. A value of 85% was used in the modeling to be conservative.



LOT AREA
16,990m^2

HARD SURFACE AREA
10,610m^2

APPROX. IMPERVIOUSNESS
60-70%

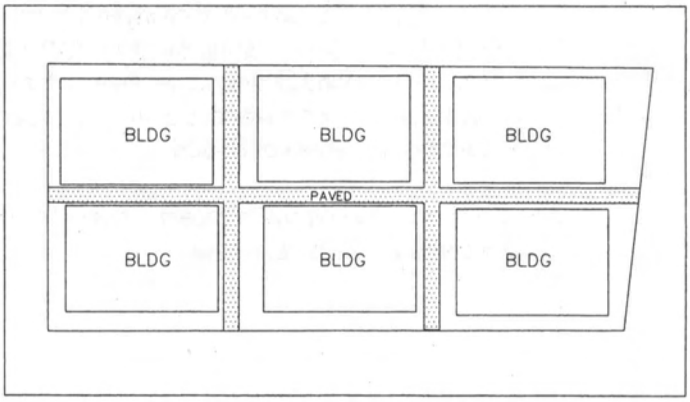


OPA 620 SAMPLE BLOCK PLAN

LOT AREA
16,990m^2

HARD SURFACE AREA
12,080m^2

APPROX. IMPERVIOUSNESS
70-80%



POTENTIAL ALTERNATE BLOCK CONFIGURATION
(BASED ON SELECTED "URBAN DESIGN POLICIES")

P:\SWM\06452 - OPA 620\Drawings\FIG-TIMP.dwg, Apr 27, 2007 - 2:22pm

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OPA 620
BLOCK IMPERVIOUSNESS

PROJECT No.	DRAWING No.
06452	FIG TIMP

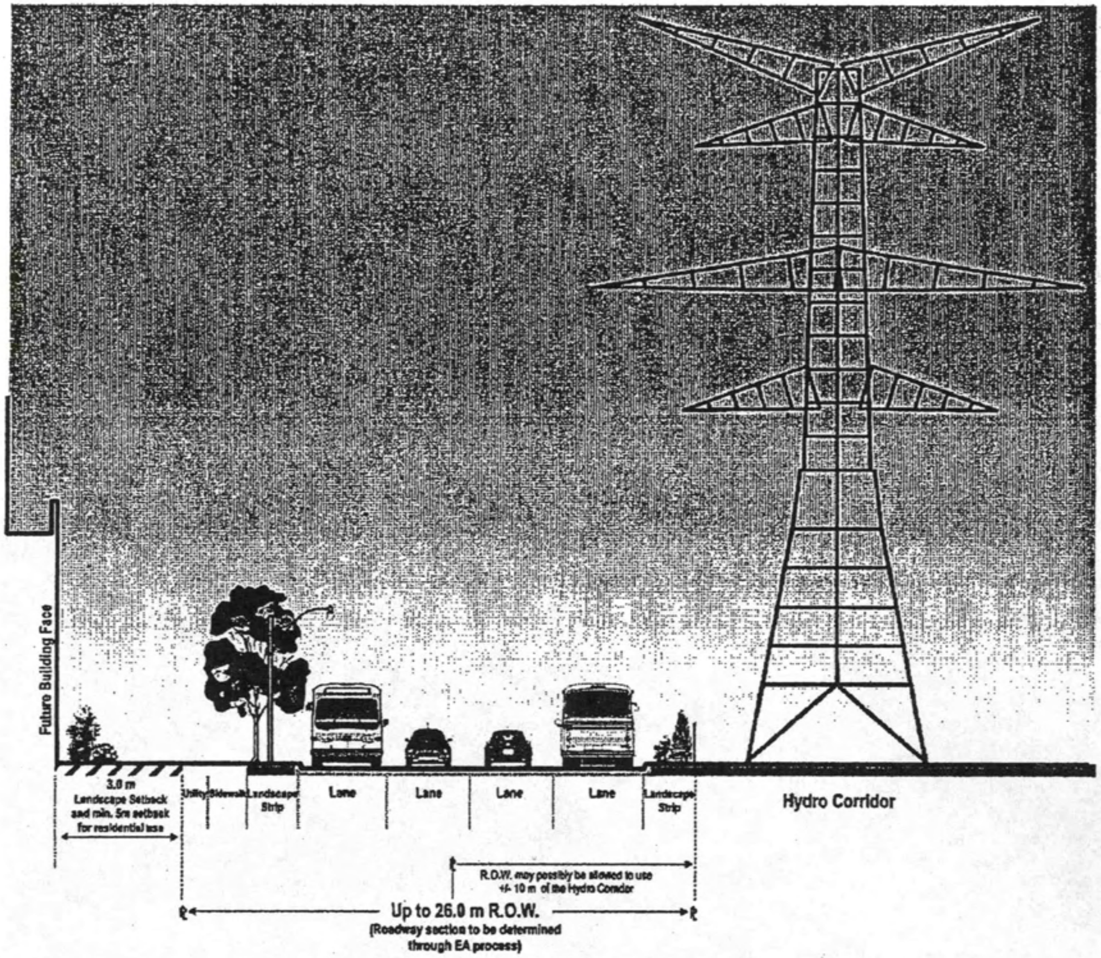


FIGURE 2 – EAST-WEST PRIMARY ROAD AND STREETSCAPE (preferred option using Hydro corridor)

TIMP=85%

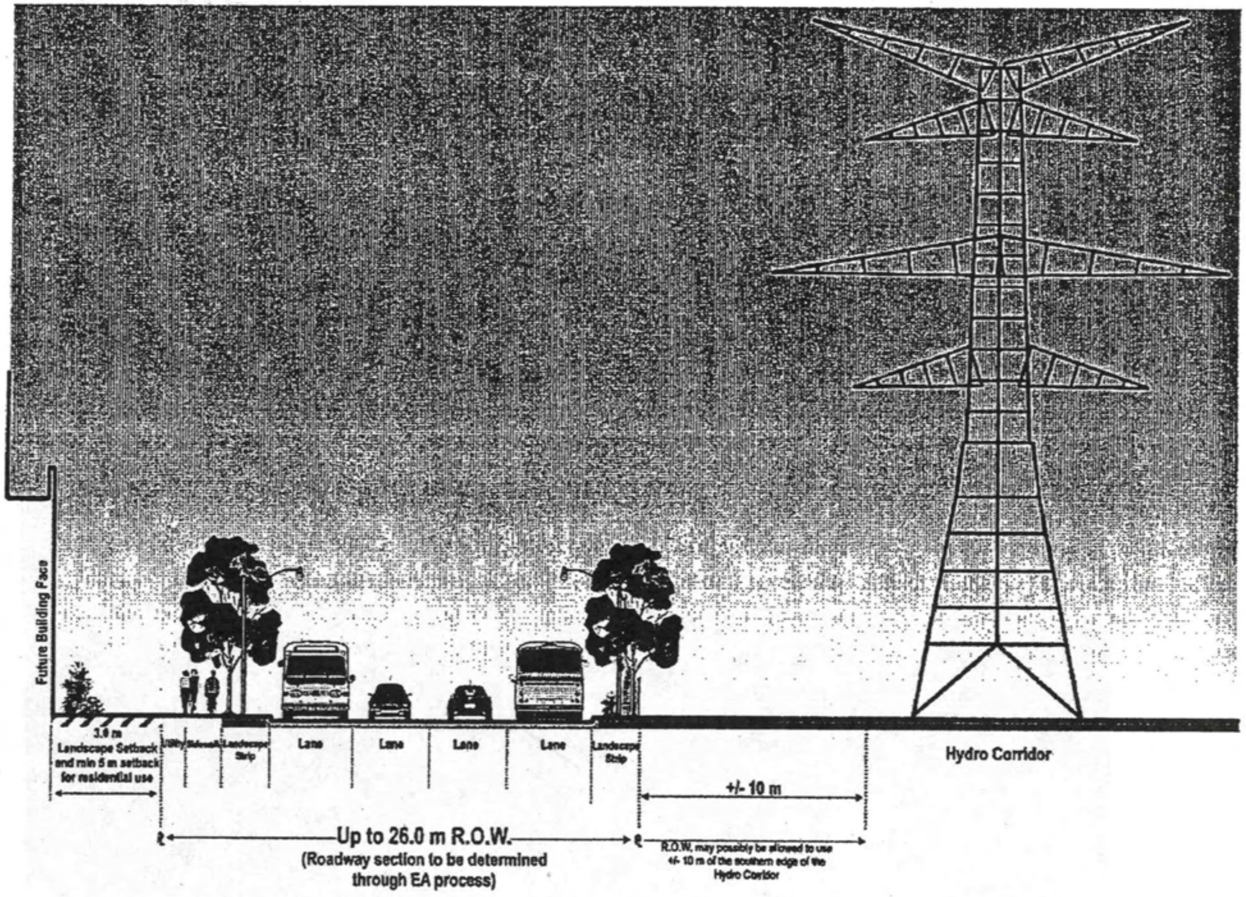


FIGURE 3 – EAST-WEST PRIMARY ROAD AND STREETSCAPE (not using the Hydro corridor)

TIME = 85%

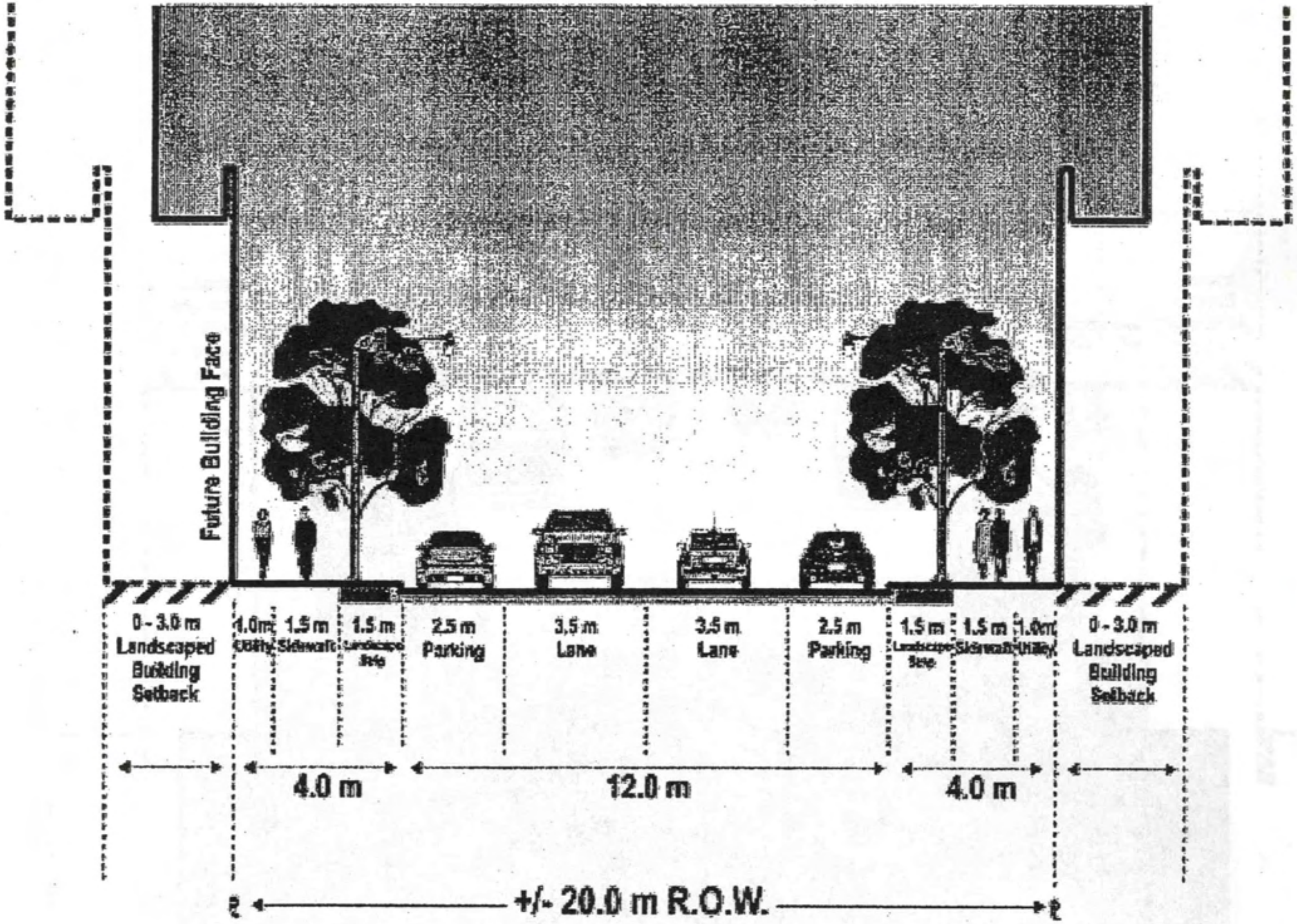


FIGURE 4 – LOCAL ROAD AND STREETSCAPE (without transit)

TIME=85%

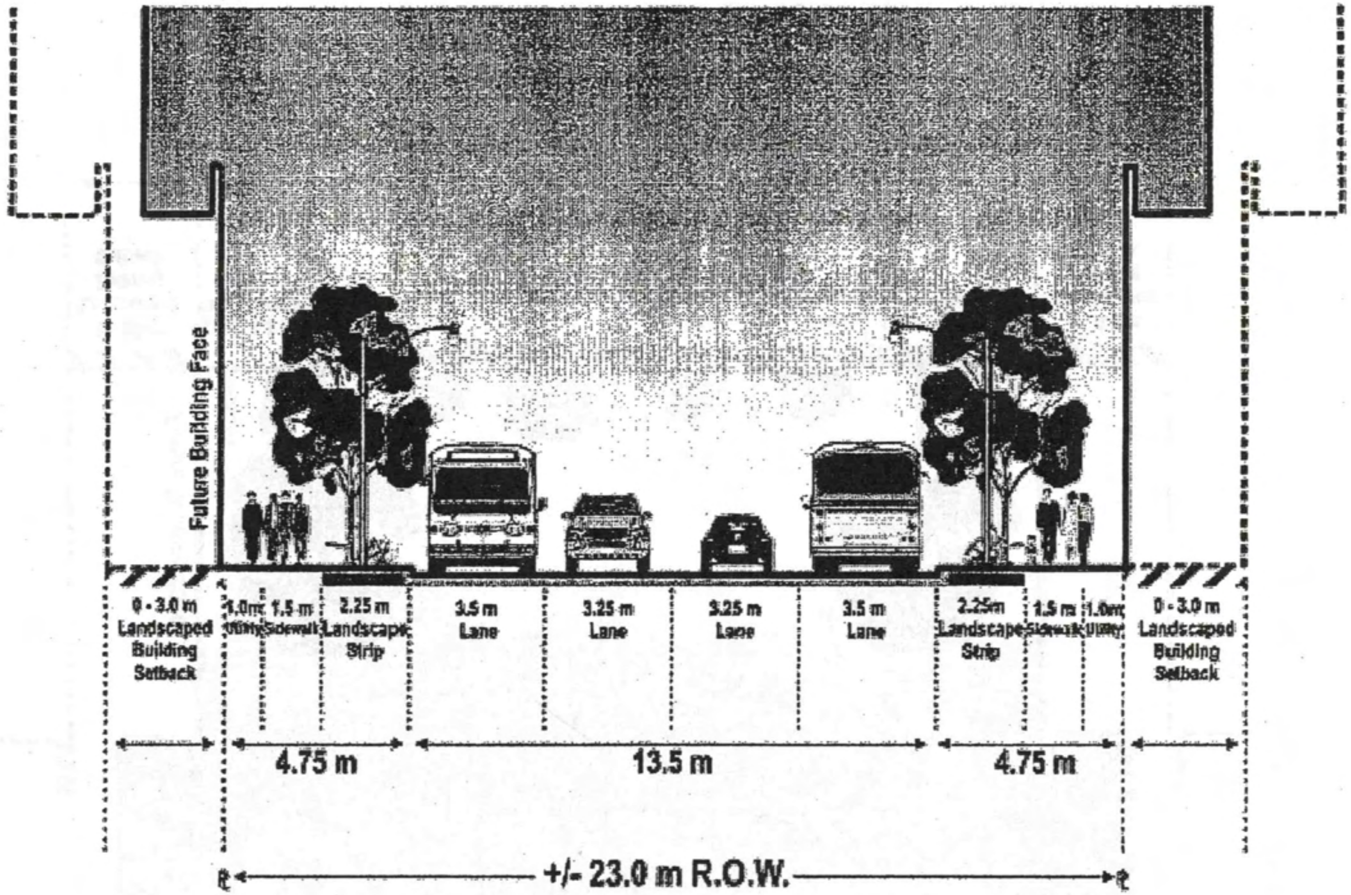
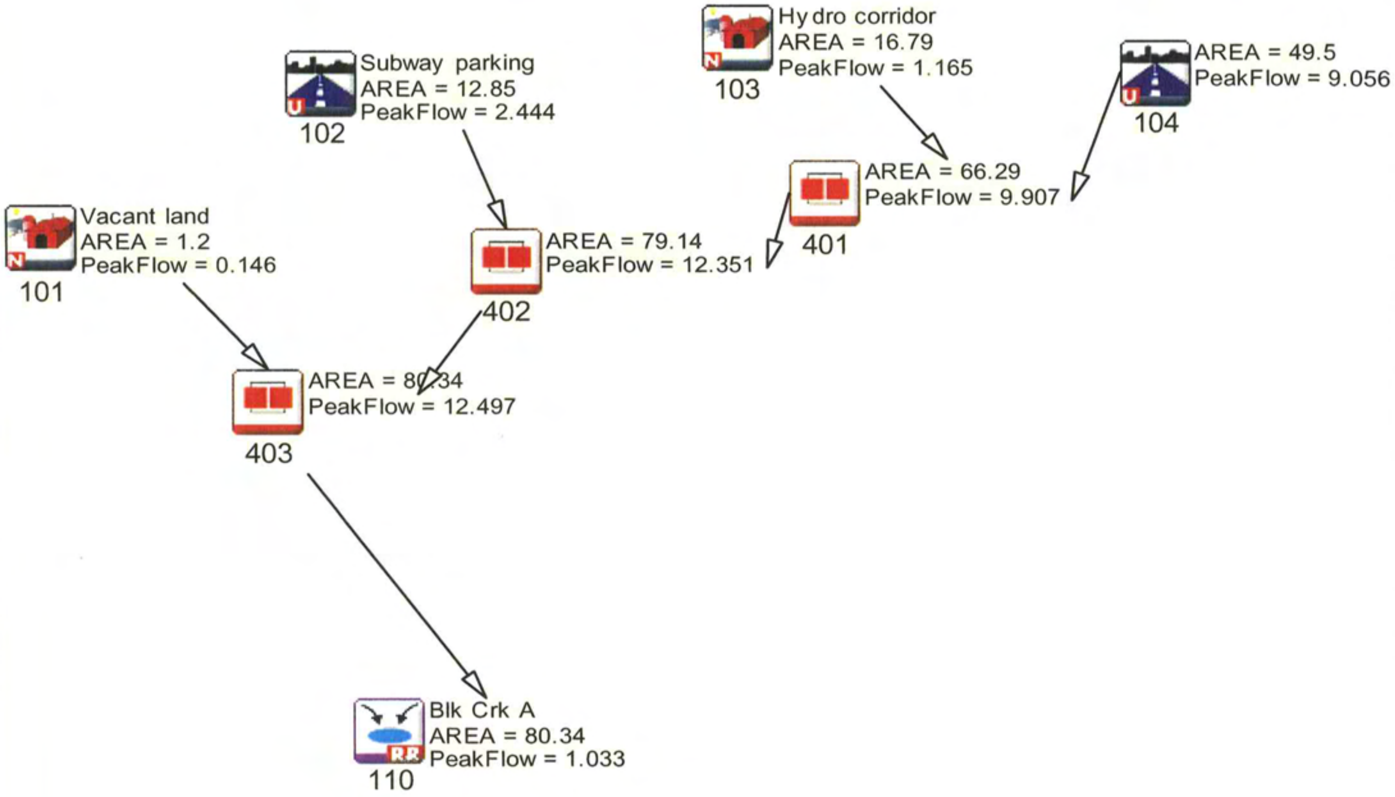


FIGURE 5 – LOCAL ROAD AND STREETSCAPE (with transit)

TIMP=80%

APPENDIX C
HYDROLOGIC ANALYSIS – BASE CONDITIONS



V02 MODEL SCHEMATIC - BASE CONDITIONS (1-SWMF)

MAY 2007

SERNAS ASSOCIATES

Project No. **06452**

HYD-BASE

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=====================================================================================================

      V    V   I    SSSSS  U   U    A    L
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM, Version 2.0
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O    Licensed To: The Sernas Group Inc.
       OOO     T      T    H   H    Y    M   M   OOO                  VO2-0074

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                ***** D E T A I L E D   O U T P U T *****


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  Output  filename: D:\VO2-Apr07\Post 6hr AES OPTION 1-1-UR.out
  Summary filename: D:\VO2-Apr07\Post 6hr AES OPTION 1-1-UR.sum


DATE: 5/1/2007                              TIME: 2:13:15 PM

USER:


COMMENTS: _______________________________________________________


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  ******************************
  ** SIMULATION NUMBER:    6 **
  ******************************


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 |                 |               gn\Hydrologic model\06452-OPA620\100Y6.STM
 | Ptotal= 80.31 mm |    Comments: 100yr/6hr
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                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                  .25      .00 |  2.00    27.30 |  3.75    11.24 |  5.50     1.61
                  .50     1.61 |  2.25    27.30 |  4.00     6.42 |  5.75     1.61
                  .75     1.61 |  2.50    73.88 |  4.25     6.42 |  6.00     1.61
                 1.00     1.61 |  2.75    73.88 |  4.50     3.21 |  6.25     1.61
                 1.25     1.61 |  3.00    20.88 |  4.75     3.21 |
                 1.50     9.64 |  3.25    20.88 |  5.00     1.61 |
                 1.75     9.64 |  3.50    11.24 |  5.25     1.61 |

--------------------------------------------------------------------------------


 -------------------
 | CALIB            |
 | NASHYD    (0101) |    Area    (ha)=   1.20   Curve Number   (CN)= 78.0
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 -------------------     U.H. Tp(hrs)=    .10

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                  .083      .00 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                  .167      .00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                  .250      .00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                  .333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                  .417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                  .500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                  .583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                  .667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                  .750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                  .833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                  .917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                 1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                 1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                 1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                 1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                 1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
```

```
                1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=    .458

     PEAK FLOW       (cms)=    .146 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  37.592
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =    .468

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0104)   |   Area     (ha)=  49.50
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     42.08        7.42
     Dep. Storage      (mm)=      2.00        5.00
     Average Slope      (%)=      1.00        2.00
     Length             (m)=    574.50       40.00
     Mannings n            =      .015        .250

     Max.Eff.Inten.(mm/hr)=     73.88       46.34
                over (min)      10.00       15.00
     Storage Coeff.  (min)=      8.97 (ii)   12.95 (ii)
     Unit Hyd. Tpeak (min)=     10.00       15.00
     Unit Hyd. peak  (cms)=       .12         .08
                                                         *TOTALS*
     PEAK FLOW       (cms)=      8.35         .73          9.056 (iii)
     TIME TO PEAK    (hrs)=      2.75        2.83           2.75
     RUNOFF VOLUME    (mm)=     78.31       38.60          72.35
     TOTAL RAINFALL   (mm)=     80.31       80.31          80.31
     RUNOFF COEFFICIENT   =       .98         .48            .90


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  78.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (0103)   |   Area     (ha)=  16.79   Curve Number    (CN)= 78.0
|ID= 1 DT= 5.0 min   |   Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=     .44

     Unit Hyd Qpeak  (cms)=   1.448

     PEAK FLOW       (cms)=   1.165 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  38.592
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =    .481

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD   (0401)   |
|   1 +  2 =  3      |               AREA    QPEAK     TPEAK      R.V.
--------------------                (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (0104):      49.50   9.056     2.75     72.35
        + ID2= 2 (0103):      16.79   1.165     3.08     38.59
          ===================================================
          ID = 3 (0401):      66.29   9.907     2.75     63.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0102)   |   Area     (ha)=  12.85
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     10.92        1.93
     Dep. Storage      (mm)=      2.00        5.00
     Average Slope      (%)=      1.00        2.00
     Length             (m)=    292.70       40.00
```

```
     Max.Eff.Inten.(mm/hr)=       73.88          46.34
               over (min)          5.00          10.00
     Storage Coeff.  (min)=        5.99 (ii)      9.97 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=         .19            .11
                                                               *TOTALS*
     PEAK FLOW       (cms)=        2.23            .21           2.444 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75            2.75
     RUNOFF VOLUME    (mm)=       78.31          38.60           72.35
     TOTAL RAINFALL   (mm)=       80.31          80.31           80.31
     RUNOFF COEFFICIENT    =        .98            .48             .90


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  78.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

-------------------
| ADD HYD   (0402) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0401):      66.29    9.907      2.75     63.80
       + ID2= 2 (0102):      12.85    2.444      2.75     72.35
         ==================================================
         ID = 3 (0402):      79.14   12.351      2.75     65.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------

-------------------
| ADD HYD   (0403) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0101):       1.20     .146      2.75     37.59
       + ID2= 2 (0402):      79.14   12.351      2.75     65.19
         ==================================================
         ID = 3 (0403):      80.34   12.497      2.75     64.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
-------------------
| RESERVOIR (0110) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE  |  OUTFLOW     STORAGE
-------------------        (cms)      (ha.m.)  |   (cms)      (ha.m.)
                           .0000       .0000   |    .8010      3.4000
                           .3540      1.7500   |    .9250      3.8400
                           .5260      2.4000   |   1.0510      4.3000
                           .6420      2.8600   |    .0000       .0000

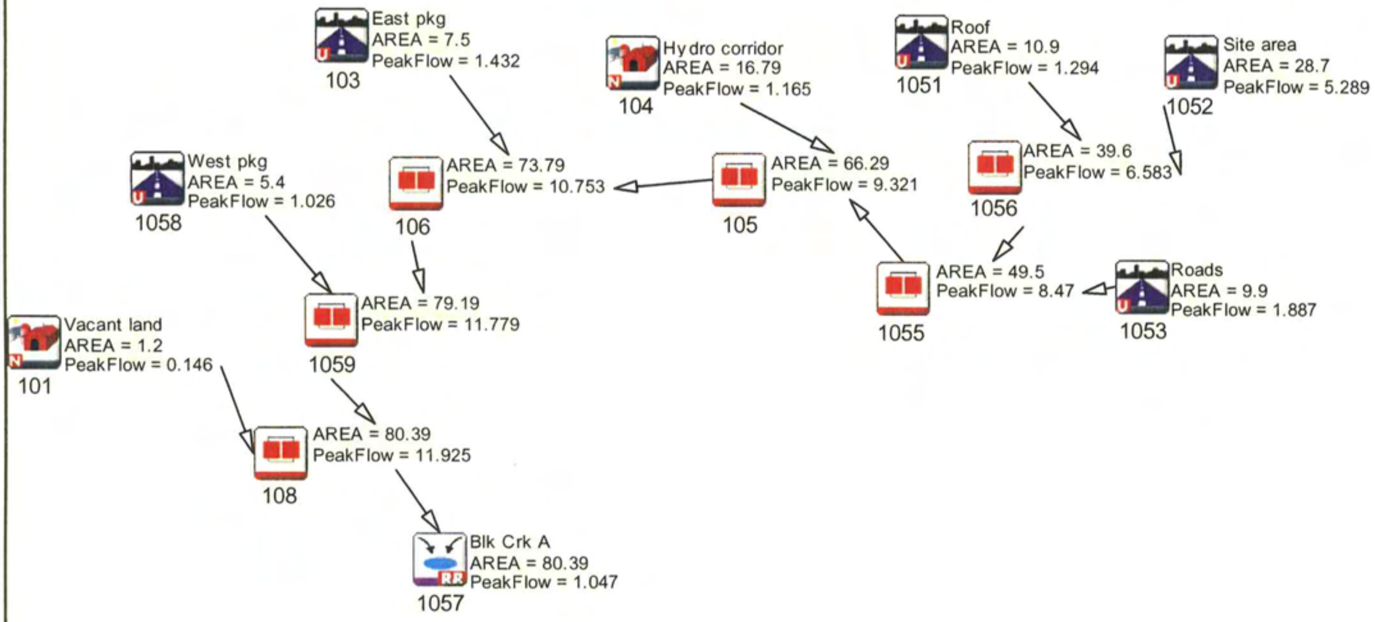
                                 AREA      QPEAK       TPEAK        R.V.
                                 (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0403)      80.34      12.50        2.75       64.78
     OUTFLOW: ID= 1 (0110)      80.34       1.03        4.50       64.76

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.26
                  TIME SHIFT OF PEAK FLOW        (min)=105.00
                  MAXIMUM  STORAGE   USED       (ha.m.)= 4.2341

------------------------------------------------------------------------------

 FINISH
============================================================================================================
```

APPENDIX D
HYDROLOGIC ANALYSIS – GREEN ROOFS / GREYWATER RE-USE (GRG)



V02 MODEL SCHEMATIC - GRG+SOURCE CONTROLS (1-SWMF)

MAY 2007

SERNAS ASSOCIATES

Project No. **06452**

HYD-GRG&SRC

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===============================================================================================

      V    V   I    SSSSS  U   U    A    L
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O   Licensed To: The Sernas Group Inc.
       OOO     T      T    H   H    Y    M   M   OOO                 VO2-0074

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                ***** D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
  Output  filename: D:\VO2-Apr07\Post 6hr AES OPTION 2-1-UR.out
  Summary filename: D:\VO2-Apr07\Post 6hr AES OPTION 2-1-UR.sum


DATE: 5/1/2007                              TIME: 2:19:19 PM

USER:


COMMENTS: ____________________________________________________


-----------------------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   6 **
  ****************************


 -------------------
 |    READ STORM    |    Filename: W:\Proj\2006\06452-OPA620 MSS\Desi
 |                  |              gn\Hydrologic model\06452-OPA620\100Y6.STM
 | Ptotal= 80.31 mm |    Comments: 100yr/6hr
 -------------------
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .25     .00 |  2.00   27.30 |  3.75   11.24 |  5.50    1.61
                   .50    1.61 |  2.25   27.30 |  4.00    6.42 |  5.75    1.61
                   .75    1.61 |  2.50   73.88 |  4.25    6.42 |  6.00    1.61
                  1.00    1.61 |  2.75   73.88 |  4.50    3.21 |  6.25    1.61
                  1.25    1.61 |  3.00   20.88 |  4.75    3.21 |
                  1.50    9.64 |  3.25   20.88 |  5.00    1.61 |
                  1.75    9.64 |  3.50   11.24 |  5.25    1.61 |

-------------------------------------------------------------------------


 -------------------
 | CALIB            |
 | STANDHYD  (0103) |   Area     (ha)=  12.85
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
 -------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=     10.92         1.93
     Dep. Storage    (mm)=      2.00         5.00
     Average Slope    (%)=      1.00         2.00
     Length           (m)=    292.70        40.00
     Mannings n          =      .015         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .083     .00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                  .167     .00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                  .250     .00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                  .333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                  .417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                  .500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                  .583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                  .667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                  .750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                  .833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
```
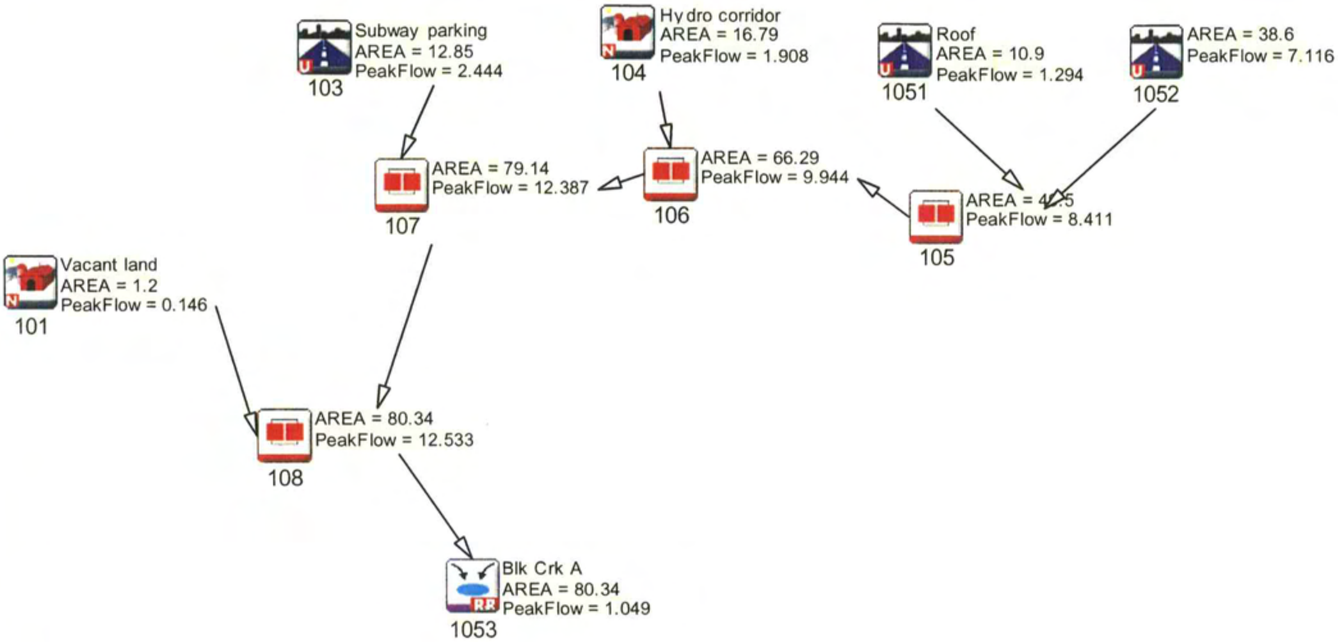

```
               1.000     1.61 | 2.583   73.88 | 4.167     6.42 |  5.75    1.61
               1.083     1.61 | 2.667   73.88 | 4.250     6.42 |  5.83    1.61
               1.167     1.61 | 2.750   73.88 | 4.333     3.21 |  5.92    1.61
               1.250     1.61 | 2.833   20.88 | 4.417     3.21 |  6.00    1.61
               1.333     9.64 | 2.917   20.88 | 4.500     3.21 |  6.08    1.61
               1.417     9.64 | 3.000   20.88 | 4.583     3.21 |  6.17    1.61
               1.500     9.64 | 3.083   20.88 | 4.667     3.21 |  6.25    1.61
               1.583     9.64 | 3.167   20.88 | 4.750     3.21 |

    Max.Eff.Inten.(mm/hr)=       73.88          56.39
               over (min)         5.00          10.00
    Storage Coeff.  (min)=        5.99 (ii)      9.97 (ii)
    Unit Hyd. Tpeak (min)=        5.00          10.00
    Unit Hyd. peak  (cms)=         .19            .11
                                                              *TOTALS*
    PEAK FLOW       (cms)=        2.23            .21           2.444 (iii)
    TIME TO PEAK    (hrs)=        2.75           2.75            2.75
    RUNOFF VOLUME    (mm)=       78.31          38.60           72.35
    TOTAL RAINFALL   (mm)=       80.31          80.31           80.31
    RUNOFF COEFFICIENT   =         .98            .48             .90

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  78.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (1052)   |    Area     (ha)=  38.60
|ID= 1 DT= 5.0 min   |    Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      32.81          5.79
    Dep. Storage      (mm)=       2.00          5.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     507.30         40.00
    Mannings n            =       .015          .250

    Max.Eff.Inten.(mm/hr)=       73.88          46.34
               over (min)        10.00          15.00
    Storage Coeff.  (min)=        8.32 (ii)     12.31 (ii)
    Unit Hyd. Tpeak (min)=       10.00          15.00
    Unit Hyd. peak  (cms)=         .13            .09
                                                              *TOTALS*
    PEAK FLOW       (cms)=        6.56            .58           7.116 (iii)
    TIME TO PEAK    (hrs)=        2.75           2.83            2.75
    RUNOFF VOLUME    (mm)=       78.31          38.60           72.35
    TOTAL RAINFALL   (mm)=       80.31          80.31           80.31
    RUNOFF COEFFICIENT   =         .98            .48             .90

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  78.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (1051)   |    Area     (ha)=  10.90
|ID= 1 DT= 5.0 min   |    Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       5.45          5.45
    Dep. Storage      (mm)=      25.00         25.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     269.60         40.00
    Mannings n            =       .015          .250

    Max.Eff.Inten.(mm/hr)=       73.88          30.94
               over (min)         5.00          20.00
    Storage Coeff.  (min)=        5.70 (ii)     16.98 (ii)
    Unit Hyd. Tpeak (min)=        5.00          20.00
    Unit Hyd. peak  (cms)=         .20            .06
                                                              *TOTALS*
    PEAK FLOW       (cms)=        1.11            .28           1.294 (iii)
    TIME TO PEAK    (hrs)=        2.75           3.00            2.75
    RUNOFF VOLUME    (mm)=       55.31          24.10           39.70
    TOTAL RAINFALL   (mm)=       80.31          80.31           80.31
    RUNOFF COEFFICIENT   =         .69            .30             .49
```

```
          CN*  =  78.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD    (0105) |
|   1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
-------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (1052):       38.60    7.116      2.75     72.35
         + ID2= 2 (1051):       10.90    1.294      2.75     39.70
           ==================================================
           ID = 3 (0105):       49.50    8.411      2.75     65.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD     (0104) |    Area      (ha)=  16.79   Curve Number    (CN)= 93.0
|ID= 1 DT= 5.0 min  |    Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------      U.H. Tp(hrs)=     .44

     Unit Hyd Qpeak  (cms)=    1.448

     PEAK FLOW       (cms)=    1.908 (i)
     TIME TO PEAK    (hrs)=    3.000
     RUNOFF VOLUME    (mm)=   60.058
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .748

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD    (0106) |
|   1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
-------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0105):       49.50    8.411      2.75     65.16
         + ID2= 2 (0104):       16.79    1.908      3.00     60.06
           ==================================================
           ID = 3 (0106):       66.29    9.944      2.75     63.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD    (0107) |
|   1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
-------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0103):       12.85    2.444      2.75     72.35
         + ID2= 2 (0106):       66.29    9.944      2.75     63.87
           ==================================================
           ID = 3 (0107):       79.14   12.387      2.75     65.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD     (0101) |    Area      (ha)=   1.20   Curve Number    (CN)= 78.0
|ID= 1 DT= 5.0 min  |    Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------      U.H. Tp(hrs)=     .10

     Unit Hyd Qpeak  (cms)=     .458

     PEAK FLOW       (cms)=     .146 (i)
     TIME TO PEAK    (hrs)=    2.750
     RUNOFF VOLUME    (mm)=   37.592
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .468

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD    (0108) |
|   1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
-------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0107):       79.14   12.387      2.75     65.25
         + ID2= 2 (0101):        1.20     .146      2.75     37.59
```

```
      ID = 3 (0108):    80.34  12.533     2.75    64.83

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (1053) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |    .8010     3.4000
                            .3540     1.6200   |    .9250     3.8000
                            .5260     2.3000   |   1.0510     4.2300
                            .6420     2.7600   |    .0000      .0000

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
    INFLOW : ID= 2 (0108)       80.34     12.53       2.75       64.83
    OUTFLOW: ID= 1 (1053)       80.34      1.05       4.50       64.82

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.37
                  TIME SHIFT OF PEAK FLOW        (min)=105.00
                  MAXIMUM  STORAGE   USED       (ha.m.)= 4.2226

-------------------------------------------------------------------------------

 FINISH
===========================================================================================================
```

APPENDIX E
HYDROLOGIC ANALYSIS – GRG + SOURCE CONTROLS



V02 MODEL SCHEMATIC - GREEN ROOFS / GREYWATER (1-SWMF)

MAY 2007

SERNAS ASSOCIATES

Project No. **06452**

HYD-GRG

```
============================================================================================================

     V    V   I   SSSSS  U   U   A    L
     V    V   I   SS     U   U  A A   L
      V  V    I    SS    U   U AAAAA  L
      V  V    I     SS   U   U A   A  L
       VV     I   SSSSS  UUUUU A   A  LLLLL

      OOO   TTTTT TTTTT H   H Y   Y M   M  OOO    TM, Version 2.0
     O   O    T     T   H   H  Y Y  MM MM O   O
     O   O    T     T   H   H   Y   M   M O   O   Licensed To: The Sernas Group Inc.
      OOO     T     T   H   H   Y   M   M  OOO                 VO2-0074

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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
  Output  filename: D:\VO2-Apr07\Post 6hr AES OPTION 3-1-UR.out
  Summary filename: D:\VO2-Apr07\Post 6hr AES OPTION 3-1-UR.sum


DATE: 5/1/2007                           TIME: 2:14:03 PM

USER:


COMMENTS: ____________________________________________________________


------------------------------------------------------------------------------------------------------------
  ******************************
  ** SIMULATION NUMBER:    6 **
  ******************************


--------------------
|    READ STORM     |     Filename: W:\Proj\2006\06452-OPA620 MSS\Desi
|                   |               gn\Hydrologic model\06452-OPA620\100Y6.STM
| Ptotal= 80.31 mm  |     Comments: 100yr/6hr
--------------------
                   TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                    .25     .00 |  2.00   27.30 |  3.75   11.24 |  5.50    1.61
                    .50    1.61 |  2.25   27.30 |  4.00    6.42 |  5.75    1.61
                    .75    1.61 |  2.50   73.88 |  4.25    6.42 |  6.00    1.61
                   1.00    1.61 |  2.75   73.88 |  4.50    3.21 |  6.25    1.61
                   1.25    1.61 |  3.00   20.88 |  4.75    3.21 |
                   1.50    9.64 |  3.25   20.88 |  5.00    1.61 |
                   1.75    9.64 |  3.50   11.24 |  5.25    1.61 |

-------------------------------------------------------------------------------


--------------------
| CALIB             |
| STANDHYD  (0103)  |    Area    (ha)=    7.50
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      6.38          1.12
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    223.60         40.00
     Mannings n            =      .015          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .083     .00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                   .167     .00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                   .250     .00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                   .333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                   .417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                   .500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                   .583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                   .667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                   .750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                   .833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
```

```
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          46.34
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        5.09 (ii)      9.07 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=         .21            .12
                                                              *TOTALS*
     PEAK FLOW       (cms)=        1.31            .13          1.432 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75           2.75
     RUNOFF VOLUME    (mm)=       78.31          38.60          72.35
     TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT   =         .98            .48            .90

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  78.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (1052)   |   Area    (ha)=  28.70
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       24.40           4.30
     Dep. Storage     (mm)=       10.00          10.00
     Average Slope     (%)=        1.00           2.00
     Length            (m)=      437.40          40.00
     Mannings n           =        .015           .250

     Max.Eff.Inten.(mm/hr)=       73.88          43.83
                over (min)        10.00          15.00
     Storage Coeff.  (min)=        7.62 (ii)     11.60 (ii)
     Unit Hyd. Tpeak (min)=       10.00          15.00
     Unit Hyd. peak  (cms)=         .13            .09
                                                              *TOTALS*
     PEAK FLOW       (cms)=        4.91            .40          5.289 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.83           2.75
     RUNOFF VOLUME    (mm)=       70.31          34.83          64.99
     TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT   =         .88            .43            .81

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  78.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (1051)   |   Area    (ha)=  10.90
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        5.45           5.45
     Dep. Storage     (mm)=       25.00          25.00
     Average Slope     (%)=        1.00           2.00
     Length            (m)=      269.60          40.00
     Mannings n           =        .015           .250

     Max.Eff.Inten.(mm/hr)=       73.88          30.94
                over (min)         5.00          20.00
     Storage Coeff.  (min)=        5.70 (ii)     16.98 (ii)
     Unit Hyd. Tpeak (min)=        5.00          20.00
     Unit Hyd. peak  (cms)=         .20            .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=        1.11            .28          1.294 (iii)
     TIME TO PEAK    (hrs)=        2.75           3.00           2.75
     RUNOFF VOLUME    (mm)=       55.31          24.10          39.70
     TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT   =         .69            .30            .49
```

```
          CN*  =  78.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD   (1056) |
|  1 +  2 =  3     |            AREA    QPEAK     TPEAK     R.V.
-------------------             (ha)    (cms)     (hrs)     (mm)
         ID1= 1 (1052):        28.70   5.289      2.75     64.99
       + ID2= 2 (1051):        10.90   1.294      2.75     39.70
         ====================================================
         ID = 3 (1056):        39.60   6.583      2.75     58.03

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (1053)  |   Area    (ha)=    9.90
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area       (ha)=       8.41         1.48
    Dep. Storage       (mm)=       2.00         5.00
    Average Slope       (%)=       1.00         2.00
    Length              (m)=     256.90        40.00
    Mannings n            =        .015         .250

    Max.Eff.Inten.(mm/hr)=        73.88        56.39
               over (min)          5.00        10.00
    Storage Coeff.   (min)=        5.53 (ii)    9.51 (ii)
    Unit Hyd. Tpeak  (min)=        5.00        10.00
    Unit Hyd. peak   (cms)=         .20          .12
                                                             *TOTALS*
    PEAK FLOW        (cms)=        1.72          .16           1.887 (iii)
    TIME TO PEAK     (hrs)=        2.75         2.75            2.75
    RUNOFF VOLUME     (mm)=       78.31        38.60           72.35
    TOTAL RAINFALL    (mm)=       80.31        80.31           80.31
    RUNOFF COEFFICIENT    =         .98          .48             .90

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  78.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD   (1055) |
|  1 +  2 =  3     |            AREA    QPEAK     TPEAK     R.V.
-------------------             (ha)    (cms)     (hrs)     (mm)
         ID1= 1 (1056):        39.60   6.583      2.75     58.03
       + ID2= 2 (1053):         9.90   1.887      2.75     72.35
         ====================================================
         ID = 3 (1055):        49.50   8.470      2.75     60.89

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (0104)  |   Area     (ha)=   16.79   Curve Number    (CN)= 78.0
|ID= 1 DT= 5.0 min  |   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
-------------------     U.H. Tp(hrs)=      .44

    Unit Hyd Qpeak  (cms)=    1.448

    PEAK FLOW       (cms)=    1.165 (i)
    TIME TO PEAK    (hrs)=    3.083
    RUNOFF VOLUME    (mm)=   38.592
    TOTAL RAINFALL   (mm)=   80.310
    RUNOFF COEFFICIENT   =     .481

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD   (0105) |
|  1 +  2 =  3     |            AREA    QPEAK     TPEAK     R.V.
-------------------             (ha)    (cms)     (hrs)     (mm)
```

```
        + ID2= 2 (0104):    16.79   1.165     3.08    38.59
          ==================================================
          ID = 3 (0105):    66.29   9.321     2.75    55.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (0106) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0103):     7.50   1.432     2.75    72.35
        + ID2= 2 (0105):    66.29   9.321     2.75    55.24
          ==================================================
          ID = 3 (0106):    73.79  10.753     2.75    56.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (1058) |   Area     (ha)=    5.40
|ID= 1 DT= 5.0 min |   Total Imp(%)=  85.00   Dir. Conn.(%)=  85.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        4.59          .81
     Dep. Storage     (mm)=       10.00        10.00
     Average Slope     (%)=        1.00         2.00
     Length            (m)=      189.70        40.00
     Mannings n           =        .015         .250

     Max.Eff.Inten.(mm/hr)=       73.88        43.83
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        4.61 (ii)    8.59 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=         .22          .12
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .94          .08          1.026 (iii)
     TIME TO PEAK    (hrs)=        2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=       70.31        34.83          64.99
     TOTAL RAINFALL   (mm)=       80.31        80.31          80.31
     RUNOFF COEFFICIENT   =         .88          .43            .81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  78.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (1059) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0106):    73.79  10.753     2.75    56.98
        + ID2= 2 (1058):     5.40   1.026     2.75    64.99
          ==================================================
          ID = 3 (1059):    79.19  11.779     2.75    57.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0101) |   Area      (ha)=   1.20   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .10

     Unit Hyd Qpeak  (cms)=     .458

     PEAK FLOW       (cms)=     .146 (i)
     TIME TO PEAK    (hrs)=    2.750
     RUNOFF VOLUME    (mm)=   37.592
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =     .468

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD   (0108) |
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```
-------------------         (ha)     (cms)      (hrs)      (mm)
         ID1= 1 (1059):     79.19  11.779       2.75     57.53
       + ID2= 2 (0101):      1.20    .146       2.75     37.59
         ================================================
         ID = 3 (0108):     80.39  11.925       2.75     57.23

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| RESERVOIR (1057) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |         OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
-------------------           (cms)      (ha.m.)    |   (cms)      (ha.m.)
                              .0000       .0000     |    .8010      2.8700
                              .3540      1.2600     |    .9250      3.2700
                              .5260      1.9000     |   1.0510      3.6500
                              .6420      2.3100     |    .0000       .0000

                                   AREA      QPEAK       TPEAK        R.V.
                                   (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0108)        80.39      11.92        2.75       57.23
     OUTFLOW: ID= 1 (1057)        80.39       1.05        4.42       57.22

                   PEAK    FLOW    REDUCTION [Qout/Qin](%)=   8.78
                   TIME SHIFT OF PEAK FLOW          (min)=100.00
                   MAXIMUM  STORAGE   USED        (ha.m.)= 3.6391

-------------------------------------------------------------------------------

 FINISH
===============================================================================================================
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APPENDIX F
INFILTRATION ASSESSMENT

Climatic Water Budget: 1971-2000
OPA620

MONTH	Total Precipitation (mm)	Mean Temperature (°C)	Heat Index	Daylight Correction Factor	Evapo-transpir. (mm)	Surplus (mm)	Deficit (mm)
January	63.6	-6.7	0.0	0.76	0.0	63.6	0.0
February	53.9	-5.6	0.0	0.88	0.0	53.9	0.0
March	66.1	-0.5	0.0	0.99	0.0	66.1	0.0
April	70.9	6.5	1.5	1.11	32.2	38.7	0.0
May	77.9	13.4	4.4	1.21	80.8	0.0	2.9
June	82.9	18.2	7.0	1.27	115.3	0.0	32.4
July	83.9	21.0	8.7	1.25	137.4	0.0	53.5
August	90.4	20.0	8.0	1.16	120.8	0.0	30.4
September	81.5	15.4	5.4	1.04	78.4	3.1	0.0
October	68.6	8.9	2.4	0.93	39.5	29.1	0.0
November	78.5	2.8	0.4	0.82	9.4	69.1	0.0
December	74.3	-3.4	0.0	0.76	0.0	74.3	0.0
TOTALS (mm)	**892.5**		**38.0**		**613.7**	**397.9**	**119.1**
	613.7						
Moisture Surplus	**278.8**	**mm**					

Notes:

1) Water budget based on Thornthwaite & Mather method (1957).
2) Data from the Richmond Hill Climatological Station located at latitude 43 °52'N, longitude 79°27'W.
3) Heat Index from "Serra Simplification"; 0.09*(mean temp)^3/2
4) Daylight correction is standard for each month (daylight hours/12)
5) Water surplus is calculated as total precipitation minus adjusted evapotranspiration.

***Runoff surplus calculated applies to impervious surfaces only**
***Runoff surplus for months of September to April equal to "surplus"**
***Runoff surplus for May to August is 50% of total precipitation**
***50% of Total P is considered conservative as 80-90% runoff is expected from impervious surfaces**

Post-to-Pre Comparison: Infiltration Volumes

	Site Area(ha)=	62.4	Water Surplus(mm)=		279	
	Imperviousness	Imp. Area	Recharge Area	Infil Factor	Infil Vol	Infil diff
PRE	0	17.8	44.6	0.6	74660.4	-
POST	0.85	53.04	9.36	0.6	15668.64	(58992)
POST-CPTR	0.85	53.04	9.36	0.6	89651.6	14991

Notes:

1) Water Surplus is estimated as 0.279 m/year.

2) Infiltration factor from MOE (2003) Table 3.1 for flat land, medium soil, cultivated land = 0.6

3) "Post-CPTR" scenario represents the incorporation of site areas for infiltration
Based on total area x corresponding annual runoff. e.g. 5mm = 35% of annual rainfall

FEASIBILITY OF INFILTRATION – CONCEPTUAL

In an effort to balance groundwater recharge, the incorporation of infiltration measures at the site level may be implemented. This refers to techniques such as infiltration trenches or porous pavements. This section shall briefly discuss the feasibility of infiltrating 5-10mm of rainfall on the site areas. A sample block area of 16990m² from the central OPA 620 area is considered. The table below provides site statistics and corresponding infiltration volumes.

SAMPLE BLOCK PLAN AREAS & INFILTRATION VOLUMES				
AREA DESCRIPTION	RELATIVE AREA (%)	APPROX. AREA (m²)	5mm INFILTRATION VOLUME (m³)	10mm INFILTRATION VOLUME (m³)
BUILDING	30-35	5,100	n/a	n/a
PAVED	50-55	8,495	42	85
PERVIOUS	15-20	3,395	17	34
TOTAL:	100	16,990	59	119

The provision of an infiltration trench with a 1m x 1m x 1m volume would provide approximately 0.3m³ of storage per square metre of trench based on a porosity of 0.3. Porous pavement with a 150mm-depth of storage medium below the granular bedding would provide approximately 0.05m³ of storage per square metre on the same basis (e.g. 1m wide x 1m long x 0.15m depth x 0.3 porosity). In order to meet the 10mm infiltration volumes the following areas would be required if each strategy were taken independently:

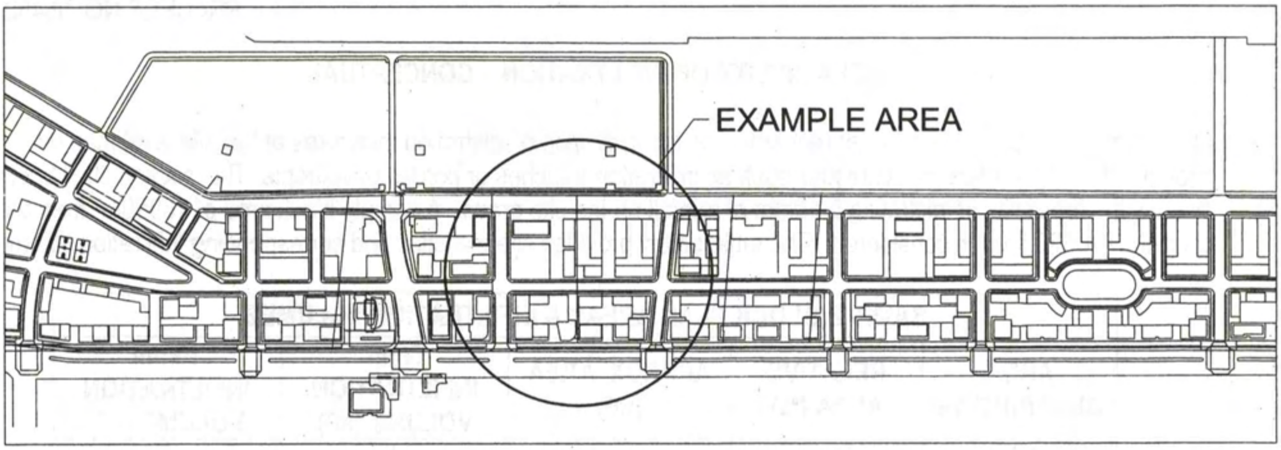
SAMPLE BLOCK PLAN INFILTRATION STRATEGY			
TECHNIQUE	STORAGE PROVIDED (m³/m²)	10mm INFILTRATION VOLUME REQUIRED (m³)	AREA REQUIRED (m²)
INFILTRATION TRENCH	0.3	119	400
POROUS PAVEMENT	0.05	119	2,380

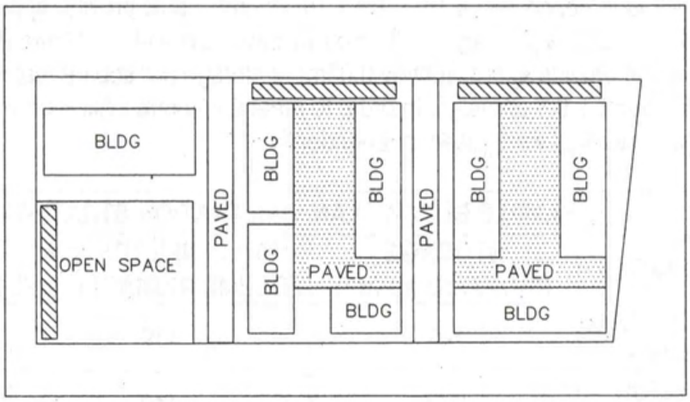
The porous pavement area required approaches one-third of the total paved area, which may be challenging to undertake however the trench area does not appear overly restrictive. A combination of these solutions could be implemented to meet the total target volumes as shown on the figure enclosed in this Appendix.

It is noted that for these techniques to truly accomplish their goal the site drainage must be directed to the trench/porous pavement area. However this is meant to illustrate that, on the assumption that grading can be made conducive to the solution, a 10mm infiltration volume can be achieved for the sample block plan.

Note that the implementation of these techniques is subject to verification by a geotechnical investigation that soils are suitable for these practices. As a general statement, it can be said that the subsurface soils through OPA 620 are not ideal for infiltration however it is recognized that TRCA strongly wishes to pursue infiltration to the best extent possible. On that basis the pursuit of a 5mm target is underscored such that measures designed for larger volumes such as 10mm shall not have their effectiveness reduced due to the restricted soil infiltration capacity.

Another practical restriction to infiltration will be the presence of underground parking garages that will be included into many of the development blocks and proposed buildings. While this does not necessarily eliminate the possibility of infiltration the underground parking garages may limit near surface areas that could have been used for infiltration as well as reduce available area on-site for infiltration due to the parking garage footprint. A measure that could be explored in this instance is the possibility of infiltration below the parking garage however this has inherent concerns relating to ground water interference and interaction with the building envelope. Once again, a geotechnical investigation would be required to verify any concerns with water table or groundwater if infiltration were to be proposed below the parking garage.





░ POTENTIAL AREA FOR POROUS PAVEMENT
AREA = 2,895m²

▨ POTENTIAL AREA FOR INFILTRATION TRENCH
AREA = 660m²

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OPA 620
SAMPLE BLOCK PLAN
INFILTRATION STRATEGY

PROJECT No.	DRAWING No.
06452	FIG INF

P:\SWM\06452 - OPA 620\Drawings\FIG-TMP.dwg, Apr 27, 2007 - 2:21pm

APPENDIX G
MTRCA STAFF REVIEW GUIDELINES:
USE OF AUTHORITY OWNED LANDS FOR STORMWATER MANAGEMENT FACILITIES

MTRCA STAFF REVIEW GUIDELINES
USE OF AUTHORITY OWNED LANDS
FOR STORMWATER MANAGEMENT FACILITIES

January 18, 1993

AUTHORITY MEETING #11/92

JANUARY 22, 1993

RESOLUTION #225

MTRCA STAFF REVIEW GUIDELINES
Use of Authority Owned Lands for Stormwater Management Facilities

This item was recommended for approval at Conservation and Related Land Management Advisory Board Meeting #4/92, held January 15, 1993.

KEY ISSUE

Review guidelines for the use of Authority owned lands for stormwater management facilities, have been prepared to assist staff and members in their consideration of these types of proposals.

Res. #225	Moved by:	Patrick Abtan
	Seconded by:	Brian Harrison

THAT the MTRCA Staff Review Guidelines - Use of Authority Owned Lands for Stormwater Management Facilities, dated January 18, 1993, Appendix CR.18/92, be approved;

AND FURTHER THAT these Guidelines be used as the framework for considering present and new proposals for the use of Authority owned lands for stormwater management facilities.

MTRCA STAFF REVIEW GUIDELINES
USE OF AUTHORITY OWNED LANDS FOR STORMWATER MANAGEMENT FACILITIES

INTRODUCTION

The control of stormwater runoff has long been recognized as a necessary part of urban development. As such, the Authority's 1980 Watershed Plan set out a program for the management of stormwater in order to meet watershed management objectives. The Authority recognizes that, in certain instances, stormwater management facilities may be considered a permissable use on Authority owned lands, provided that the proposal complements other Authority objectives and achieves a greater conservation benefit. The following **Review Guidelines** set out a decision making framework based on specified performance standards.

These **Review Guidelines** were prepared for use by Authority staff. It should be noted that approvals obtained by following this process do not preclude the requirement to obtain approvals from other regulatory agencies.

Purpose

In order to assess whether a stormwater management (SWM) facility is reasonable in the proposed location, the **MTRCA Staff Review Guidelines - Use of Authority Owned Lands for Stormwater Management Facilities** have been prepared. These **Review Guidelines** set out criteria to enable a careful evaluation and to ensure that the proposal complies with the broad range of Authority program goals and objectives.

The **Review Guidelines** are organized into three Phases:

Phase I:	Conceptual Level
Phase II:	Preliminary Design
Phase III:	Detailed Design, Maintenance and Monitoring

Each Phase involves a series of iterative steps requiring action by either the proponent or Authority staff. The evaluation of any proposal to locate SWM facilities on Authority owned lands will be phased in accordance with the level of detail and decision making outlined within.

PHASE I: CONCEPTUAL LEVEL

The purpose of Phase I is to determine if the proposed stormwater management (SWM) facility and its proposed location on Authority land is reasonable, based on a review of fundamental Authority water and related land management objectives. Stormwater management facilities will only be considered in those locations where site characteristics are deemed to be appropriate and where the proposal will not compromise the Authority's objectives (e.g. flood risk management, public use), as set out in Step 2.

Step 1: Information Required from Proponent

The proponent must submit a written request identifying interest in using Authority lands for stormwater management purposes. The request should generally indicate and briefly describe the **purpose** of the proposed SWM facility, the rationale and justification for location.

A locational map must be provided and shall illustrate:

- major road intersections
- existing contours
- valley/floodplain lands
- watercourses
- property limits
- existing vegetative cover (presence/absence)
- lands to be serviced by the proposal
- subwatershed boundaries associated with:
    - a) the existing drainage areas; and
    - b) the proposed SWM facility location
- existing and proposed land use designation and zoning within identified subwatersheds

Step 2: MTRCA Staff Conceptual Review

** **Requests for SWM facilities on Authority owned land will be considered and coordinated for internal review by the Plan Review Section.**

Evaluation of the purpose, rationale and justification of the proposal shall be based on its general compliance with Authority SWM policies, criteria and implementation procedures.

Where the proposed stormwater management facilities do not conflict with any of the following Authority objectives, the proposal would be suitable for further consideration as outlined within Phases II and III.

- If the proposed SWM facility is located within the valley and stream corridor, then the proposal must comply with the Valley and Stream Corridor Management Program.
- The proposal shall be compatible with other uses which may have been established or are being negotiated through existing/proposed Management Agreements, easements, etc..
- The proposal shall not be considered if the Authority lands are the subject of negotiation for sale, until such time as the negotiations are complete.
- The proposed location shall not conflict or interfere with current or planned public use of Authority lands (i.e. recreation, education, trails, etc.)
- The proposed location shall not adversely affect any known archaeological, heritage, architectural, or other cultural resources.
- If the proposed SWM facility is located outside the valley and stream corridor, then the proposal must comply with the following objective:
    - The proposed location shall not adversely affect valued resource features such as a Significant Area (as defined in the Valley and Stream Corridor Management Program), and/or a forested area/woodlot, and/or wetland, and/or other natural heritage resources.

MTRCA Staff Recommendation and Resultant Action:

(1) If one or more of the above listed objectives is affected by the proposal, then Authority staff, **through Management Committee**[*], would not support the request.

> **Staff will provide a written response documenting the rationale for their decision.**

(2) If none of the above listed objectives are affected by the proposal, then Authority staff, **through Management Committee**, would further consider the proposal.

> **Staff will provide a written response directing the proponent to provide additional information, based on issues identified during the conceptual review and as listed in Step I of Phase II. Staff will advise the proponent of Authority interests as set out in other Authority documents.**
>
> **NOTE: Conceptual approval is not to be interpreted as final approval.**

Appeal Process

The proponent may appeal a Management Committee decision by requesting that the proposal be forwarded to the Executive Committee for consideration.

[*] NOTE: Management Committee is comprised of the MTRCA upper management, staff team.

PHASE II: PRELIMINARY DESIGN

The purpose of Phase II is to evaluate whether the specific proposal can meet Authority performance standards and criteria.

Step 1: Information Required from Proponent

To complete the next level of review, the proponent must provide the Authority with any or all of the following preliminary design information, which responds to the site specific requirements identified at the conceptual level of review:

- Subwatershed Study and/or Preliminary Stormwater Best Management Practices (BMP) Plan (Guidelines for preparing these plans are available upon request)
- Clear evaluation of alternative Stormwater BMPs and alternative locations (including Authority lands and other lands)
- Impact Analyses: flood control, erosion/slope stability, environment, public use programming
- Preliminary Design Drawings, which have regard for Community Reach Planning, public use and other Authority program objectives.
- Proposed Compensation Package, including and addressing: initial payment and long term monitoring and maintenance with rationale for same
- The municipality must indicate in writing that it is willing to assume maintenance responsibilities for the facility through a formal easement agreement with the Authority.

  NOTE: The proponent must be willing to monitor the effectiveness of the facility for a two year period following its construction, and be prepared to carry out any design modifications to improve its performance accordingly.

Step 2: MTRCA Staff Review of Preliminary Design Information Package

Based on a review of the Preliminary Design Information Package, Authority staff will determine if the proposal is in compliance with Authority objectives in accordance with the Valley and Stream Corridor Management Program, Watershed Plan Programs, Master Plans, Studies, etc., and meet our technical requirements.

Following the initial staff review, staff may require additional information, clarification, or minor modifications/revisions from the proponent. Once this additional information has been provided to the satisfaction of staff, staff will prepare a recommendation.

MTRCA Staff Recommendation and Resultant Action

(1) If staff is <u>not</u> satisfied that the proposal meets the objectives of the Authority, then staff, **through Management Committee**, will not support the proposal.

> **Staff will provide a written response documenting the rationale for their decision.**

(2) If staff is satisfied that the proposal meets the objectives, policies, and criteria of the Authority, then staff, **through Management Committee**, will prepare a recommendation to the Executive Committee.

> **Staff will prepare a report summarizing the proposal, information received to date and a description of how the proposal meets the policies, objectives and criteria of the Authority and request direction to proceed to the Public Consultation Process.**

Step 3: Public Consultation Process

- The Authority's intention to consider the use of Authority lands for stormwater management facilities will be duly publicized and all expenses associated with the Public Consultation Process will be provided by the proponent.
- The general public and any other interested parties will be invited to make submissions, either verbal or written, prior to a final recommendation being made with respect to the public use of Authority lands for stormwater management facilities.

NOTES: The level of the public consultation process shall be tailored to the extent of public consultation already incurred to date through the municipal planning process.

A joint consultation process is encouraged which involves both the municipality, in which the proposal is situated, and the Authority.

MTRCA Staff Recommendation and Resultant Action

Based on the comments submitted during the Public Consultation Process plus technical information submitted by the proponent to date, staff, through Management Committee, will prepare a report to the Executive Committee with a recommendation of whether or not this proposal should be supported.

(1) If the Executive Committee decision is not to support the proposal, then the proponent will be notified of the decision, with reasons.

(2) If the Executive Committee decision is in support of the proposal, then the proponent will be advised to finalize the submission by providing the details required in Step 1 of Phase III.

PHASE III: DETAILED DESIGN, MAINTENANCE AND MONITORING

The purpose of Phase III is to finalize the proposal and the Authority's consideration/review.

Step 1: Information Required from Proponent

- Detailed Design/Construction Drawings
- Rehabilitation Plan
- Erosion and Sediment Control Plan
  (including construction site surveillance and compliance monitoring provisions)
- Finalized Compensation Package, which includes:
  - Compensation
  - Costs
  - Maintenance Plan
  - Monitoring Plan

- Agreement for Easement, signed by the Municipality, the Authority, and the Proponent
  - Letter of Credit

Step 2: MTRCA Staff Review of Detailed Submission

Staff will review the detailed submission and compensation package, according to Authority objectives, policies, and criteria. Staff may require additional information, clarification, or minor modifications/revisions. Once this additional information has been provided to the satisfaction of staff, staff will prepare a recommendation (see Step 3).

Step 3: Final MTRCA Approval

Authority staff, through Management Committee, will prepare a report to the Executive Committee/Authority with a recommendation as to the approval or refusal of the proposal. The report will contain a summary of the proposal and the results of the Public Consultation Process.

Executive Committee approval will be required for the issuance of permits pursuant to O. Reg. 158, under Section 28 of the **Conservation Authorities Act**.

Authority approval will be required for the granting of easement. Approval from the Ministry of Natural Resources and the Provincial Government will then be required under Section 21(c) of the **Conservation Authorities Act** (R.S.O. 1990).

APPENDIX H
COST APPROXIMATIONS

COST APPROXIMATION -
STRATEGY #F3: 1-POND SCENARIO
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

PROJECT: 06452.400
CITY OF VAUGHAN

	BLK CRK A SWM FACILITY			ENGINEER'S ESTIMATE	
ITEM	DESCRIPTION	EST. QTY.	UNIT	UNIT RATE	ESTIMATED AMOUNT
	BLK CRK A SWMF				
	Excavation & off-site disposal	120000	m3	8.00	$ 960,000.00
	Control structure	1	LS	50,000.00	$ 50,000.00
	Landscaping incl. topsoil/sodding	30000	m²	14.00	$ 420,000.00
	Access roads, bollards, signage, etc.	1	LS	75,000.00	$ 75,000.00
	Relocate barn	1	LS	500,000.00	$ 500,000.00
	Demolish house	1	LS	50,000.00	$ 50,000.00
	Sewer extension (2250mm-dia. pipe)	485	m	3,000.00	$ 1,455,000.00
	Jane St. crossing	1	LS	100,000.00	$ 100,000.00
	SUB-TOTAL				3,610,000.00
	CONTINGENCIES (15% OF TOTAL)				541,500.00
	TOTAL CONSTRUCTION COST WITH CONTINGENCIES				$ 4,151,500.00

SERNAS ASSOCIATES
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PROJECT: 06452.400
CITY OF VAUGHAN

COST APPROXIMATION -
STRATEGY #F2: 2-POND SCENARIO
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

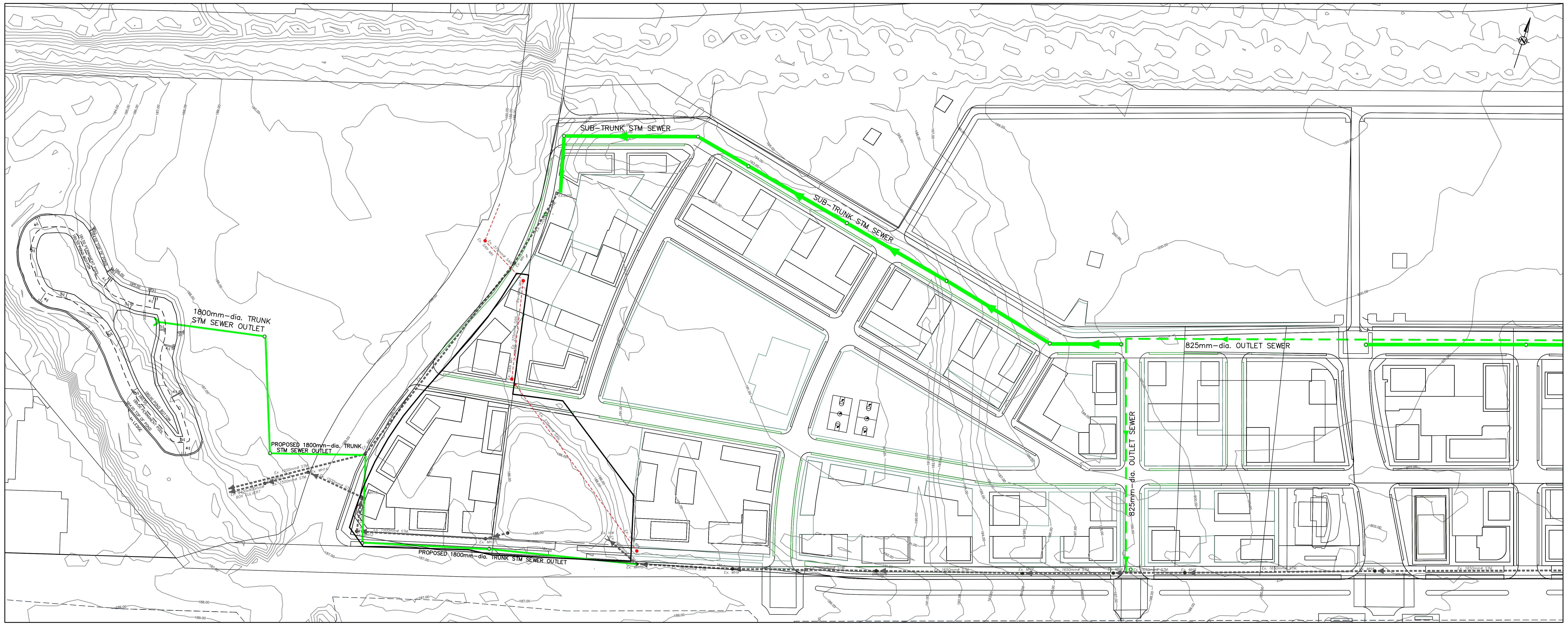
	EAST + BLK CRK B SWM FACILITY			ENGINEER'S ESTIMATE	
ITEM	DESCRIPTION	EST. QTY.	UNIT	UNIT RATE	ESTIMATED AMOUNT
	EAST SWMF				
	Excavation & off-site disposal	50000	m3	8.00	$ 400,000.00
	Control structure	1	LS	50,000.00	$ 50,000.00
	Landscaping incl. topsoil/sodding	13000	m^2	14.00	$ 182,000.00
	Access roads, bollards, signage, etc.	1	LS	50,000.00	$ 50,000.00
	EAST SWMF ASSOCIATED INFRASTRUCTURE				
	New trunk sewer to east SWMF (1500mm-dia. pipe)	370	m	1,600.00	$ 592,000.00
	Break-in for flow diversion	1	LS	10,000.00	$ 10,000.00
	East SWMF outlet pipe (825mm-dia. pipe)	800	m	675.00	$ 540,000.00
	Break-in for connection to trunk sewer	1	LS	5,000.00	$ 5,000.00
	BLK CRK B SWMF				
	Excavation & off-site disposal	60000	m3	8.00	$ 480,000.00
	Control structure	1	LS	40,000.00	$ 40,000.00
	Landscaping incl. topsoil/sodding	15000	m^2	14.00	$ 210,000.00
	Access roads, bollards, signage, etc.	1	LS	50,000.00	$ 50,000.00
	BLK CRK B ASSOCIATED INFRASTRUCTURE				
	Trunk sewer outlet from Jane St. to Blk Crk B SWMF (1800mm-dia.)	545	m	2,200.00	$ 1,199,000.00
	Jane St. crossing	1	LS	100,000.00	$ 100,000.00
	SUB-TOTAL				3,908,000.00
	CONTINGENCIES (15% OF TOTAL)				586,200.00
	TOTAL CONSTRUCTION COST WITH CONTINGENCIES				$ 4,494,200.00

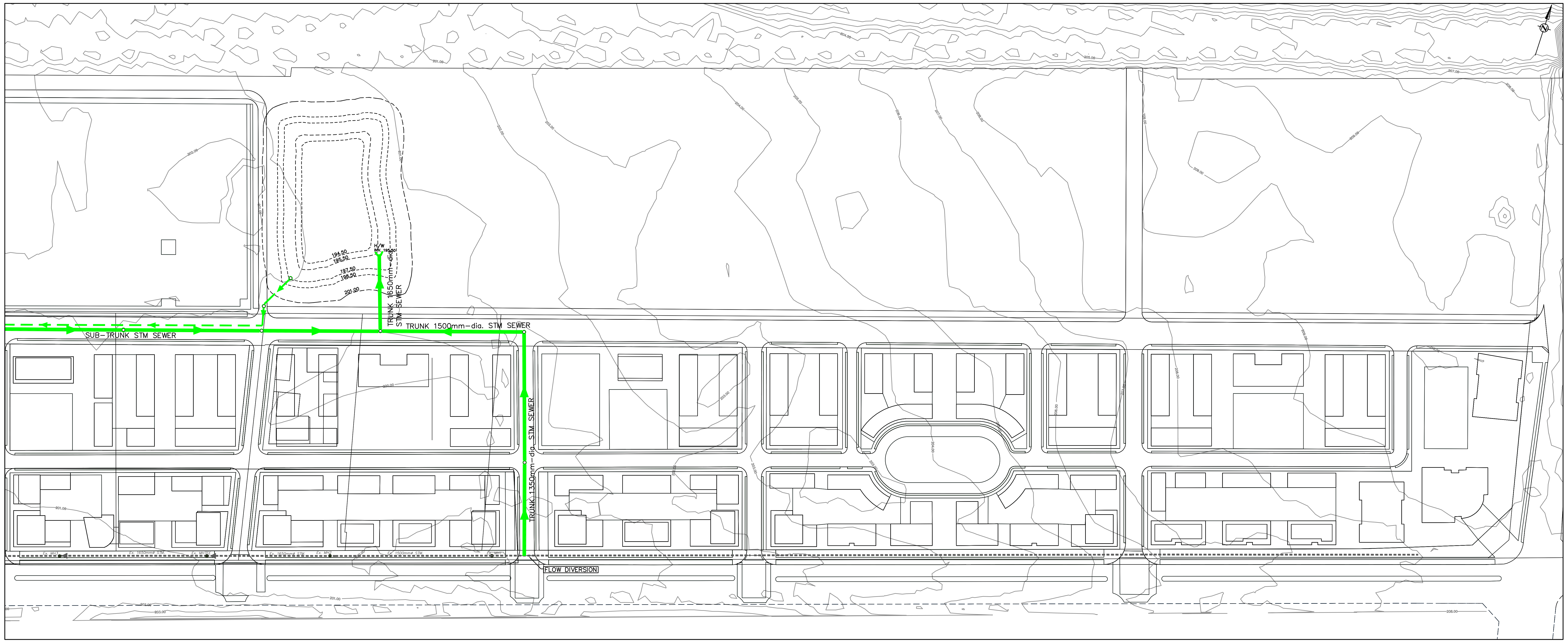
COST APPROXIMATION -
STRATEGY #F1: 3-POND SCENARIO
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

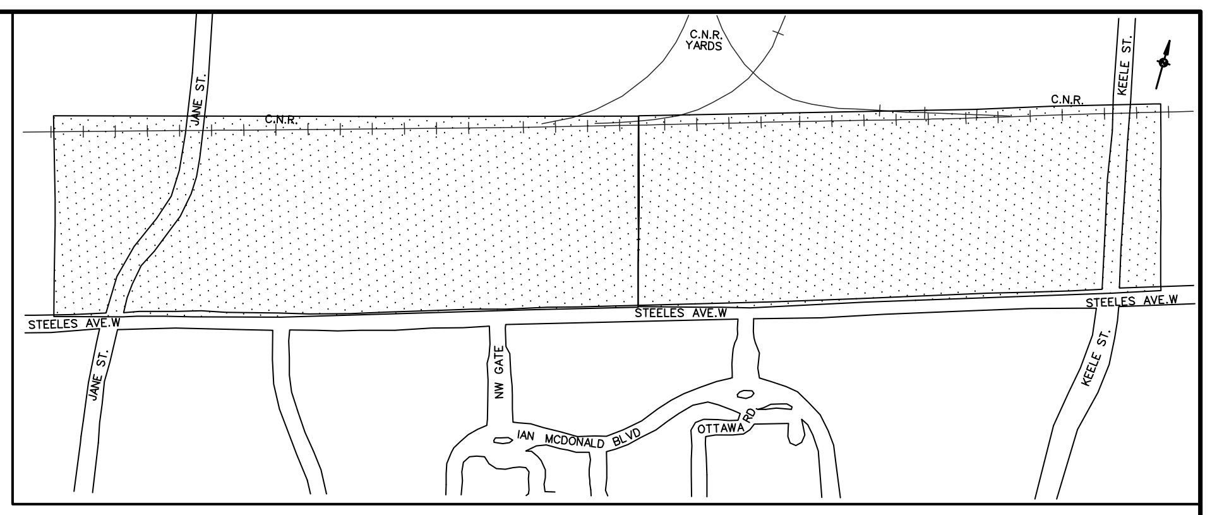
PROJECT: 06452.400
CITY OF VAUGHAN

	EAST, WEST & BLK CRK C SWM FACILITY			ENGINEER'S ESTIMATE	
ITEM	DESCRIPTION	EST. QTY.	UNIT	UNIT RATE	ESTIMATED AMOUNT
	EAST SWMF				
	Excavation & off-site disposal	50000	m3	8.00	$ 400,000.00
	Control structure	1	LS	50,000.00	$ 50,000.00
	Landscaping incl. topsoil/sodding	13000	m²	14.00	$ 182,000.00
	Access roads, bollards, signage, etc.	1	LS	50,000.00	$ 50,000.00
	EAST SWMF ASSOCIATED INFRASTRUCTURE				
	New trunk sewer to east SWMF (1500mm-dia. pipe)	370	m	1,600.00	$ 592,000.00
	Break-in for flow diversion	1	LS	10,000.00	$ 10,000.00
	East SWMF outlet pipe (825mm-dia. pipe)	800	m	675.00	$ 540,000.00
	Break-in for connection to trunk sewer	1	LS	5,000.00	$ 5,000.00
	WEST SWMF				
	Construct/install underground stormwater mgmt system	5700	m3	300.00	$ 1,710,000.00
	Oil-grit separator system	1	LS	200,000.00	$ 200,000.00
	WEST SWMF ASSOCIATED INFRASTRUCTURE				
	New trunk sewer on-site to west SWMF (1350mm-dia. pipe)	400	m	1,400.00	$ 560,000.00
	Break-in for flow diversion	1	LS	10,000.00	$ 10,000.00
	West SWMF outlet pipe (750mm-dia. pipe)	350	m	575.00	$ 201,250.00
	Break-in for connection to trunk sewer	1	LS	2,000.00	$ 2,000.00
	BLK CRK C SWMF				
	Excavation & off-site disposal	18000	m3	8.00	$ 144,000.00
	Control structure	1	LS	20,000.00	$ 20,000.00
	Landscaping incl. topsoil/sodding	10000	m²	14.00	$ 140,000.00
	Access roads, bollards, signage, etc.	1	LS	50,000.00	$ 50,000.00
	BLK CRK C ASSOCIATED INFRASTRUCTURE				
	Trunk sewer outlet from Jane St. to Blk Crk C SWMF (1200mm-dia.)	595	m	1,200.00	$ 714,000.00
	Jane St. crossing	1	LS	100,000.00	$ 100,000.00
	SUB-TOTAL				5,680,250.00
	CONTINGENCIES (15% OF TOTAL)				852,037.50
	TOTAL CONSTRUCTION COST WITH CONTINGENCIES				$ 6,532,287.50

APPENDIX I
SERVICING LAYOUT FOR PREFERRED STRATEGY (DRAWING SWM-101)







KEY PLAN (not to scale)

SUBJECT LANDS ▨

No.	DESCRIPTION	BY	DATE

REVISIONS

THE SERNAS GROUP
(A Member of the Sernas Group Inc.)

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Approved as to form in reliance upon the professional skill and ability of Sernas Associates, Consulting Engineers, as to design and specification.

Director of Engineering

Date:

CITY OF Vaughan
ENGINEERING DEPARTMENT

OPA 620

CONCEPTUAL ULTIMATE SERVICING LAYOUT

DESIGNED BY M.A.

DATE: MARCH 2007

CHECKED BY M.A.

DRAWN BY S.Y.

PROJECT No. 06452

APPROVED BY M.A.

SCALE 1:2000

DWG. No. SWM-101

P:\SWM\06452 - OPA 620\Drawings\06452-Steeles corridor OPA 620.dwg, SWM-101, 9/2/2009 2:20:20 PM, SYunyaev, CutePDF Writer.pc3

APPENDIX J
EXTRAPOLATED COSTS FOR PREFERRED STRATEGY

COST APPROXIMATION - 5-YR HORIZON (2007-2012)

STRATEGY #F2: 2-POND SCENARIO

OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

PROJECT: 06452.400
CITY OF VAUGHAN

EAST + BLK CRK B SWM FACILITY

ITEM	DESCRIPTION	CONSTRUCTION YEAR	2007 COST	APPLICABLE COST
	BLK CRK B SWMF			
	Construct Black Creek 'B' SWM facility in 2007 in preparation for imminent OPA 620 construction	2007	$ 2,390,850	$ 2,390,850
	EAST SWMF			
	Construct East SWM facility in 2012 in anticipation of OPA 620 build-out	2012	$ 2,103,350	$ 2,546,767
	TOTAL CONSTRUCTION COST FOR 5-YEAR HORIZON			4,937,617.41

Notes & Assumptions:

Note 1 - Cost for Blk Crk Facility from cost approximation = $2,390,850
inclusive of associated infrastructure & 15% contingency

Note 2 - Cost for East Facility from cost approximation = $2,103,350
inclusive of associated infrastructure & 15% contingency

Note 3 - Projected values are based on: P x (1+i)^n
Where n = number of years from 2007
i = 3.9% - rate of construction increases
(taken as 3.9% based on CANDATA info from 2002-2007)
P= total cost of SWM facility

Costs quoted in Canadian dollars (2007)

COST APPROXIMATION - 10-YR HORIZON (2007-2017)
STRATEGY #F2: 2-POND SCENARIO
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

PROJECT: 06452.400
CITY OF VAUGHAN

EAST + BLK CRK B SWM FACILITY

ITEM	DESCRIPTION	CONSTRUCTION YEAR	2007 COST	APPLICABLE COST
	BLK CRK B SWMF			
	Construct Black Creek 'B' SWM facility in 2009 once full engineering, by-laws & zoning are completed	2009	$ 2,390,850	$ 2,580,973
	EAST SWMF			
	Construct East SWM facility in 2014 in anticipation of OPA 620 build-out	2014	$ 2,103,350	$ 2,749,289

Notes & Assumptions:

Note 1 - Cost for Blk Crk Facility from cost approximation = $2,390,850
inclusive of associated infrastructure & 15% contingency

Note 2 - Cost for East Facility from cost approximation = $2,103,350
inclusive of associated infrastructure & 15% contingency

Note 3 - Projected values are based on: P x (1+i)^n
Where n = number of years from 2007
i = 3.9% - rate of construction increases
(taken as 3.9% based on CANDATA info from 2002-2007)
P= total cost of SWM facility

Costs quoted in Canadian dollars (2007)

TOTAL CONSTRUCTION COST FOR 10-YEAR HORIZON	5,330,261.68

COST APPROXIMATION - 15-YR HORIZON (2007-2022)
STRATEGY #F2: 2-POND SCENARIO
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

EAST + BLK CRK B SWM FACILITY

ITEM	DESCRIPTION	CONSTRUCTION YEAR	2007 COST	APPLICABLE COST
	BLK CRK B SWMF			
	Construct Black Creek 'B' SWM facility in 2009 once full engineering, by-laws & zoning are completed	2009	$ 2,390,850	$ 2,580,973
	EAST SWMF			
	Construct East SWM facility in 2017 to accomodate OPA 620 build-out	2017	$ 2,103,350	$ 3,083,664

Notes & Assumptions:

Note 1 - Cost for Blk Crk Facility from cost approximation = $2,390,850
inclusive of associated infrastructure & 15% contingency

Note 2 - Cost for East Facility from cost approximation = $2,103,350
inclusive of associated infrastructure & 15% contingency

Note 3 - Projected values are based on: P x (1+i)^n
Where n = number of years from 2007
i = 3.9% - rate of construction increases
(taken as 3.9% based on CANDATA info from 2002-2007)
P= total cost of SWM facility

Costs quoted in Canadian dollars (2007)

TOTAL CONSTRUCTION COST FOR 15-YEAR HORIZON	5,664,636.58

APPENDIX K
DECEMBER 12, 2008 SUBMISSION TO TRCA

SERNAS ASSOCIATES
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Municipal Engineering Services
Land Development Planning
Development Management
Water Resources Management
Acoustical Engineering
Geomorphic & Environmental Sciences
Transportation Planning

December 12, 2008

Toronto and Region Conservation Authority
5 Shoreham Drive
Downsview, Ontario
M3N 1S4

Attention: Mr. Sameer Dhalla, P.Eng.

Dear Mr. Dhalla:

Re: Master SWM Strategy Report for OPA 620
City of Vaughan
Replay to TRCA Comments
Our Project No. 06452.400

Prior to issuing a revised Master Stormwater Management Report for OPA 620, we have proposed the following measures to address the following concerns raised by the Toronto and Region Conservation Authority.

1. *Options that manage all stormwater on OPA 620 lands should be explored (i.e. using source controls, distributed quantity storage and SWM facilities on tableland).*

   Section 4 of the report reviews all available source or lot level controls, conveyance controls and end-of-pipe practices. From the range of Best Management Practices the stormwater strategy for OPA 620 included the consideration of the following:

   a) Source controls:
      - Soak away pits
      - Rainwater harvesting
      - Green roofs
      - Porous pavement/permeable paners
      - Bioretention swale
      - On-site groundwater storage

   b) Conveyance controls
      - Based on discussions with the City of Vaughan none were deemed viable for this type of development.

   c) End-of-Pipe Practices
      - Wet ponds
      - Underground Storage

1.) Source Controls

A) Green Roofs and Rainwater Harvesting

In Section 5 of the report source controls are discussed in detail. The discussion on roof areas utilizing green roofs, rainwater harvesting and grey water re-use is summarized as follows:

- Green roofs to be implemented in 50% of the total development roof areas.
- Green roofs will be used in conjunction with grey water reuse and rainwater harvesting.
- Assumption was made that between green roofs and grey water reuse up to 25mm of rainfall can be removed for the system during any given storm.

The capture of 25mm of rainfall has subsequently been reviewed and based on updated information that capture of the first 25mm is considered too aggressive. A more realistic rainfall amount would be 15mm of capture. 15mm of capture would represent over 80% of total rainfall in a given year (see City of Toronto's Wet Weather Flow Management Guidelines)

According to the City of Toronto's Wet Weather Flow Management Guidelines for a 1 ha site having the same proportion of site/open space (58%), Roof area (22%) and road area (20%) as the OPA 620 lands implementing green roofs with a 15 mm capture would result in retention of approximately 53% of rainfall in a given year. Comparatively, the same site without green roofs would only retain 35% of rainfall in a given year. While this is a significant increase in the amount of retention the impact of green roofs on quantity control is limited. Using the same 1 ha representative site for analysis purposes we modeled the peak flow events under the two scenarios; with green roofs and without green roofs using Visual OTTHYMO. The results of this comparison are summarized in the following table:

Event	Discharge from 1 ha Site (with Green Roofs) m^3/s	Discharge from 1 ha Site (without Green Roofs) m^3/s
25 mm Event	0.026	0.026
2 Year	0.042	0.043
5 Year	0.064	0.066
10 Year	0.079	0.081
25 Year	0.099	0.101
50 Year	0.113	0.115
100 Year	0.127	0.129

…/3

B) Remaining Source Controls

In the report, the remaining source controls were summarized as follows:

- Source controls such as soak away pits, porous pavement and bioretention area to be implemented on the remaining area of site exclusive of the roof areas and underground parking areas.
- An aggressive 10mm capture and infiltration had been proposed for these areas.

Current City of Toronto Guidelines requests in general a 5mm capture and infiltration while TRCA Guidelines require a water balance (which in many cases equates to 5mm). We have proposed a 10mm capture which represents 70% of the total yearly rainfall. Again this target may be aggressive given the general poor infiltration capacity of the insitu soils and the lack of detailed geotechnical information. Details of the existing geotechnical information are provided within the report in Section 2.1 however the general soils classification from the Ontario Soil Survey's Soil Survey of York County is Chinguacousy Clay loam. These soils have a SCS hydrologic soils group classification of C/D. Thus it is now proposed that 7.5mm capture, which represents 60% of the total yearly rainfall be utilized.

C) On site Quantity Controls

Section 7.3 discusses the use of on-site storage to assist in achieving volumetric controls and is summarized as follows:

- Proposed use of 180 l/s/ha as the site release rate.
- In order to provide on-site volumetric control to meet the unit rates for the receiving stream a release of 15-25 l/s/ha is required with a storage requirement of approximately 500m^3 per hectare in addition to any roof storage.

Based on the large storage requirement per hectare it was deemed that the storage volumes were too high for on-site storage alone to provide the required volumetric controls and as such end-of-pipe storage is required for quantity control.

There are a number of public park areas located within the concept plan for OPA 620. However, most of the park blocks are located within the east drainage area. In the east drainage area the SWM facility proposed within the ORC lands has sufficient capacity to provide the required quality and quantity control.

There is one park area within the west drainage area of the OPA 620 lands that could be used for quantity storage. The park area is approximately 1.5 hectares in size. Assuming 50% of the park area will be available for underground storage (50% was assumed due to the park's close proximity to the future subway and park uses), a storage porosity of 50% and a depth of 1m, approximately 3700m^3 of water can be stored. The use of the park area for underground storage is subject to approval of the parks department and the drainage area that could drain to the park.

D) Tableland SWM Facilities

It is proposed that a tableland SWM facility be placed in the Hydro lands east of the TTC parking areas to service a portion of the east half of the OPA 620 lands and the TTC parking areas. TTC staff have scheduled a workshop for December 16, 2008 to present options for the configuration of this facility.

As discussed in C) above an additional 3700m^3 could be provided in the park area via underground storage. Shown on Figure A attached is an additional tableland SWM facility that would eliminate the need for the TRCA SWM facility. However, the location for the additional tableland SWM facility at the intersection of Jane and Steeles (the gateway into OPA 620) is not an acceptable option for the City of Vaughan or the Region of York.

.../5

The various storage scenarios put forth in the draft OPA 620 report have been reviewed and even if the underground storage facilities (TTC parking and park land) are implemented there are certain areas of the OPA 620 lands that will still need to drain to the TRCA SWM facility for water quantity control. Implementing the above would reduce the size of the SWM facility within the TRCA lands but not eliminate it. We have enclosed Figure B showing a revised SWM facility within TRCA lands. This facility is located within the valley lands and outside the 100-year flood line.

2. *All options that include a SWM pond on TRCA lands must demonstrate the option conforms to TRCA Guideline for the Use of Authority Lands for SWM Facilities (see attached) which require: an archaeological investigation to be completed by TRCA, a floodplain analysis (see attached flood elevations), erosion and sediment control details including pond clean-out details, TRCA's terrestrial natural heritage systems strategy integration and a habitat impact assessment (EIS, fisheries).*

   Sections 7.2, and 7.3 of the draft report analysis show the proposed SWM facility within the TRCA lands conforms to the TRCA Guidelines for use of the Authority Lands for SWM facilities. Additional investigations such as archaeological investigation to be done by TRCA; integration to TRCA's terrestrial natural heritage systems strategy and habitat impact assessment need to be coordinated with TRCA.

   A floodplain analysis has been undertaken based on an updated SWM facility within the TRCA lands and is attached for your review. Erosion and Sediment control details including pond clean-out details will be more appropriately provided during detail design

3. *The use of green/sustainable technologies in commendable, however, further details are required as to how feasible the source control targets are. If they are not achievable, how will the proposed SWM strategy be affected.*

   It should be noted that we have revisited the green technologies and have reduced the rainfall amount to be treated based on additional information available and knowledge gain since the draft report was prepared.

It should be noted that the quantity controls have been designed assuming no green technologies have been implemented. Implementation of green technology will only decrease the required amount of quantity storage.

It is acknowledged that if on-site quality controls are implemented to decrease the required amount of quality storage provided in the proposed SWM facilities, then there must be a means of enforcing these on-site controls to ensure that treatment is being attained.

4. *The feasibility of providing clean stormwater to the BCPV pond as a green / sustainable technology should be explored.*

   a) As part of detail design a provision of clean water to the BCPV pond will be investigated. The water source will likely be roof runoff from building(s) near the Jane and Steeles intersection. Since no investigation of utilities on Steeles Avenue has taken place this gravity clean water pipe will be dependent on not interfering with existing infrastructure on Steeles Avenue.

   Based on our review of the OPA 620 lands, a gravity clean water pipe collecting roof runoff can be provided for the BCPV lands subject to required easements and ability to cross Steeles Avenue.

5. *A detailed phasing and staging plan should be provided detailing at that point the proposed SWM facilities should be constructed.*

   A detailed phasing plan would be very difficult to provide at this time due to the following:

   - The OPA 620 plan shows the ultimate redevelopment of the UPS lands. Presently UPS intends to stay and expand their existing facility. As you are aware, their Phase 1 Expansion has been approved. However, any further expansion will require expansion of the existing pond (City's), construction of the SWM Facility proposed on TRCA property and/or stringent on-site quality and quantity controls.
   - There are on going negotiations to utilize some of the UPS's remaining lands for the future TTC subway stop and transferring the City pond lands and the existing lands at the intersection of Jane and Steeles to UPS.
   - Development of the TTC subway stop will trigger the construction of the SWM facility within TRCA lands.

.../7

- Development of any lands draining to the proposal ORC SWM facility will not trigger the construction of the SWM facility within the TRCA lands but will trigger the construction of the ORC SWM facility.
- For some sites stringent on-site controls, water reuse, and infiltration could be utilized in the interim to extend the life of the existing City owned SWM facility and delay construction of the proposed TRCA facility. This assumes that the existing City owned SWM facility is not removed.

For the reasons mentioned above we believe that it is not possible to provide a detailed phasing and staging plan at this time. However, brief outlines of two possible staging plans are outlined below:

At present, there is an operating SWM facility within the City owned lands. This facility, designed to control flows for the entire development, is based on higher release rate than the release allowed by TRCA today. This facility does not provide adequate water quality control or adequate long-term quantity control.

Two Phasing strategies have been developed to implement the proposed stormwater options within the TRCA lands. The first strategy involves the construction of the ultimate sewer across Jane Street through the TRCA lands to the ultimate outlet at the existing SWM facility. The existing SWM facility will be upgraded to its ultimate design. This strategy would require either the first development and/or the City to upfront the costs of the works. Collection of special area charge over time as development proceeds will recoup the costs. The clear advantage of this strategy is the ultimate facility and storm sewer system will be constructed within the TRCA lands at an early stage reducing complications and increased costs that may develop over time. The obvious drawback for this strategy is the large upfront costs.

The second strategy involves the continued used of the City owned SWM facility with the added requirement of the implementation of the stringent site controls. This strategy would optimize the existing SWM facility for water quality control. Modifications to the control structure would increase the level of control for more frequent storms and allow less frequent storms (in the interim) to be controlled to the previous standard in combination with increased site controls as an interim measure for the initial developments. In addition, stringent on-site infiltration or reuse of 7.5mm of rainfall and implementation of green roofs would reduce the need for quality controls within the existing SWM facility. The collection of the special area development charge by the City over a period of time as development proceeds would provide enough funding for the City to construct the required storm sewer infrastructure and retrofit the SWM facility within the TRCA lands.

Clearly the advantage of this strategy is that there are no requirements for upfront cost for either the City or the developers and that most of the quality and quantity requirements can be met. A drawback with this strategy is the time delay in constructing the ultimate SWM facility within TRCA lands and increased costs with the passage of time. Also the construction of the TTC station and subsequent required alterations to the UPS site may require the removal of the existing City owned SWM facility.

6.) Further details are required regarding the special area charge of Stormwater Management for OPA 620 lands.

The special area charge will be created to adequately fund the cost of construction of the SWM facilities and external sewer relevant to the SWM facility. It is anticipated that each development will be paying the special area charge on a hectorage basis similar to a development charge. Costs to be included include:

- Cost to construct the SWM facilities (TRCA and ORC)
- Cost of major sewer network to get floors to the SWM facilities
- Cost of all works related to construction of the SWM facility such as studies, environmental improvements and accesses.
- Presently excludes the cost of land for the SWM Facilities.

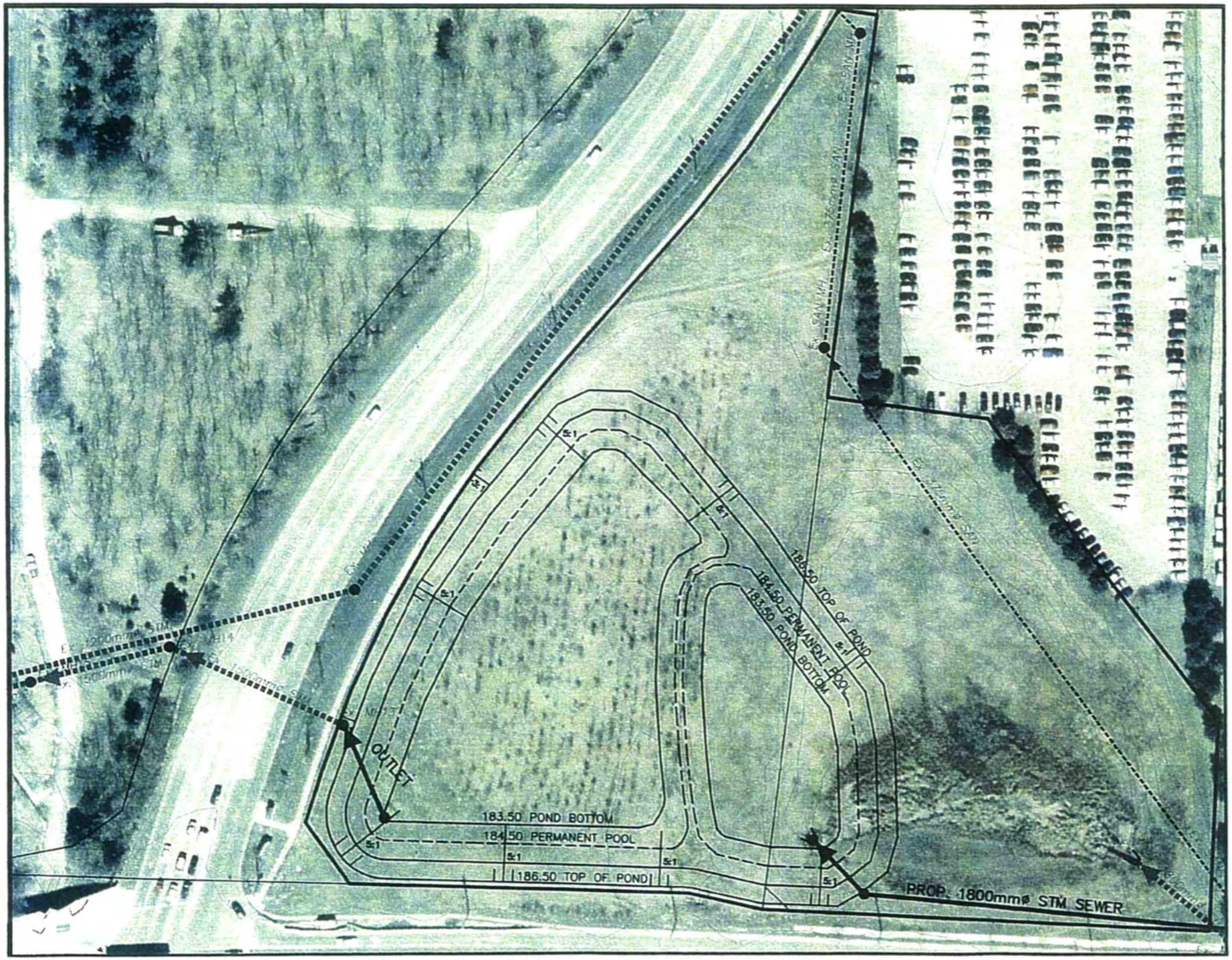
We trust that this letter addresses your concern outlined in your March 26, 2008 memo. Upon satisfactory resolution of your comments, the report will be updated to reflect these changes. If you have any questions or require clarification, please do not hesitate to contact the undersigned.

Yours truly,

SERNAS ASSOCIATES

Ken Chow, P.Eng.
Principal, Manager, Water Resources

c.c City of Vaughan, Attn: Mr. Michael Frieri, Mr. Tony Artuso,
Mr. Saad Yousaf, Mr. Bill Robinson,
Mr. Andrew Pearce
TRCA, Attn: Mr. Bill Kiru



THE SERNAS GROUP

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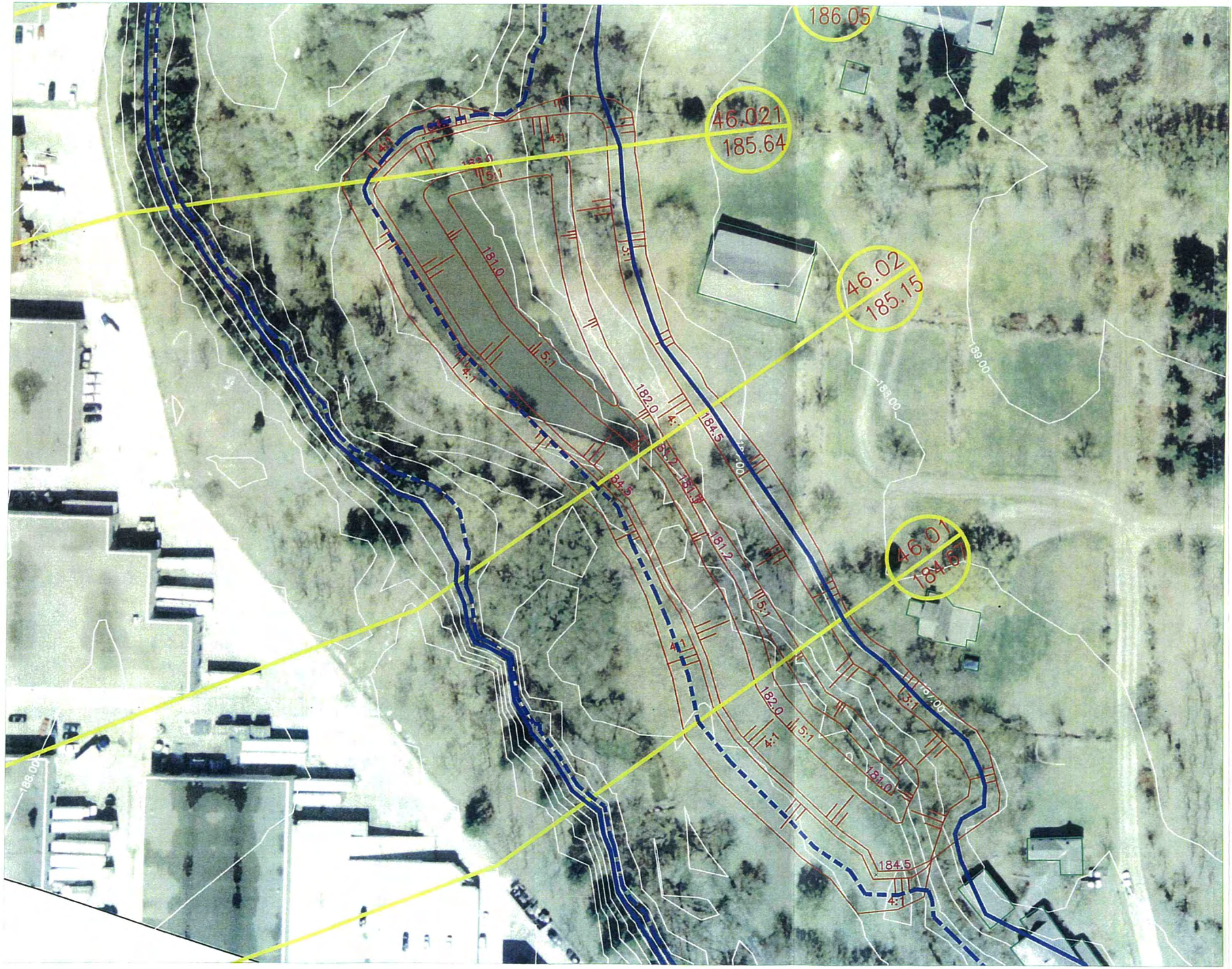
416.21
sernasgrou

CONCEPTUAL TABLELAND
SWM FACILITY

OPA 620

SCALE 1:1000	PROJECT No.	FIGURE No.
DATE: Mar. 2008	06452	Figure. A
DRAWN BY : S.Y.		



181.0 – 1125sqm
182.0 – 3185 sqm
184.5 – 8146 sqm

▬	Regional Storm Floodline
╍	100-Year Storm Floodline

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BLACK CREEK
SWM FACILITY

OPA 620

SCALE 1:1000 DATE: APR. 2008 DRAWN BY : S.Y.	PROJECT No. 06452	FIGURE No. Figure B

Appendix 1B

Assessment of Potential Natural Impacts from the Construction of One New SWM Facility and the Removal of an Existing SWM Facility – Savanta Inc.

SAVANTA

September 30, 2011

Mr. Muneef Ahmad, P.Eng., LEED AP
Associate Manager – Water Resources
Sernas Associates
141 Brunel Road,
Mississauga ON, L4Z 1X3

Re: OPA 620 Master Plan – Assessment of Potential Natural Heritage Impacts from the Construction of One New SWM Facility and the Removal of an Existing SWM Facility

Dear Mr. Ahmad:

Savanta Inc. (Savanta) was retained by Sernas Associates (Sernas) to provide a scoped natural heritage assessment of two locations that are being considered for alteration within Vaughan's OPA 620 Master Plan area.

At the first site, located within the existing hydro corridor north of Steeles Avenue, east of Jane Street, a new SWM facility is being proposed. At the second site, located at the northeast corner of Jane Street and Steeles Avenue, the existing SWM facility is being considered for removal (i.e., the lands would be filled in to enable expansion of the UPS plant).

Savanta's assessment is considered "scoped" in that it consisted of a single site visit during winter conditions, and was intended to provide a general indication of the quality and extent of natural heritage features on these subject lands. Notwithstanding the timing of this survey, the site conditions were good, with minimal snow cover and the terrestrial features easily observed.

Site Investigation and Background Information Review
Savanta's senior aquatic and terrestrial ecologists visited the two sites on January 21st, 2010. Site photographs are provided in Appendix A – Photographic Record. The observations for each of the sites are described below, and both are depicted on Figure 1 of Appendix B.

a) *First Study Area: Hydro Corridor* —This site is located on the north side of Steeles Avenue, immediately north of a series of industrial buildings that front on to Steeles. This area is dominated by cultural meadows and cultivated parcels. There is a small open-water pond and minor portions of a mineral deciduous swamp community in the extreme northwest corner. Several pictures within the Photo Record detail the site conditions during the recent visit.

The majority of the area is covered by old-field meadow vegetation within the hydro right-of-way. This community is composed of very common species, many exotic, including asters, goldenrods, grasses, white sweet clover and wild carrot.

Around the shore of the pond, a zone of densely growing cattail has developed, with a few clusters of willow shrubs and red-osier on higher ground. It appears that water fluctuates considerably during the growing season, as some wetland plants, e.g. water plantain, were observed higher on the banks.

North of the pond, along a shallow drainage feature, a narrow zone of wet meadow species is found, mostly covered with tall white aster and cattail.

None of the above communities or species are considered of significance, and all species would be considered to be "common and secure" within Ontario.

b) *Second Study Area (Existing Storm Water Facility)* —This site is located to the northeast of Steeles Avenue and Jane Street intersection. The area is well defined topographically, being a large, flat depression surrounded by slopes.

The bottom of the facility, which receives most of the stormwater, has a dense cover of cattail marsh. Co-dominants include purple loosestrife and tall white aster.

Immediately north of the cattail marsh, but still within the bowl, terrain gently rises and becomes drier. There, a community best characterized as old-field meadow has developed. It is composed of ubiquitous species, such as wild carrot, grasses, asters, goldenrods, thistle, yarrow and St. John's-wort. This cover type extends elsewhere on the slopes and on the berm.

The two communities at this location are very common throughout southern Ontario and in the Toronto area.

Other Sources of Information

In addition to the field investigations, Savanta has consulted other sources of background information to learn more about the two sites and assess their quality and potential significance.

Geotechnical investigations at the first site were carried out by Shad & Associates (2010). Based on the borehole data, the site is underlain by glacial clayey silt/silty clay and sandy silt till deposits. The water table found within the dug pond appears to be a reflection of the local ground water table.

An environmental site assessment was carried out by Pinchin Environmental (2010). While no concerns were raised for the first site, some potential hazards mostly related to chemical contaminants were noted for the second site.

Beacon Environmental (2009) conducted an environmental assessment of natural heritage features and functions in a larger area (York Spadina Subway Extension) that included both of the sites considered in this report. Likewise, Bruce Tree Expert Company (2009) carried out a tree assessment in the same area. Both studies concluded that no major natural heritage issues exist on the lands with Beacon's Ecological Land Classification (ELC) map being essentially identical to Savanta's characterization. Beacon also stated that no provincially or nationally rare, endangered or at risk plant or animal species were found. They note, though, the value of the remaining small treed areas (oak swamp and forest) just north of the dug-out pond in the first area, on account of old trees, provision of habitat for birds and habitat for locally (in Toronto) rare species. Also, the pond is identified as breeding habitat for Green Frog (however, the cattail marsh in the second area was not identified as amphibian breeding habitat). No fish habitat was identified in the lands studied. We note that virtually all of the small treed area would remain unaffected by the proposed construction of a SWM facility in this area.

The Toronto and Region Conservation Authority (TRCA) has prepared a Draft Terrestrial Natural Heritage Strategy (NHS) to assist in mapping the existing natural heritage features within their jurisdiction. This Strategy not only maps the existing features, but also includes a "Target NHS" map that identifies proposed expansion of the NHS under ideal future conditions. However, both of these study areas are considered to occur within an urban area and neither of these locations have been identified as providing important natural heritage functions. In addition, Savanta has seen TRCA mapping that identifies flora and fauna species of concern as well areas of "natural cover". However, in comparing this mapping to the actual site conditions, we that several of the areas that are depicted as being "green" are in fact existing commercial warehouse/parking development or are barren/scarified fields.

Discussion and Conclusions

Based on the results of field investigations conducted by Savanta and the analysis of existing available information, neither of these subject lands are considered ecologically sensitive.

Site 1: Hydro Corridor – the concept plan for this site would see the creation of a three-cell storm water management pond, wherein water would enter at the southeast corner and proceed through the second and third cells before eventually discharging at the southwest corner. This facility design would provide Enhanced water quality treatment. The placement of the proposed SWM facility would result in removal of some old-field meadow and cultivated field currently providing minimal terrestrial functions. The existing dug pond would be removed, and although it evidently does not provide direct or indirect fish habitat, it likely supports some degree of breeding amphibian activity. We note that Beacon's survey work identified three frog species (American toad, northern leopard frog, and green frog) – each of these amphibian species are "common and secure" in Ontario and the loss of these specimens with the removal would not be viewed as a significant impact. The loss of this breeding habitat may well be of a temporary nature, as some colonization of the new proposed SWM facility is likely to occur once the ponds become established. We recognize, however, that while SWM pond habitat is often utilized by wildlife once the ponds become established, this is not necessarily encouraged (i.e., the ponds are not designed to attract wildlife such as frogs since the primary goal of the SWM facility is for retaining contaminated sediments).

As noted previously, the proposed footprint of the three-cell SWM pond will primarily occur on cultural meadow and ploughed field and on the aforementioned dug pond. The adjacent oak grove, near the northwest corner of the proposed pond block will likely not be unaffected by the development of this area.

Site 2: Existing SWM Pond – the proposal as this location is for the filling in of the existing SWM pond. Savanta's assessment, in conjunction with other field inventories of this area have identified no species of significance or rarity. Savanta understands that the existing storm water management facility located to the south within the Black Creek Pioneer Village is being examined for possible expansion and restoration. Should this be possible, it is anticipated that it would provide an improvement in overall water quality treatment to downstream reaches of Black Creek.

We trust that the above information will address your needs at this time. Please don't hesitate to contact the undersigned to discuss in more detail.

Sincerely,

Rick Hubbard　　　　C Zoladeski

Richard Hubbard, Vice President　　　　Chris Zoladeski, Senior Botanist

References

Shad & Associates. 2010. Preliminary Geotechnical Investigation, Potential SWM Facility: Study Area 2 North of Steeles Avenue West and East of Jane Street, Vaughan, Ontario.

Pinchin Environmental. 2010. DRAFT Phase I Environmental Site Assessment Part of Lot 1, Concession 4, Vaughan, Ontario.

Pinchin Environmental. 2010. DRAFT Phase I Environmental Site Assessment 7100 Keele Street,Vaughan, Ontario.

Beacon Environmental. 2009. Environmental Assessment Natural Heritage Features and Functions Steeles West Station.

Beacon Environmental. 2009. Natural Heritage Impact Assessment for the Proposed Design for the Steeles West Station. Toronto York Spadina Subway Extension.

Beacon Environmental. 2009. Natural Heritage Impact Assessment for the Proposed Launch Shaft Staging Area Design for the Steeles West Station. Toronto York Spadina Subway Extension.

Bruce Tree Expert Company Ltd. 2009. Arborist Report & Tree Removal and Protection Recommendations: Steeles West Launch Shaft .

Bruce Tree Expert Company Ltd. 2009. Arborist Report & Tree Removal and Protection Recommendations: Steeles West Project.

Appendix A
Photographic Record

OPA 620 Master Plan – View of First and Second Study Areas

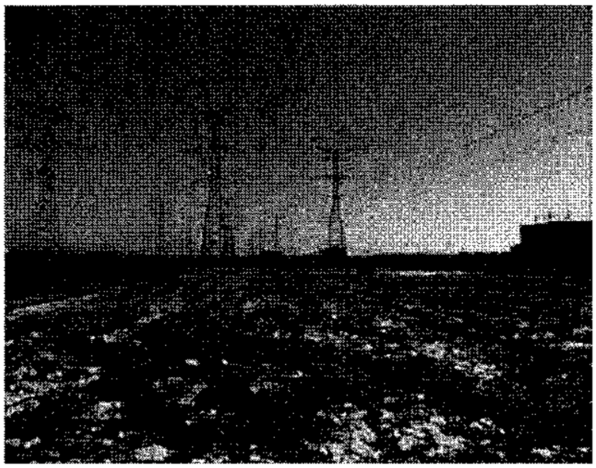

Photo 1: Looking east on Hydro Corridor.

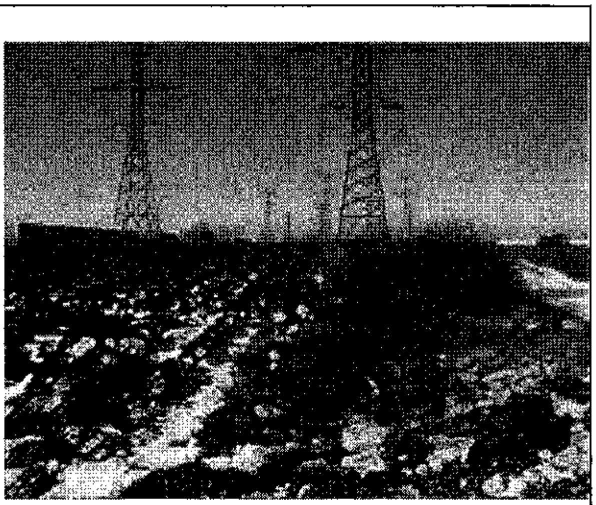

Photo 2: Close-up of tilled fields.

Photo 3: Roadway adjacent to small dug pond.

Photo 4: Close-up of dug pond - this receives drainage input from culverts.

Photo 5: View adjacent to hedgerow.

PHOTOGRAPHIC RECORD

PAGE 1 OF 3

SAVANTA

Photo 6: View of hedgerow looking west.

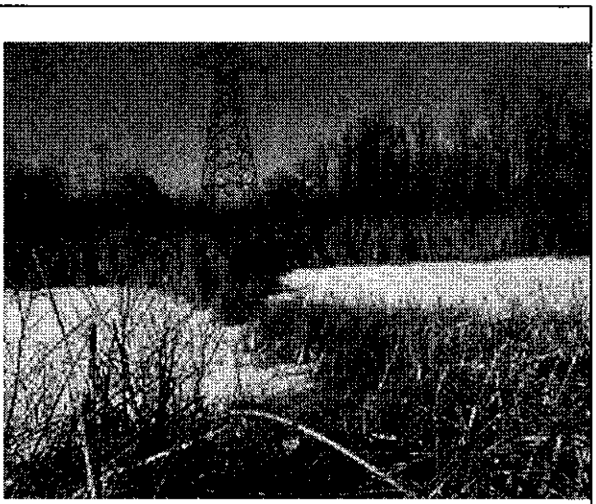

Photo 7: Close-up of dug pond.

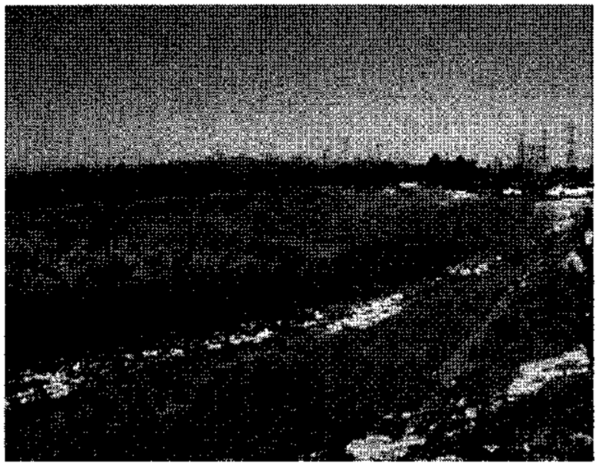

Photo 8: View of SWM pond, looking eastward along Steeles Avenue.

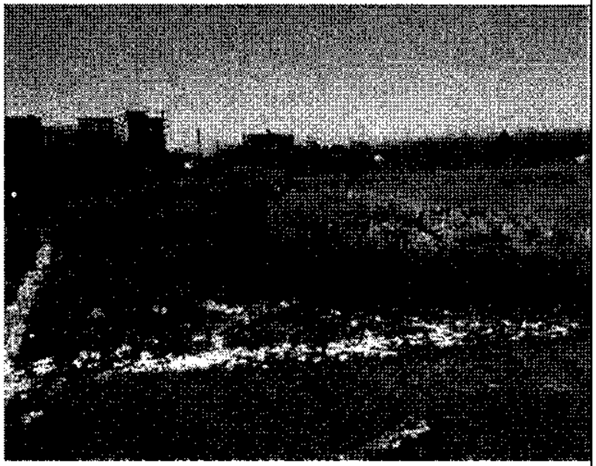

Photo 9: View of SWM pond looking west towards Jane Street.

Photo 10: View of SWM pond from atop the headwall.

PHOTOGRAPHIC RECORD

PAGE 2 OF 3

SAVANTA

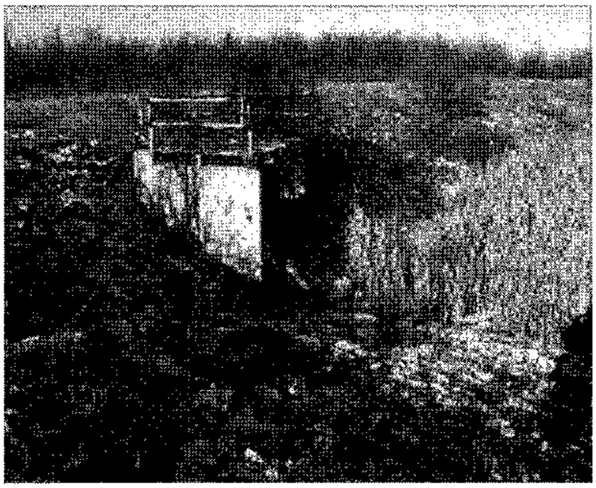

Photo 11: Another view of headwall.

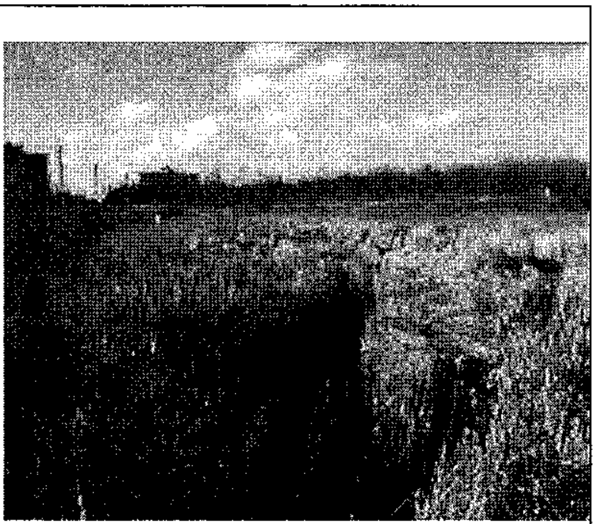

Photo 12: View from input headwall, looking across the cattail-lined pond.

PHOTOGRAPHIC RECORD

PAGE 3 OF 3

SAVANTA

Appendix B
Report Figures

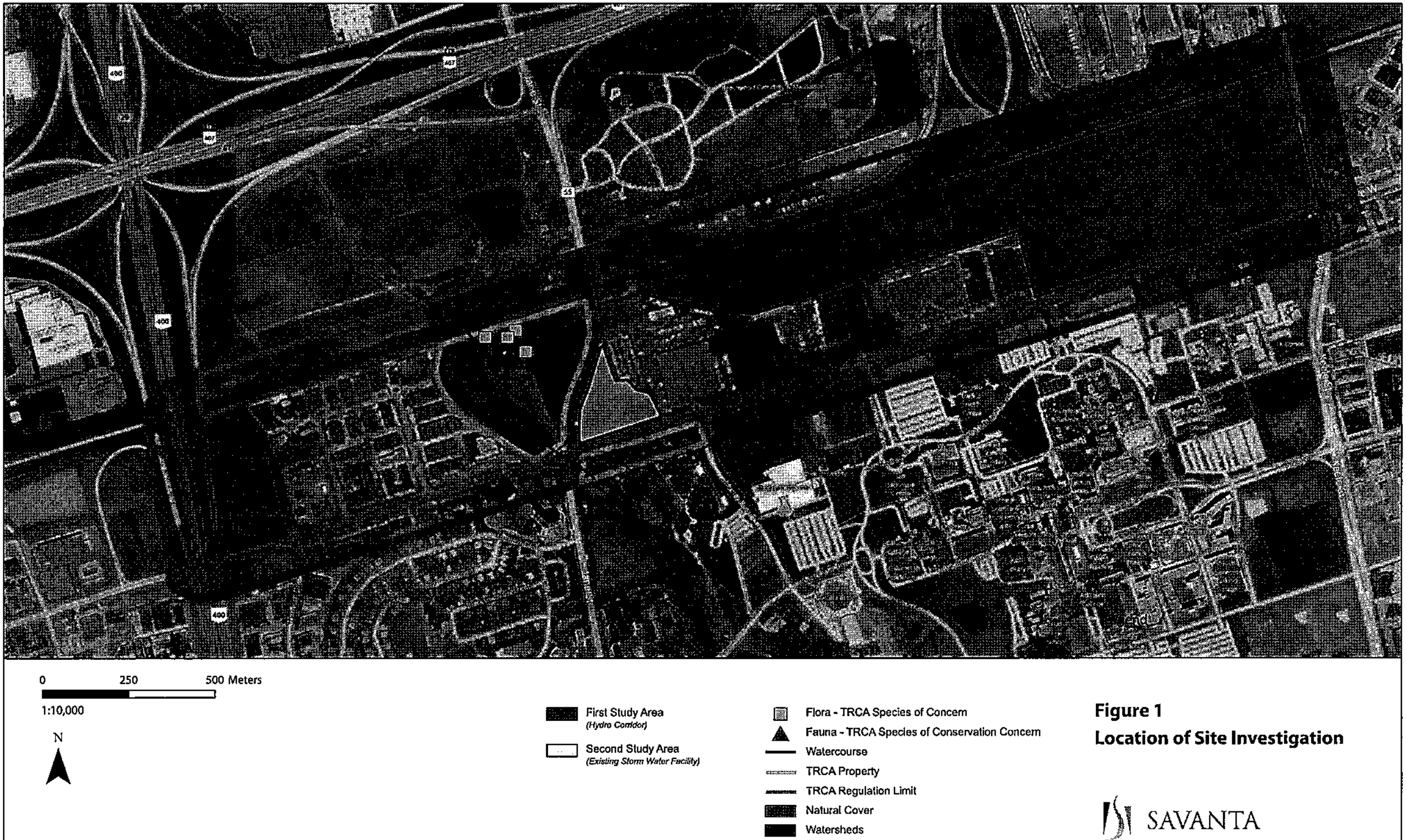

Figure 1
Location of Site Investigation

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Date Saved: 9/30/2011 9:10:47 AM
Path: S:\7055 - SAV 6251 Northwest Brampton\gis\mxd\Figure 1 Locations of Site Investigation.mxd Prepared in Corel Draw Path: S:\7055 - SAV 6251 Northwest Brampton\gis\corel\Figure 1 Locations of Site Investigation.cdr

Appendix 1C

Phase I Environmental Site Assessment, 7100 Keele Street – Pinchin Environmental Ltd.

DRAFT
Phase I Environmental Site Assessment
7100 Keele Street,
Vaughan, Ontario

Prepared for:
City of Vaughan c/o The Sernas Group Inc.
c/o Shad & Associates Inc.
83 Citation Drive,
Unit 9
Vaughan, Ontario
L4K 2Z6

Attention: Mr. Houshang Shad

February 3, 2010

Pinchin File: 57167.002

EXECUTIVE SUMMARY

Pinchin Environmental Ltd. ("Pinchin") was retained on January 19, 2010 by Mr. Houshang Shad of Shad & Associates Inc. ("Client"), on behalf of The Sernas Group Inc., and the City of Vaughan, to conduct a Phase I Environmental Site Assessment ("ESA") of the property identified as 7100 Keele Street, Vaughan, Ontario (hereafter referred to as the "Site"). At the time of Pinchin's Site visit, the Site was vacant and undeveloped.

Pinchin was advised by the Client that the purpose of the Phase I ESA was to assess potential issues of environmental concern in relation to the potential redevelopment of the Site.

The Phase I ESA was completed in general accordance with the Canadian Standards Association ("CSA") document entitled "*Phase I Environmental Site Assessment, CSA Standard Z768-01*" dated November 2001, including a review of readily available historical records, a review of readily accessible regulatory records, a Site visit, interviews, an evaluation of information and reporting, subject to the limitations outlined in Section 8.0 of this report.

Based on the results of the Phase I ESA completed by Pinchin, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site. As such, no subsurface investigation work (Phase II ESA) is recommended at this time.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.
This report has been issued without having received a response from the Ontario Ministry of the Environment ("MOE"). Once a response is received, the information will be reviewed by Pinchin and, if there is any information that represents a potential issue of environmental concern, a copy of the response will be forwarded to the Client under separate cover. Our conclusions and recommendations may be amended based on this information.

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background

Pinchin Environmental Ltd. ("Pinchin") was retained on January 19, 2010 by Mr. Houshang Shad of Shad & Associates Inc. ("Client"), on behalf of The Sernas Group Inc., and the City of Vaughan, to conduct a Phase I Environmental Site Assessment ("ESA") of the property identified as 7100 Keele Street, Vaughan, Ontario (hereafter referred to as the "Site"). At the time of Pinchin's Site visit, the Site was vacant and undeveloped.

Pinchin was advised by the Client that the purpose of the Phase I ESA was to assess potential issues of environmental concern in relation to the potential redevelopment of the Site.

1.2 Scope of Work

The Phase I ESA was completed in general accordance with the Canadian Standards Association ("CSA") document entitled "*Phase I Environmental Site Assessment, CSA Standard Z768-01*" dated November 2001, including a review of readily available historical and regulatory records, a Site visit, interviews, an evaluation of information and reporting, all subject to the limitations outlined in Section 8.0 of this report.

2.0 SITE DESCRIPTION

2.1 Site Location and Physical Description

As indicated on Figure 1 (Key Map), the Site is located within the hydro corridor south of the Canadian National Railway, approximately one kilometre ("km") east of Jane Street, and approximately 215 metres ("m") north of Steeles Avenue West in Vaughan, Ontario. The Site is situated in an area that consists predominantly of commercial land uses. Figure 2 illustrates the Site and surrounding area.

A summary of the physical description of the Site is provided below:

Topic	Findings
Site Area	2.6 hectares (6.42 acres).
Buildings on-Site	None. The Site was vacant and undeveloped.
Number of Floors (Including ground level)	Not applicable.
Subsurface Levels	Not applicable.
Approx. Footprint Area of Buildings	Not applicable.
Approx. Total Area of Buildings	Not applicable.
Heating / Cooling	Not applicable.
Elevators	Not applicable.

Topic	Findings
Emergency Generators	Not applicable.
Landscaped / Grassed/Bare Ground Areas	The Site consisted of vegetated land.
Paved or Other Sealed Surface Materials	Not applicable.

2.2 Topographic, Geologic and Hydrogeologic Setting

Topic	Findings
Topography of Site and Surrounding Area	The Site gradually sloped south/southeast.
Site Grade Relative to the Adjoining Properties	The Site was approximately 1 m higher in elevation than the adjoining properties to the south/southeast.
Subsurface Soils	Halton Till (silt to silty clay matrix with high carbonate content).
Fill Materials	None observed.
Bedrock Type	Shale, limestone, dolostone and siltstone of the Georgian Bay Formation.
Inferred Bedrock Depth	Unknown based on the information reviewed.
Inferred Groundwater Depth	Unknown based on the information reviewed.
Nearest Open Water Body	A small pond was located on the northwest portion of the Site. A tributary of Black creek is located approximately 1.5 km west of the Site. Lake Ontario is located approximately 16 km south/southeast of the Site.
Inferred Groundwater Flow Direction	South based on topography.

2.3 Site Operations

The Site consisted of vegetated, vacant and undeveloped land with a small pond located in the northwest portion of the Site.

3.0 HISTORICAL RECORDS REVIEW

3.1 Site Interviews and Records

There was no Site Representative available at the time of the Site visit.

3.2 Aerial Photographs

Copies of aerial photographs dated 1954, 1984, 2003 and 2007 were obtained from the National Air Photo Library in Ottawa, Ontario, and the online City of Vaughan GIS System, and reviewed by Pinchin. A summary of information obtained with respect to the Site is provided in the following table:

Year of Photograph	Site
1954 - 2003	The Site appeared to consist of vacant, forested/agricultural land.
2007	The Site appeared to consist of vacant, undeveloped land with a small pond located in the northwest portion of the Site.

A summary of information obtained with respect to the surrounding area is provided in the following table:

Year of Photograph	North	East	South	West
1954	Vacant undeveloped/ agricultural land.	Vacant undeveloped/ agricultural land.	Vacant undeveloped/ agricultural land.	Vacant undeveloped/ agricultural land.
1984	Canadian National Railway ("CNR") appeared to be developed north of the Site.	A hydro corridor and vacant, undeveloped land.	Similar to 1954.	A hydro corridor and vacant, undeveloped land.
2003	Large multi-tenant commercial building (7171 Jane Street) appeared to be constructed northwest of the Site.	Similar to 1984.	Similar to 1984.	Similar to 1984.
2007	Similar to 1984.	Similar to 1984.	Multi-tenant commercial buildings (2600 – 2720 Steeles Avenue West) appeared to be constructed.	Similar to 1984.

At the time of the Site visit, the Site was inaccessible as there was a barbed wire fence along the south Site boundary and the CNR restricting access north of the Site. Because Pinchin had restricted access to the Site, Pinchin could not confirm or deny the presence of the small pond located in the northwest portion of the Site, as viewed in the 2007 aerial photograph.

Based on Pinchin's review of the above-noted aerial photographs, nothing was observed that is likely to give rise to potential subsurface impacts in connection with the Site.

3.3 RMS Information

Pinchin contacted Risk Management Services ("RMS") to obtain copies of Fire Insurance Plans ("FIPs") related to the Site and surrounding area, as well as Property Underwriters' Reports ("PURs") and Property Underwriters' Plans ("PUPs") related to the Site. No records related to the Site and surrounding area were provided for Pinchin's review by RMS.

3.4 City Directories

City directories for the years 1967 to 2001 were reviewed by Pinchin at the Toronto Reference Library in Toronto, Ontario. A summary of information obtained with respect to the Site is provided in the following table:

Year(s)	Occupant Listings for Site Address
1967 - 2001	Not listed.

In general, the city directories indicated that the surrounding area has been historically occupied by commercial and residential land uses since 1990.

No historical dry cleaning operations, retail fuel outlets or other operations of potential environmental concern were identified, with the exception of the following:

- Autopro Collision (an automotive repair/servicing facility) was listed at 7171 Jane Street in 2001. This property is located approximately 190 m northwest of the Site and is inferred to be hydraulically upgradient relative to the Site. Based on the distance between the automotive repair/servicing facility and the Site, it is Pinchin's opinion that this off-Site operation is unlikely to give rise to potential subsurface impacts in connection with the Site.

Based on Pinchin's review of the above-noted city directories, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site.

3.5 Previous Environmental Reports

No previous reports (i.e., Phase I ESAs, geological or geotechnical reports) were provided for Pinchin's review.

3.6 Historical Summary

Based on the results of the historical review, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site.

4.0 REGULATORY INFORMATION AND CORRESPONDENCE

4.1 Site Regulatory Information

Pinchin was not provided regulatory information with respect to the Site.

4.2 Ontario Ministry of the Environment

An Ontario Ministry of the Environment ("MOE") Freedom of Information request was submitted to the MOE for information on file with respect to the Site. Specifically, the MOE was asked what information it has regarding historical spills, orders, investigations/prosecutions, waste generator numbers/classes and Certificates-of-Approval ("C-of-As"). At the time of writing this report, no response had been received from the MOE. When a formal response is received, it will be reviewed by Pinchin. If there is any information that represents a potential issue of environmental concern, a copy of the response will be forwarded to the Client under separate cover. Our conclusions and recommendations may be amended based on this information. A copy of Pinchin's request submitted to the MOE is provided in Appendix II of this report.

Pinchin conducted a search of the MOE *Brownfields Environmental Site Registry*. Based on the results of Pinchin's search, a Record of Site Condition ("RSC") has not been filed for the Site or neighbouring properties, within a 700 m radius of the Site.

4.3 Technical Standards & Safety Authority

The Technical Standards & Safety Authority ("TSSA") was contacted to establish the status of the Site with respect to its files, to identify outstanding instructions, incident reports, fuel/oil spills or contamination records associated with the Site. Based on an electronic mail response from Mr. Carlien Buist of the TSSA on February 2, 2010, no information was on file with respect to the Site.

4.4 EcoLog ERIS

Pinchin submitted a request to EcoLog Environmental Risk Information Services Ltd. ("ERIS") for a review of the following databases, as they pertain to the Site and surrounding properties:

- Inventory of PCB Storage Sites, dated 1987 to October 2004;
- Waste Generators Summary, dated 1986 to June 2009;
- Waste Disposal Sites – MOE CA Inventory, dated 1970 to September 2002; and
- Ontario Spills, dated 1988 to 2008.

In addition, Pinchin reviewed the following publications prepared by INTERA for the MOE, dated April 1987:

- "*Inventory of Coal and Gasification Plant Waste Sites in Ontario*"; and
- "*Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario*".

A copy of the EcoLog ERIS report is provided in Appendix III. Information obtained from the above-noted sources indicated the following:

- The Site was not listed in any of the above-noted databases reviewed by Pinchin;
- Wajax Fluid Power, located at 2720 Steeles Avenue West, had been registered with the MOE as a generator (Generator #ON0160109) of various hazardous wastes including petroleum distillates, halogenated solvents, waste oils and lubricants, and emulsified oils from 1994 to 1998. Interwood Marketing Group, located at 2720 Steeles Avenue West, had been registered with the MOE as a generator (Generator #ON1842700) of inorganic and organic laboratory chemicals from 1994 to 2001. This property is located approximately 13 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred groundwater flow direction, it is Pinchin's opinion that these off-Site operations are unlikely to give rise to potential subsurface impacts in connection with the Site;

- Northview Print & Copy Inc. (formerly Beta Reproduction Inc.), located at 2700 Steeles Avenue West, had been registered with the MOE as a generator (Generator #ON2337700) of photoprocessing wastes from 1997 to 2004. This property is located approximately 10 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation is unlikely to give rise to potential subsurface impacts in connection with the Site;
- ICI Canada, located at 2600 Steeles Avenue West, had been registered with the MOE as a generator (Generator #ON0003996) of various hazardous wastes including paint/pigment/coating residues and inorganic laboratory chemicals from 1997 to 2001. St. Clair Paint and Wallpaper (formerly Clairtone Professional Paints), located at 2600 Steeles Avenue West, had been registered with the MOE as a generator (Generator #ON1400200) of paint/pigment/coating residues in 1990 and from 1992 to 1998. This property is located approximately 15 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred groundwater flow direction, it is Pinchin's opinion that these off-Site operations are unlikely to give rise to potential subsurface impacts in connection with the Site;
- Additional surrounding properties were registered with the MOE as waste generators. However, based on the information provided within the EcoLog ERIS report, the location/distance between these properties and the Site, as well as the inferred direction of groundwater flow, it is Pinchin's opinion that the potential issues of concern associated with these listings are unlikely to give rise to potential subsurface impacts in connection with the Site;
- The Ontario Spills database indicated that on August 22, 1991, an underground storage tank ("UST") leaked paint thinner at 2600 Steeles Avenue West, resulting in a possible environmental impact to the surface water of Black Creek. The spill was located a minimum of 15 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. On August 10, 1992, 300 litres of diesel spilled onto the ground at 2600 Steeles Avenue West. The spill was located a minimum of 15 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. On August 10, 2001, 23-45 litres of Shellsol 7 spilled onto concrete floor located at 2600 Steeles Avenue West. The spill was contained and cleaned. The spill was located a minimum of 15 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. On August 2, 2001, 180 litres of paint spilled onto the ground at 2600 Steeles Avenue West. The spill was cleaned. The spill was located a minimum of 15 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred direction of groundwater flow, and the elevation of this property in relation to the Site, it is Pinchin's opinion that these historical spills are unlikely to give rise to potential subsurface impacts in connection with the Site;

- The Ontario Spills database indicated that on February 11, 1991, 675 litres of diesel fuel spilled onto the road and into the sewer near 2700 Steeles Avenue West. The spill was located approximately 200 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. On April 5, 2002, 350 litres of diesel fuel spilled onto the paved parking lot at 2700 Steeles Avenue West. The spill was located a minimum of 10 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. On November 29, 1990, 100 litres of hydraulic oil was spilled onto the ground and into the sewer at 2700 Steeles Avenue West. The spill was located a minimum of 10 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. On February 18, 1999, 228 litres of diesel spilled onto the pavement at the rear of 2700 Steeles Avenue West; however an environmental impact was not anticipated. The spill was located a minimum of 10 m south of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred direction of groundwater flow, and the elevation of this property in relation to the Site, it is Pinchin's opinion that these historical spills are unlikely to give rise to potential subsurface impacts in connection with the Site; and
- The Ontario Spills database indicated that on March 18, 1998, 2-4 litres of diesel fuel spilled onto the road and into the catch basin located at the corner of Steeles Avenue West and Founders Road. The spill was cleaned. The spill was located approximately 235 m southeast of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred direction of groundwater flow, and the distance between this spill and the Site, it is Pinchin's opinion that this historical spill is unlikely to give rise to potential subsurface impacts in connection with the Site.

Based on Pinchin's review of the above-noted information sources, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site.

4.5 Regulatory Information Summary

Based on the regulatory information reviewed, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site.

5.0 SITE VISIT

Ms. Tracey-Ann Bullock of Pinchin (see Appendix V for assessor qualifications) conducted a Site visit on January 25, 2010. The Site was inaccessible as there was a barbed wire fence along the south Site boundary and the Canadian National Railway restricting access north of the Site. The Site was viewed and photographed from approximately 10 m south of the Site boundary. At the time of the Site visit, the ground surface was wet, with minimal snow cover, and the weather was raining. The Site visit was documented with notes and photographs. The results of the Site visit are discussed below. Photographs of some of the features noted during the Site visit are attached in Appendix IV.

5.1 Hazardous Materials

No hazardous materials were observed on-Site during the Site visit.

5.2 Storage Tanks

5.2.1 Aboveground Storage Tanks

No aboveground storage tanks ("ASTs") were observed on-Site. However, Pinchin was unaccompanied at the time of the Site visit, and had restricted access to the Site. Therefore, a representative knowledgeable about the Site was not available to confirm or deny the presence of a former or current AST located at the Site.

5.2.2 Underground Storage Tanks

No evidence of USTs (i.e., fill/vent pipes) were observed on-Site. However, Pinchin was unaccompanied at the time of the Site visit, and had restricted access to the Site. Therefore, a representative knowledgeable about the Site was not available to confirm or deny the presence of a former or current UST located at the Site.

5.3 Water and Wastewater

Topic	Findings
Water Supply Source	Not applicable.
Water Use	None observed.
Sanitary/Process Wastewater Receptor	No sanitary or process wastewater was generated at the Site.
Pits, Sumps or Lagoons	No pits, sumps or lagoons were observed on-Site.
Grease Traps	None observed.
Oil/Water Separators	None observed.
Storm Water Flow and Receptor	No catch basins or sewers were observed on-Site. Storm water would likely run overland and percolate naturally through the soil or collect in the on-Site pond.
Wells	None observed.
Watercourses, Ditches or Standing Water	None observed.

At the time of the Site visit, the Site was inaccessible as there was a barbed wire fence along the south Site boundary and the CNR restricting access north of the Site. Because Pinchin had restricted access to the Site, Pinchin could not confirm or deny the presence of the small pond located in the northwest portion of the Site, as viewed in the 2007 aerial photograph.

5.4 Polychlorinated Biphenyls

The use of polychlorinated biphenyls ("PCBs") as dielectric fluids in electrical equipment such as transformers, fluorescent lamp ballasts and capacitors was common up to about 1980. The Federal Chlorobiphenyls Regulation, SOR/91-152, prohibits the use of PCBs in the aforementioned electrical equipment installed after July 1, 1980.

PCBs were not considered an issue as the Site was undeveloped.

5.5 Asbestos-Containing Materials

Asbestos-containing materials ("ACMs") are commonly found in building construction materials (particularly in older buildings constructed prior to 1985). Friable asbestos (friable is defined as a material that can be crumbled, powdered or pulverized by hand pressure) was widely used in sprayed fireproofing until 1973, and in decorative or finishing plasters, and thermal systems insulation until the early 1980s. Non-friable or manufactured asbestos products were widely used in building construction including in vinyl floor tiles, sheet flooring, ceiling tiles, pipe gaskets, roofing materials, asbestos cement boards, and numerous other products until the mid-1980s. A very limited number of non-friable asbestos products in limited quantities are still in use currently in building construction. The application of friable asbestos was banned by Ontario Regulation 654/85, which came into effect March 1985. On November 1, 2005, this regulation was most recently updated and changed to Ontario Regulation 278/05.

ACMs were not considered an issue as the Site was undeveloped.

5.6 Lead Containing Paints

Although paints containing lead were banned from uses on exterior or interior surfaces of buildings, furniture or household products in the 1970s, various commercial paints (e.g., road paint) are still known to contain lead.

Lead-containing paints were not considered an issue as the Site was undeveloped.

5.7 Ozone-Depleting Substances

Ozone-depleting substances were not considered an issue as the Site was undeveloped.

5.8 Radon

Radon was not considered an issue as the Site was undeveloped. In addition, the geology of the area is not considered an issue with respect to radon generation.

5.9 Mould or Microbial Contamination

The presence of mould or other microbiological contamination in buildings has become a concern to building tenants and owners due to potential health effects on occupants and users. Provincial Ministries of Labour have recently issued guidelines on enforced regulations to protect the health of construction workers who are exposed to mould in the course of building renovation. The presence of water leaks or high humidity can cause the growth or amplification of mould within building environments.

Mould and microbial contamination was not considered an issue as the Site was undeveloped.

5.10 Air Emissions

Air emissions were not considered an issue as the Site was undeveloped.

5.11 Staining and Stressed Vegetation

No evidence of historical chemical discharges or releases (i.e., staining or stressed vegetation) was observed during the Site visit.

5.12 Non-Hazardous Wastes

Non-hazardous wastes were not produced as the Site was undeveloped.

6.0 ACTIVITIES ON ADJACENT PROPERTIES

The Site was located in an urban area that was developed with commercial and residential land uses. A description of the adjacent properties is summarized in the following table, based on Pinchin's observations from the Site and publicly accessible locations:

	NORTH	EAST	SOUTH	WEST
OPERATION OR ACTIVITY	CNR that runs northeast to southwest, and vacant, undeveloped land. 7171 Jane Street (Noble Trade and Masonite International Corporation) was located northwest of the Site.	A hydro corridor and vacant, undeveloped land.	Multi-tenant commercial buildings (2600 – 2720 Steeles Avenue West), followed by Steeles Avenue West.	A hydro corridor and vacant, undeveloped land.
DIRECTION WITH RESPECT TO INFERRED GROUNDWATER FLOW	Upgradient.	Transgradient.	Downgradient.	Transgradient.
VISIBLE EMISSIONS	None observed.	None observed.	None observed.	None observed.
VISIBLE OUTDOOR STORAGE OF HAZARDOUS MATERIALS	None observed.	None observed.	None observed.	None observed.

Based on Pinchin's observations of the adjacent properties, nothing was observed that is likely to give rise to potential subsurface impacts in connection with the Site.

7.0 FINDINGS AND RECOMMENDATIONS

Based on the results of the Phase I ESA completed by Pinchin, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site. As such, no subsurface investigation work (Phase II ESA) is recommended at this time.

8.0 STANDARD LIMITATIONS

This Phase I ESA was performed in order to identify potential issues of environmental concern associated with the Site identified as 7100 Keele Street, Vaughan, Ontario, at the time of the Site visit. This Phase I ESA was performed in general accordance with currently acceptable practices for completing Phase I ESAs and specific Client requests, as applicable to this Site. This report was prepared for the sole use of the Client. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the sole responsibility of the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Such reliance will only be provided by Pinchin following written authorization from Client. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed.

The information provided in this report is based upon analysis of available documents, records and drawings, and personal interviews. In evaluating the Site, Pinchin has relied in good faith on information provided by other individuals noted in this report. Pinchin has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the current owner/occupant. Pinchin accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted, or contained in reports that were reviewed. The scope of work for this Phase I ESA did not include an intrusive investigation for designated substances (i.e., asbestos, mould, etc.) and, therefore, these materials may be present in concealed areas.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

The CSA document entitled "*Phase I Environmental Site Assessment, CSA Standard Z768-01*" dated November 2001, does not apply to environmental auditing or environmental management systems. Therefore, with respect to Site operations and conditions, compliance with applicable Federal, Provincial or Municipal acts, regulations, laws and/or statutes was not evaluated as part of the Phase I ESA.

9.0 CLOSURE

The conclusions and recommendations represent the best judgement of the assessor based on the Site conditions observed on January 25, 2010 and current environmental standards.

This report has been issued without having received a response to a request for information from the MOE. Our conclusions and recommendations may be amended based on information obtained from this regulatory agency.

We trust that the information provided in this report meets your current requirements. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,

PINCHIN ENVIRONMENTAL LTD.

DRAFT

per: Tracey-Ann Bullock, B.Sc.
Project Technologist
Environmental Due Diligence &
Remediation
tbullock@pinchin.com

DRAFT

per: Andy Vanin, P. Eng.
Operations Manager
Environmental Due Diligence &
Remediation
avanin@pinchin.com

TB/AV/ih

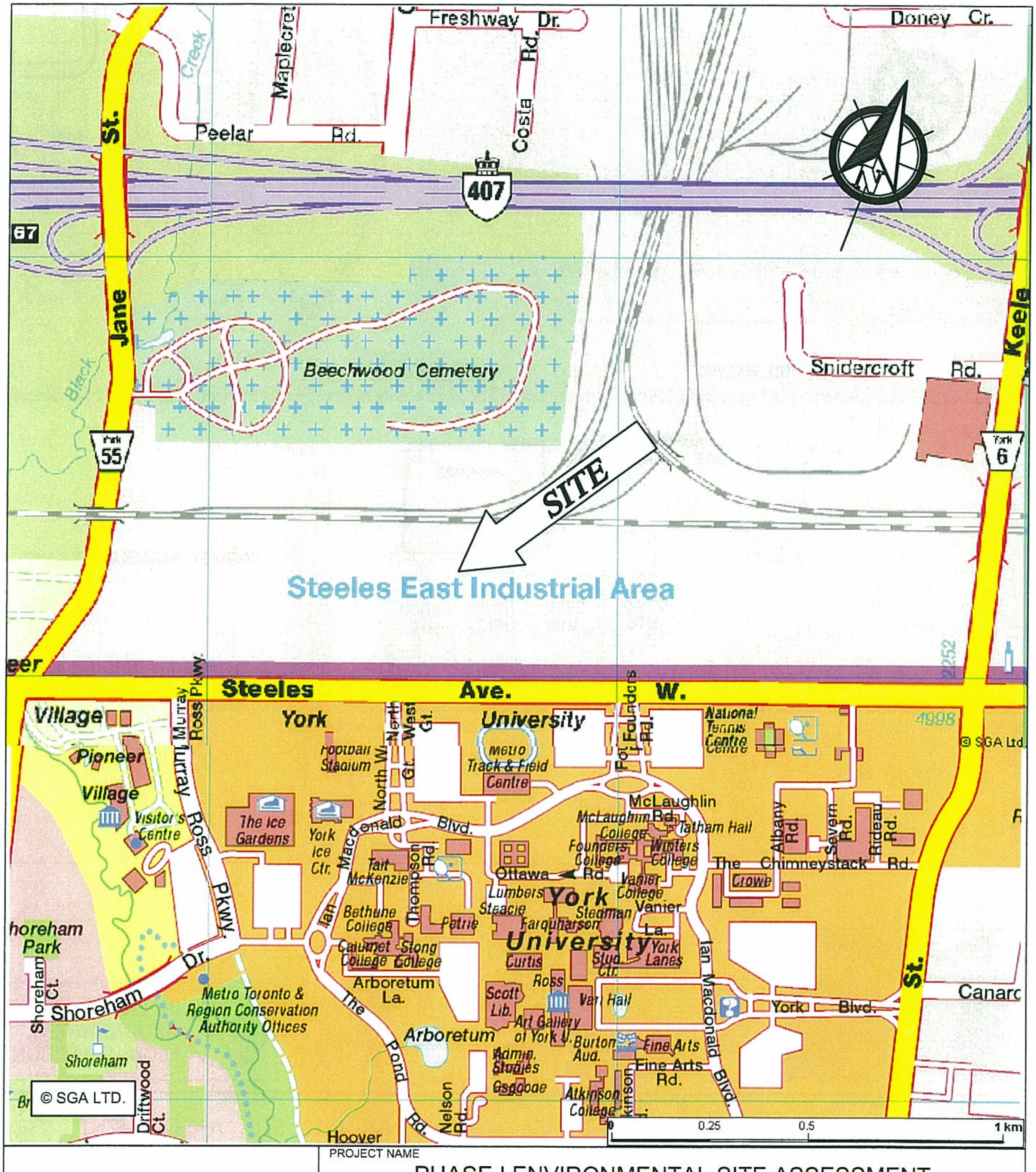
10.0 REFERENCES

The following documents, persons or organizations provided information used in this report:

1. EcoLog ERIS report entitled "*Un-named, Jane St & Steeles Ave W, Vaughan, Ontario*" dated January 26, 2010 (ERIS Project # 20100120022).
2. Risk Management Services.
3. Ontario Geological Survey 1991. Bedrock Geology of Ontario, southern sheet; Ontario Geological Survey, Map 2544, scale 1:1,000,000.
4. Barnett, P.J., Cowan, W.R. and Henry, A.P. 1991. Quaternary Geology of Ontario, Southern Sheet; Ontario Geological Survey, Map 2556, scale 1:1,000,000.
5. National Air Photo Library, Ottawa, Ontario.
6. City of Vaughan GIS System:
    - http://www.vaughanmaps.ca/Default.aspx
7. Toronto Reference Library, Toronto, Ontario.
8. Technical Standards & Safety Authority.
9. Ontario Ministry of the Environment.
10. MOE Brownfields Environmental Site Registry.

J:\57000s\57167 Shad\57167.002 Steeles\Phase I\Report\57167.002_DRAFT_PhI ESA_7100 Keele Street, Vaughan, ON_Feb. 3, 2010.docx

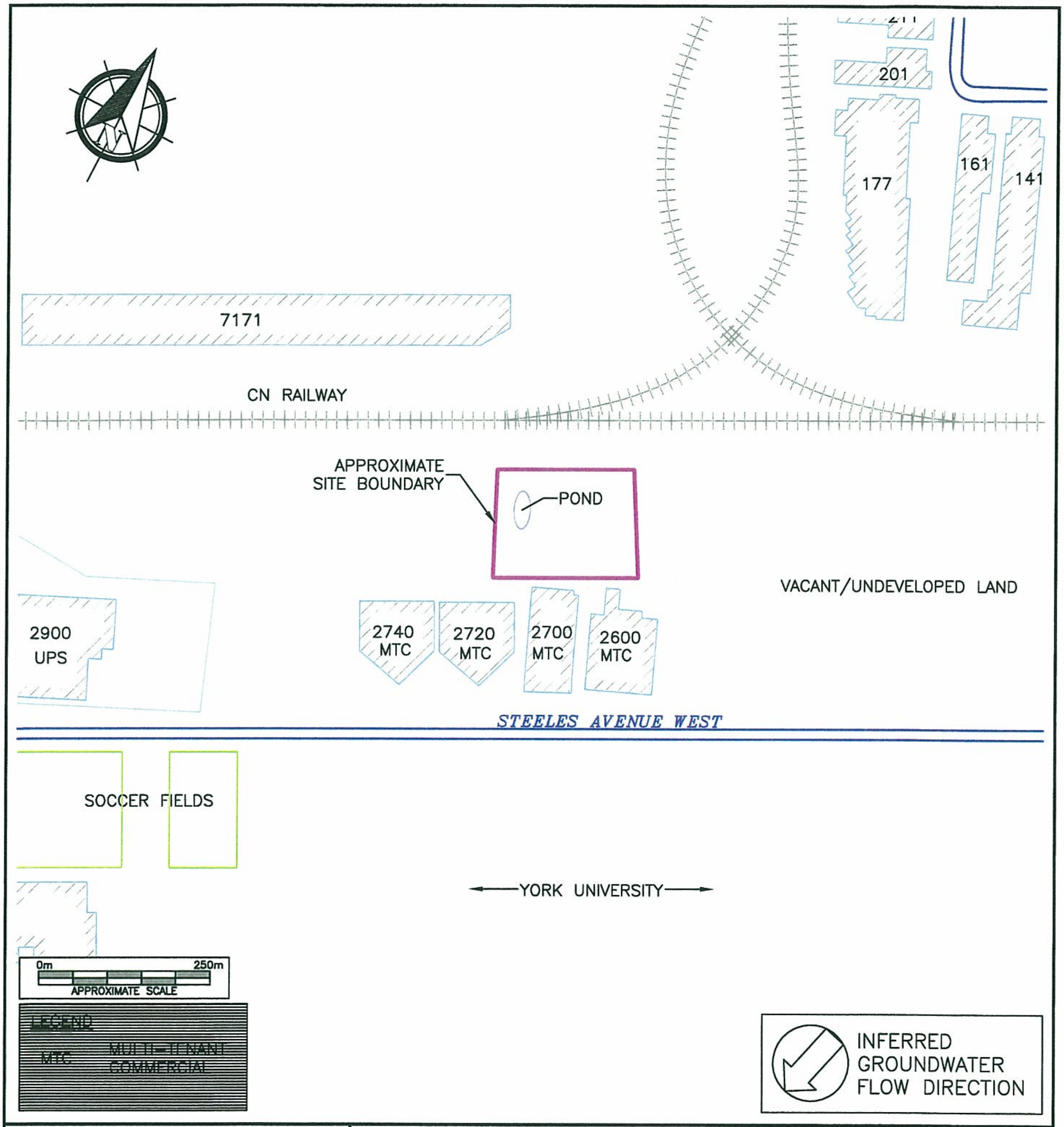
FIGURES



PINCHIN
ENVIRONMENTAL

PROJECT NAME PHASE I ENVIRONMENTAL SITE ASSESSMENT	
CLIENT NAME CITY OF VAUGHAN	
PROJECT LOCATION 7100 KEELE STREET, VAUGHAN, ONTARIO	
FIGURE NAME KEY MAP	FIGURE NO. 1

SCALE	PROJECT NO.	DATE:
AS SHOWN	57167.002	FEB. 2010



PINCHIN
ENVIRONMENTAL

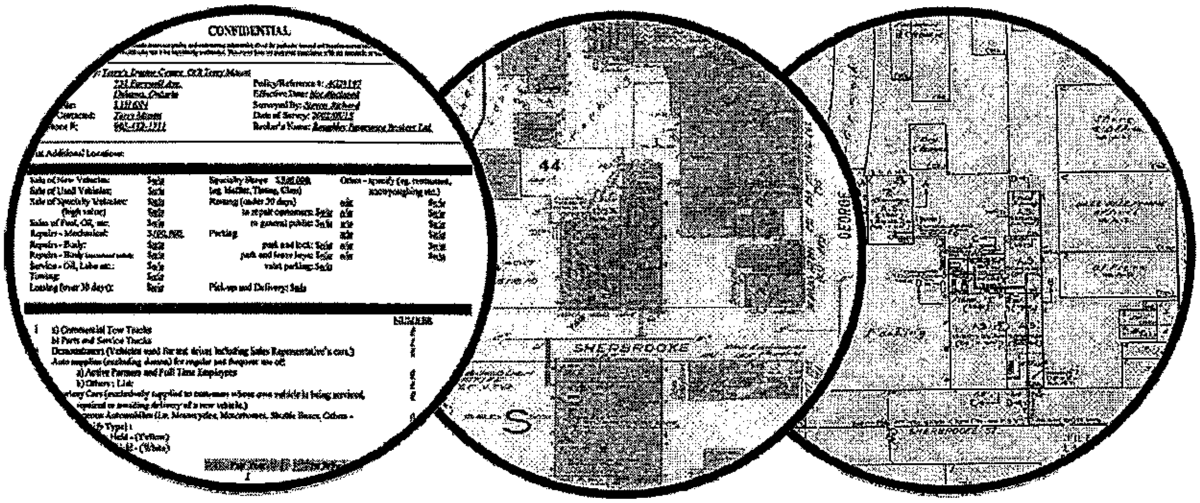
PROJECT NAME	PHASE I ENVIRONMENTAL SITE ASSESSMENT
CLIENT NAME	CITY OF VAUGHAN
PROJECT LOCATION	7100 KEELE STREET, VAUGHAN, ONTARIO
FIGURE NAME	SITE AND SURROUNDING LAND USE PLAN
FIGURE NO.	2
APPROXIMATE SCALE	AS SHOWN
PROJECT NO.	57167.002
DATE	FEB. 2010

APPENDIX I

RMS RESPONSE

HEIRS™

Historical
Environmental
Information
Reporting
System



Site Address:
7100 Keele St
Vaughan, ON

Project No:
57167.002

Requested by:
Irene Hutchison
Pinchin Environmental

Date Completed:
January 29, 2010

rms

RISK MANAGEMENT SERVICES
An **SCM** Company

150 Commerce Valley Drive W
Thornhill, ON L3T 7Z3
Tel: (905) 882-6300 xt5405
www.scm-rms.ca

Report Completed By:
Joan Majchrowski

HEIRS™

Historical
Environmental
Information
Reporting
System

NO RECORDS FOUND

Site Address:
7100 Keele St
Vaughan, ON

Project No:
57167.002

APPENDIX II

CORRESPONDENCE WITH REGULATORY AGENCIES

Ontario

Ministry of
Environment
and Energy

Freedom of Information Request

This form is for requesting documents which are in the Ministry's files on environmental concerns related to properties. Please refer to the guide on the completion and use of this form. Our fax no. is (416) 314-4285.

Requester Data

Name, Title, Company Name and Mailing Address of Requester

Irene Hutchison
Pinchin Environmental Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5
Email Address: ihutchison@pinchin.com

Telephone/Fax Nos.	Your Project/Reference No.	Signature of Requester
Tel : 905-363-1340 Fax : 905-363-0681	57167.002	

For Ministry Use Only

FOI Request No.

Date Request Received

Fee Paid $

☐ ACCT ☐ CHQ ☑ VISA ☐ CASH

CNR	ER	NOR	SWR	WCR
SAC	IEB	EAA	EMR	SWA

Request Parameters

Municipal Address / Lot, Concession, Geographic Township (Municipal address essential for cities, towns or regions)

7100 Keele Street, Vaughan, Ontario

Present Property Owner(s) and Date(s) of Ownership

City of Vaughan

Previous Property Owner(s) and Date(s) of Ownership

Present/Previous Tenant(s),(if applicable)

Search Parameters Files older than 2 years may require $60.00 retrieval cost. There is no guarantee that records responsive to your request will be located.	**Specify Year(s) Requested**
Environmental concerns (General correspondence, occurrence reports, abatement)	ALL YEARS
Orders	ALL YEARS
Spills	ALL YEARS
Investigations/prosecutions ▸ ***Owner and tenant information must be provided***	ALL YEARS
Waste Generator number/classes	ALL YEARS

Certificates of Approval ▸ Proponent information must be provided

1987 and prior records are searched manually. **Search fees in excess of $300.00** could be incurred, depending on the types and years to be searched. Specify Certificates of Approval number (s) (if known). **If supporting documents are also required, mark SD box** and specify type e.g. maps, plans, reports, etc.

	SD	Specify Year(s) Requested
air - *emissions*	YES	ALL YEARS
water - *mains, treatment, ground level, standpipes & elevated storage, pumping stations (local & booster)*	YES	ALL YEARS
sewage - *sanitary, storm, treatment, stormwater, leachate & leachate treatment & sewage pump stations*	YES	ALL YEARS
waste water - *industrial discharge*	YES	ALL YEARS
waste sites - *disposal, landfill sites, transfer stations, processing sites, incinerator sites*	YES	ALL YEARS
waste systems - *haulers: sewage, non-hazardous & hazardous waste, mobile waste processing units, PCB destruction*	YES	ALL YEARS
pesticides - *licenses*	NO	

A $5.00 non-refundable application fee, payable to the Minister of Finance, is mandatory. The cost of locating on-site and/or preparing any record is $30.00/hour and 20 cents/page for photocopying and you will be contacted for approval for fees in excess of $30.00.

APPENDIX III

ECOLOG ERIS

DATABASE
REPORTS

Canada's Primary Environmental Risk Information Service

Project Site: Un-named
Jane St & Steeles Ave W
Vaughan, ON

Client: Irene Hutchison
Pinchin Environmental
2470 Milltower Court
Mississauga, ON L5N7W5

ERIS Project No: 20100120022

Report Type: Custom Report - .25km Search Radius

Prepared By: Mark Mattei
mmattei@eris.ca

Date: January 26, 2010

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ECOLOG ERIS

12 Concorde Place, Suite 800 Toronto, Ontario M3C 4J2
416-510-5204 • Fax: 416-510-5133 Toll Free: 1-866-517-5204 • www.eris.ca • info@eris.ca

Table of Contents

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Report Summary

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Number of Mappable Records Surrounding the Site

Database		Selected	On-site	Within 0.25	0.25km to 0.25km	Total
AAGR	Abandoned Aggregate Inventory	N	0	0	0	0
AGR	Aggregate Inventory	N	0	0	0	0
AMIS	Abandoned Mine Information System	N	0	0	0	0
ANDR	Anderson's Waste Disposal Sites	N	0	0	0	0
AUWR	Automobile Wrecking & Supplies	N	0	0	0	0
BORE	Borehole	N	0	17	0	17
CA	Certificates of Approval	N	0	3	0	3
CFOT	Commercial Fuel Oil Tanks	N	0	0	0	0
CHEM	Chemical Register	N	0	0	0	0
COAL	Coal Gasification Plants	N	0	0	0	0
CONV	Compliance and Convictions	N	0	0	0	0
DRL	Drill Hole Database	N	0	0	0	0
EBR	Environmental Registry	N	0	1	0	1
EEM	Environmental Effects Monitoring	N	0	0	0	0
EHS	ERIS Historical Searches	N	0	6	0	6
EIIS	Environmental Issues Information System	N	0	0	0	0
FCON	Federal Convictions	N	0	0	0	0
FCS	Contaminated Sites on Federal Land	N	0	0	0	0
FOFT	Fisheries & Oceans Fuel Storage Tanks	N	0	0	0	0
FST	Fuel Storage Tank	N	0	2	0	2
GEN	Ontario Regulation 347 Waste Generators Summary	Y	0	20	0	20
IAFT	Indian & Northern Affairs Fuel Tanks	N	0	0	0	0
MINE	Canadian Mine Locations	N	0	0	0	0
MNR	Mineral Occurrences	N	0	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	N	0	0	0	0
NCPL	Non-Compliance Reports	N	0	0	0	0
NDFT	National Defence & Canadian Forces Fuel Storage Tanks	N	0	0	0	0
NDSP	National Defence & Canadian Forces Spills	N	0	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	N	0	0	0	0
NEES	National Environmental Emergencies System (NEES)	N	0	0	0	0
NPCB	National PCB Inventory	N	0	1	0	1
NPRI	National Pollutant Release Inventory	N	0	0	0	0
OGW	Oil and Gas Wells	N	0	0	0	0
OOGW	Ontario Oil and Gas Wells	N	0	0	0	0
OPCB	Inventory of PCB Storage Sites	Y	0	0	0	0
PAP	Canadian Pulp and Paper	N	0	1	0	1
PCFT	Parks Canada Fuel Storage Tanks	N	0	0	0	0
PES	Pesticide Register	N	0	1	0	1
PRT	Private and Retail Fuel Storage Tanks	N	0	4	0	4
REC	Ontario Regulation 347 Waste Receivers Summary	N	0	0	0	0
RSC	Record of Site Condition	N	0	0	0	0
RST	Retail Fuel Storage Tanks	N	0	0	0	0

Report Summary

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Database		Selected	On-site	Within 0.25	0.25km to 0.25km	Total
SCT	Scott's Manufacturing Directory	N	0	26	0	26
SPL	Ontario Spills	Y	0	14	0	14
SRDS	Wastewater Discharger Registration Database	N	0	0	0	0
TANK	Anderson's Storage Tanks	N	0	0	0	0
TCFT	Transport Canada Fuel Storage Tanks	N	0	0	0	0
WDS	Waste Disposal Sites - MOE CA Inventory	Y	0	0	0	0
WDSH	Waste Disposal Sites - MOE 1991 Historical Approval Inventory	Y	0	0	0	0
WWIS	Water Well Information System	N	0	7	0	7
		TOTAL	0	103	0	103

The databases chosen by the client as per the submitted order form are denoted in the 'Selected' column in the above table. Counts have been provided outside the primary buffer area for cursory examination only. These records have not been examined or verified, therefore, they are subject to change.

ECOLOG ERIS
Pinpointing Your Environmental Risks
12 Concorde Pl, Suite 800 North York, ON M3C 4J2
416-510-5204

Project Property: Un-named
Jane St && Steeles Ave W
Vaughan, ON

ERIS Project #: 20100120022

Date: JAN-26-2010

LEGEND

- ⬚ Project Property
- △ Database Location

Points of Interest

- Chimney
- ○ Silo

Pipe & Transmission Lines

- Pipeline
- Transmission Line
- Transmission Tower
- ■ Transformer Station

Rail

- Railway - Main
- Railway - Sidetrack
- Railway - Abandoned
- Bridge
- Tunnel

Transportation - Other

- ▨ Embankment
- Trail
- Runway

Hydrographic Features

- Permanent Waterway
- Intermittent Waterway
- ■ Open Reservoir
- Dyke/Levee
- Dam
- Breakwall
- ▨ Wetland

Landuse Classifications

- ▨ Open Area
- ▨ Residential
- ■ Commercial
- ▨ Resource and Industrial
- ▨ Government and Institutional
- ■ Parks and Recreational
- ▨ Waterbody

Recreation

- ■ Golf Course/Driving Range
- ■ Park/Sports Field
- ▨ Other Recreation Area
- Sports/Race Track
- ▨ Cemetery
- ▨ Campground

Vegetation

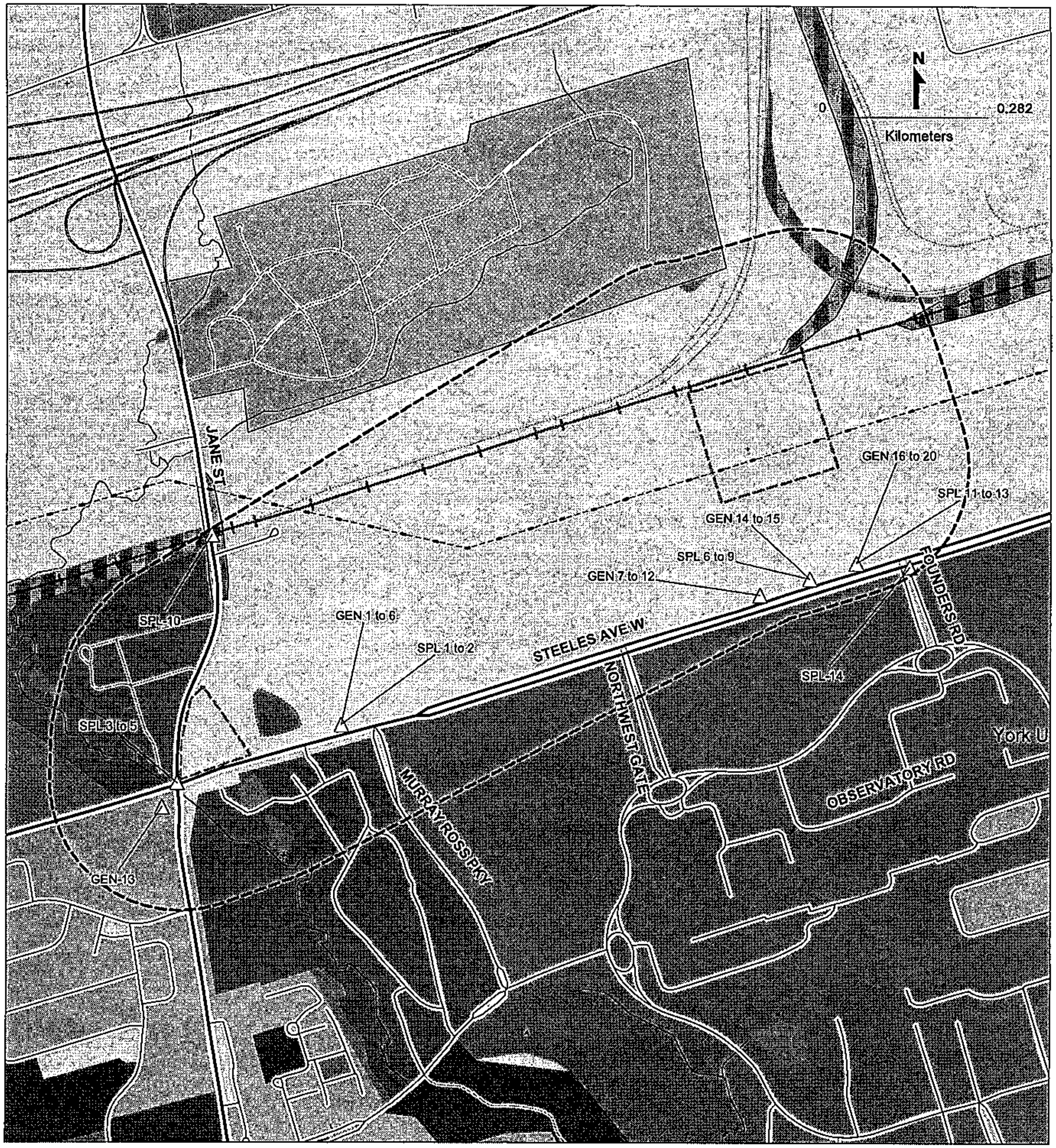
- ▨ Wooded Area
- Orchard
- ▨ Vineyard

Industrial Resources

- Conveyor
- Crane: Moveable
- Crane: Stationary
- ● Tank
- ▨ Rock Cut
- ■ Auto Wrecker
- ▨ Lumber Yard
- ■ Pit

This diagram is to be used solely for relative street location purposes. It may not accurately portray street or site positions.

SITE DIAGRAM



Site Report

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

FOR COMPLETE INFORMATION, REFER TO DETAIL REPORT

A search has been conducted for this site (address) and company name. No records were found, within the database(s) selected, that meet either of these criteria.

Detail Report

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan ON
Report Type: Custom Report, 0.25 km Search Radius

If information is required for sites located beyond the selected address, please contact your ERIS representative.

Ontario Regulation 347 Waste Generators Summary

Ontario Spills

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-1	UNITED PARCEL SERVICE CANADA LTD	2900 STEELES AVENUE WEST VAUGHAN L4K 3S2	4842	COURIER SERV. IND.	148	INORGANIC LABORATORY CHEMICALS
			Generator #: Approval Yrs:	ON0178514 97	212	ALIPHATIC SOLVENTS
					213	PETROLEUM DISTILLATES
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES
GEN-2	UNITED PARCEL SERVICE CANADA LIMITED	2900 Steeles Ave West Concord L4K 3S2			112	Acid solutions - containing heavy metals
			Generator #: Approval Yrs:	ON0178514 As of June 2009	122	Alkaline slutions - containing other metals and non-metals (not cyanide)
					145	Wastes from the use of pigments, coatings and paints
					148	Misc. wastes and inorganic chemicals
					212	Aliphatic solvents and residues
					213	Petroleum distillates
					221	Light fuels
					251	Waste oils/sludges (petroleum based)
					252	Waste crankcase oils and lubricants
					263	Misc. waste organic chemicals
					331	Waste compressed gases including cylinders
GEN-3	UNITED PARCEL SERVICE CANADA LTD.	2900 STEELS AVE. WEST CONCORD L4K 3S2	6351	GARAGES(GEN. REPAIR)	213	PETROLEUM DISTILLATES
			Generator #: Approval Yrs:	ON0178514 88,89,90	252	WASTE OILS & LUBRICANTS

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-4	UNITED PARCEL SERVICE CANADA LTD. 39-292	2900 STEELES AVENUE WEST VAUGHAN L4K 3S2	4842	COURIER SERV. IND.	148	INORGANIC LABORATORY CHEMICALS
			Generator #:	ON0178514	212	ALIPHATIC SOLVENTS
			Approval Yrs:	92,93,94,95,96	213	PETROLEUM DISTILLATES
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES
GEN-5	UNITED PARCEL SERVICE CANADA LIMITED	2900 STEELES AVENUE WEST VAUGHAN L4K 3S2	4842	COURIER SERV. IND.	145	PAINT/PIGMENT/COATING RESIDUES
			Generator #:	ON0178514	148	INORGANIC LABORATORY CHEMICALS
			Approval Yrs:	98,99,00,01	212	ALIPHATIC SOLVENTS
					213	PETROLEUM DISTILLATES
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-6	UNITED PARCEL SERVICE CANADA LIMITED	2900 Steeles Ave West Concord L4K 3S2			122	ALKALINE WASTES - OTHER METALS
			Generator #:	ON0178514	112	ACID WASTE - HEAVY METALS
			Approval Yrs:	02,03,04,05,06,07,08	122	ALKALINE WASTES - OTHER METALS
					122	ALKALINE WASTES - OTHER METALS
					331	WASTE COMPRESSED GASES
					145	PAINT/PIGMENT/COATING RESIDUES
					148	INORGANIC LABORATORY CHEMICALS
					212	ALIPHATIC SOLVENTS
					213	PETROLEUM DISTILLATES
					221	LIGHT FUELS
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES
GEN-7	WAJAX FLUID POWER,(OUT OF BUSINESS)	2720 STEELES AVENUE WEST VAUGHAN L4K 4N5	3999	OTHER MANU. PROD.	213	PETROLEUM DISTILLATES
			Generator #:	ON0160109	241	HALOGENATED SOLVENTS
			Approval Yrs:	98	252	WASTE OILS & LUBRICANTS
					253	EMULSIFIED OILS
GEN-8	DYNESCO INC.(SEE & USE ON0160109) 12-494	2720 STEELES AVE. W. VAUGHAN L4K 4N5	3999	OTHER MANU. PROD.	213	PETROLEUM DISTILLATES
			Generator #:	ON0764902	241	HALOGENATED SOLVENTS
			Approval Yrs:	92,93,94,95,96,97,98	252	WASTE OILS & LUBRICANTS
					253	EMULSIFIED OILS

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-9	DYNESCO INC.	2720 STEELES AVE. W. NORTH YORK L4K 4N5	3999 **Generator #:** **Approval Yrs:**	OTHER MANU. PROD. ON0764902 90	213 241 252 253	PETROLEUM DISTILLATES HALOGENATED SOLVENTS WASTE OILS & LUBRICANTS EMULSIFIED OILS
GEN-10	WAJAX FLUID POWER	2720 STEELES AVE. W. VAUGHAN L4K 4N5	3999 **Generator #:** **Approval Yrs:**	OTHER MANU. PROD. ON0160109 94,95	213 241 252 253	PETROLEUM DISTILLATES HALOGENATED SOLVENTS WASTE OILS & LUBRICANTS EMULSIFIED OILS
GEN-11	WAJAX FLUID POWER (OUT OF BUSINESS)	2720 STEELES AVE. W. VAUGHAN L4K 4N5	3999 **Generator #:** **Approval Yrs:**	OTHER MANU. PROD. ON0160109 96,97	213 241 252 253	PETROLEUM DISTILLATES HALOGENATED SOLVENTS WASTE OILS & LUBRICANTS EMULSIFIED OILS
GEN-12	INTERWOOD MARKETING GROUP	2720 STEELES AVENUE WEST VAUGHAN L4K 4S3	4799 **Generator #:** **Approval Yrs:**	OTHER STOR./WARE. ON1842700 94,95,96,97,98,99,00,01	148 263	INORGANIC LABORATORY CHEMICALS ORGANIC LABORATORY CHEMICALS
GEN-13	CANADIAN TENNIS ASSOCIATION	3111 STEELES AVENUE WEST NORTH YORK M3J 3H2	9642 **Generator #:** **Approval Yrs:**	PRO. ATHLETES, ETC. ON1789200 93,94,95,96,97,98	145 213	PAINT/PIGMENT/COATING RESIDUES PETROLEUM DISTILLATES
GEN-14	Northview Print & Copy Inc.	2700 STEELES AVENUE WEST, UNIT 1 CONCORD L4K 3C8	**Generator #:** **Approval Yrs:**	ON2337700 02,03,04	264	PHOTOPROCESSING WASTES
GEN-15	BETA REPRODUCTION INC.	2700 STEELES AVENUE WEST, UNIT 1 VAUGHAN L4K 3C8	7796 **Generator #:** **Approval Yrs:**	DUPLICATING SERV. ON2337700 97,98,99,00,01	264	PHOTOPROCESSING WASTES

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-16	ICI CANADA INC.	2600 STEELES AVENUE WEST VAUGHAN L4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON0003996 97,99,00,01	145 148	PAINT/PIGMENT/COATING RESIDUES INORGANIC LABORATORY CHEMICALS
GEN-17	ICI CANADA INC	2600 STEELES AVENUE WEST VAUGHAN L4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON0003996 98	145 148	PAINT/PIGMENT/COATING RESIDUES INORGANIC LABORATORY CHEMICALS
GEN-18	CLAIRTONE PROFESSIONAL PAINTS	2600 STEELES AVENUE WEST CONCORD L4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON1400200 90	145	PAINT/PIGMENT/COATING RESIDUES
GEN-19	ST. CLAIR PAINT AND WALLPAPER 08-851	2600 STEELES AVENUE WEST,VAUGHAN CONCORD K4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON1400200 92,93,94,95,96	145	PAINT/PIGMENT/COATING RESIDUES
GEN-20	ST. CLAIR PAINT(SEE & USE ON0003996)	2600 STEELES AVENUE WEST,VAUGHAN CONCORD K4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON1400200 97,98	145	PAINT/PIGMENT/COATING RESIDUES

Ontario Spills

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-1	UNITED PARCEL SERVICE	UNDERGROUND TANK BESIDE MAINTENANCE GARAGE AT 2900 STEELES AVE. WEST VAUGHAN CITY	77580	10/14/1992	10/15/1992		

Incident Summary: UNITED PARCEL SERVICE - 180 L OF WASTE OIL TO GROUND FROM TANK.
Incident Cause: CONTAINER OVERFLOW
Incident Reason: INTENTIONAL/PLANNED
Nature of Impact: Soil contamination
Receiving Medium: LAND
Environmental Impact: POSSIBLE

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-2	PETRO-CANADA	2900 STEELES AVENUE/JANE STREET UNITED PARCEL, NORTH SIDE OF STEELES TANK TRUCK (CARGO) VAUGHAN CITY	78781	11/13/1992	11/13/1992		

Incident Summary: PETRO-CANADA - 40L GASOLINE TO GROUND WHEN PIPING BROKE OFF TRUCK.
Incident Cause: PIPE/HOSE LEAK
Incident Reason: ERROR
Nature of Impact:
Receiving Medium: LAND
Environmental Impact: NOT ANTICIPATED

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-3	NORTH YORK WORKS	STEELES AVE WEST/JANE ST AT BLACK CREEK PIONEER VILLAGE. SANITARY SEWER SYSTEM TORONTO CITY	132902	10/10/1996	10/10/1996		

Incident Summary: NORTH YORK WORKS- SEWAGE OVERFLOW FROM SANITARY MANHOLE TO GR'ND,CLEANING
Incident Cause: OTHER CAUSE (N.O.S.)
Incident Reason: EQUIPMENT FAILURE
Nature of Impact: Soil contamination
Receiving Medium: LAND
Environmental Impact: POSSIBLE

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-4	CLAIRTONE PROFESSIONAL PAINTS	BLACK CREEK SHOREHAM & JANE, STEELES AND JANE CONCORD PLANT 2600 STEELES AVENUE WEST VAUGHAN CITY	56050	8/22/1991	8/22/1991		

Incident Summary: CLAIRTONE PROFESSIONAL PAINTS: THINNER IN BLACK CREEK
Incident Cause: UNDERGROUND TANK LEAK
Incident Reason: CORROSION
Nature of Impact: Surface Water Pollution
Receiving Medium: WATER
Environmental Impact: POSSIBLE

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-5	Toronto Transit Commission	CATCHBASIN ON STEELES JUST WEST OF JANE STREET<UNOFFICIAL> TORONTO	8786-5NUNEV	6/25/2003	6/25/2003	ETHYLENE GLYCOL (ANTIFREEZE)	25 L

Incident Summary: TTC-25 L Antifreeze to Road,15 L to CB
Incident Cause:
Incident Reason:
Nature of Impact:
Receiving Medium: Water
Environmental Impact: Not Anticipated

Ontario Spills

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-6	TRANSPORT TRUCK	NEAR 2700 STEELES AVE. WEST MOTOR VEHICLE (OPERATING FLUID) TORONTO CITY	46557 **Incident Summary:** TRANSPORT TRUCK RUPTURED SADDLE TANK; 675 L DIESELFUEL TO ROAD/SEWER **Incident Cause:** OTHER TRANSPORTATION ACCIDENT **Incident Reason:** ERROR **Nature of Impact:** Other **Receiving Medium:** LAND **Environmental Impact:** CONFIRMED	2/11/1991	2/11/1991		
SPL-7	TRANSPORT TRUCK	HUMBER RIVER, FROM 2700 STEELES AVE WEST, PARKING LOT EAST OF JANE ST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	223747 **Incident Summary:** LEVIGNE TRANSPORT: 350L DIESEL TO PKG LOT, 200 TOSTORMS.W/D,F/D,W/D. **Incident Cause:** OTHER CONTAINER LEAK **Incident Reason:** ERROR **Nature of Impact:** Water course or lake **Receiving Medium:** LAND **Environmental Impact:** CONFIRMED	4/5/2002	4/5/2002		
SPL-8	BFI	2700 STEELES AVE WEST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	129705 **Incident Summary:** BFI:100L HYDRAULIC OIL TO GROUND AND SEWER DUE TO RUPTURED HOSE ON TRUCK **Incident Cause:** PIPE/HOSE LEAK **Incident Reason:** OVERSTRESS/OVERPRESSURE **Nature of Impact:** Water course or lake **Receiving Medium:** LAND / WATER **Environmental Impact:** POSSIBLE	11/29/1990	11/29/1990		
SPL-9	TRANSPORT TRUCK	REAR OF 2700 STEELES AVE WEST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	164779 **Incident Summary:** MCKEVITT TRUCKING-228 L DIESEL TO PVMT FRM FUEL TANK.NO C-B'S IMPACTED. **Incident Cause:** OTHER TRANSPORTATION ACCIDENT **Incident Reason:** ERROR **Nature of Impact:** **Receiving Medium:** LAND **Environmental Impact:** NOT ANTICIPATED	2/18/1999	2/18/1999		
SPL-10	CANADIAN NATIONAL RAILWAY	AT JANE & STEELES JUST WEST OF CN'S YARD TRAIN TORONTO CITY	164711 **Incident Summary:** CN RAIL-90 L DIESEL ONTO GROUND & DITCH DUE TO TRAIN DERAILMENT.CLEANED. **Incident Cause:** DERAILMENT **Incident Reason:** UNKNOWN **Nature of Impact:** Soil contamination **Receiving Medium:** LAND **Environmental Impact:** POSSIBLE	2/16/1999	2/16/1999		

Ontario Spills

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-11	TRANSPORT TRUCK	2600 STEELES AVENUE WEST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	74512 **Incident Summary:** TRANSPORT TRUCK: 300 L DIESEL FUEL TO LAND **Incident Cause:** OTHER CONTAINER LEAK **Incident Reason:** OTHER **Nature of Impact:** Water course or lake **Receiving Medium:** LAND **Environmental Impact:** POSSIBLE	8/10/1992	8/10/1992		
SPL-12	ICI PAINTS (CANADA) INC.	ICI CANADA- NW CRN OF PROPERTY-YARD VAUGHAN PLANT 8200 KEELE STREET VAUGHAN CITY	208602 **Incident Summary:** ICI PAINTS(CANADA)INC.- 23-45 L OF SHELLSOL 7 TO CONC CONTAINMENT.CLEANED **Incident Cause:** UNKNOWN **Incident Reason:** UNKNOWN **Nature of Impact:** Soil contamination **Receiving Medium:** Land **Environmental Impact:** Possible	8/10/2001	8/10/2001		
SPL-13	ICI PAINTS (CANADA) INC.	ICI PAINT - WHAREHOUSE, 2600 STEELES AVE. VAUGHAN PLANT 8200 KEELE STREET VAUGHAN CITY	210320 **Incident Summary:** BACKENTRY -ICI PAINTS: 180 L PAINT TO GROUND. CLEANED. **Incident Cause:** OTHER CAUSE (N.O.S.) **Incident Reason:** DAMAGE BY MOVING EQUIPMENT **Nature of Impact:** Soil contamination **Receiving Medium:** Land **Environmental Impact:** Confirmed	8/2/2001	8/29/2001		
SPL-14	TRANSPORT TRUCK	CB AT CORNER OF STEELES & FOUNDERS RD AT YORK U CAMPUS. MOTOR VEHICLE (OPERATING FLUID) TORONTO CITY	153436 **Incident Summary:** BON L INC-2-4 L DIESEL TOROADWAY & CATCHBASIN,FD &WORKS,CLEANED-UP. **Incident Cause:** OTHER CONTAINER LEAK **Incident Reason:** ERROR **Nature of Impact:** **Receiving Medium:** LAND / WATER **Environmental Impact:** NOT ANTICIPATED	3/18/1998	3/18/1998		

Appendix: Ontario Database Descriptions

EcoLog Environmental Risk Information Services Ltd can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to EcoLog ERIS at the time of update. <u>Note</u>: Databases denoted with "*" indicates that the database will no longer be updated. See the individual database descriptions for more information.

Provincial Government Source Databases:

<u>Abandoned Aggregate Inventory</u> Up to Sept 2002 AAGR

The MAAP Program maintains a database of all abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.

<u>Aggregate Inventory</u> Up to Mar 2008 AGR

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. Please note that the database is only referenced by lot\concession and city/town location. The databases provides information regarding the registered owner/operator, location, status, licence type, and maximum tonnage.

<u>Abandoned Mines Information System</u> 1800-2005 AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

<u>Borehole</u> 1875-Jul 2009 BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc.
For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

<u>Certificates of Approval</u> 1985-Sept 2002* (for current CofA info please check the EBR Database) CA

This database contains the following types of approvals: Certificates of Approval (Air) issued under Section 9 of the Ontario EPA; Certificates of Approval (Industrial Wastewater) issued under Section 53 of the Ontario Water Resources Act ("OWRA"); and Certificates of Approval (Municipal/Provincial Sewage and Waterworks) issued under Sections 52 and 53 of the OWRA. For more current Certificate of Approval information please see the EBR database, which will include information such as 'Approval for discharge into the natural environment other than water (i.e. Air) (EPA s.9)', and Approval for sewage works (OWRA s.53(1)).

<u>TSSA Commercial Fuel Oil Tanks</u> 1948-2009 CFOT

Since May 2002, Ontario developed a new act where it became mandatory for fuel oil tanks to be registered with Technical Standards & Safety Authority (TSSA). This data would include all commercial underground fuel oil tanks in Ontario with fields such as location, registration number, tank material, age of tank and tank size.

Coal Gasification Plants 1987, 1988* **COAL**

This inventory of all known and historical coal gasification plants was collected by the Ministry of Environment. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, landuse, soil condition, site operators/occupants, site description, and potential environmental impacts. This information is effective to 1988, but the program has since been discontinued.

Compliance and Convictions 1989-2009 **CONV**

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Drill Holes 1886-2005 **DRL**

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Environmental Registry 1994-2009 **EBR**

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, licence, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes things like; Approval for discharge into the natural environment other than water (i.e. Air), Permit to Take Water (PTTW), Certificate of Property Use (CPU), Approval for a waste disposal site, Order for preventative measures.(EPA s. 18), Order for conformity with Act for waste disposal sites.(EPA s. 44), Order for remedial work.(EPA s. 17) and many more.

TSSA Fuel Storage Tanks Current to Dec 2008 **FST**

The Technical Standards & Safety Authority (TSSA), under the *Technical Standards & Safety Act* of 2000 maintains a database of registered private and retail fuel storage tanks in Ontario with fields such as location, tank status, license date, tank type, tank capacity, fuel type, installation year and facility type.

Ontario Regulation 347 Waste Generators Summary 1986-Jun 2009 **GEN**

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Mineral Occurrences 1846-Sept 2008 **MNR**

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the planimetric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Non-Compliance Reports **1992(water only), 1994-2007** **NCPL**

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

Ontario Oil and Gas Wells **1800-Aug 2009** **OOGW**

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. Information available for all wells in the ERIS database include well owner/operator, location, permit start date, well cap date, licence number, status, depth and the primary target (rock unit) of the well being drilled.

Ontario Inventory of PCB Storage Sites **1987-Oct 2004** **OPCB**

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Pesticide Register **1988-Nov 2008** **PES**

The Ontario Ministry of Environment maintains a database of all manufacturers and vendors of registered pesticides.

Private and Retail Fuel Storage Tanks **1989-1996*** **PRT**

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Ontario Regulation 347 Waste Receivers Summary **1986-2008** **REC**

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Record of Site Condition **1997-Sept 2001, Oct 2004-2009** **RSC**

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use, such as residential, proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up. Information available includes Registration Number, Filing Owner, Property Address, Filing Date and Municipality.

Ontario Spills **1988-2008** **SPL**

This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Wastewater Discharger Registration Database **1990-2008** **SRDS**

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Waste Disposal Sites - MOE CA Inventory **1970-Sept 2002** **WDS**

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. For more current information for Waste Disposal Sites please see the EBR database, which will include information such as 'Approval for a waste disposal site (EPA s.27)' and 'Approval for use of a former waste disposal site (EPA s.46)'.

Waste Disposal Sites - MOE 1991 Historical Approval Inventory **Up to Oct 1990*** **WDSH**

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Water Well Information System **1955-May 2009** **WWIS**

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. Geographic coordinates are reliable according to the given percentage. Wells that are identified with lot and concession only are now also included in the database and is no longer provided as a separate report.

Federal Government Source Databases: Diagram Identifier:

Environmental Effects Monitoring **1992-2007*** **EEM**

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Environmental Issues Inventory System **1992-2001*** **EIIS**

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Federal Convictions **1988-Jun 2007** **FCON**

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Contaminated Sites on Federal Land **June 2000-Sept 2009** **FCS**

The Treasury Board of Canada Secretariat maintains an inventory of all known contaminated sites held by various Federal departments and agencies. This inventory does not include properties owned by Crown corporations, but does contain non-federal sites for which the Government of Canada has accepted some or all financial responsibility. All sites have been classified through a system developed by the Canadian Council of Ministers of the Environment. The database provides information on company name, location, site ID #, property use, classification, current status, contaminant type and plan of action for site remediation.

Fisheries & Oceans Fuel Tanks **1964-Sept 2003** **FOFT**

Fisheries & Oceans Canada maintains an inventory of all aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Indian & Northern Affairs Fuel Tanks **1950-Aug 2003** **IAFT**

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of all aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

National Analysis of Trends in Emergencies System (NATES) **1974-1994*** **NATE**

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

National Defence & Canadian Forces Fuel Tanks **Up to May 2001*** **NDFT**

The Department of National Defence and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

National Defence & Canadian Forces Spills **Mar 1999-Jul 2009** **NDSP**

The Department of National Defence and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

National Defence & Canadian Forces Waste Disposal Sites **2001-April 2007** **NDWD**

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

National Environmental Emergencies System (NEES) 1974-2003 **NEES**

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for all previous Environment Canada spill datasets. NEES is composed of the historic datasets – or Trends – which dates from approximately 1974 to present. **NEES Trends** is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

National PCB Inventory 1988-June 2004 **NPCB**

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. All federal out-of-service PCB containing equipment and all PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites.

National Pollutant Release Inventory 1993-2007 **NPRI**

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers of 178 specified substances.

Parks Canada Fuel Storage Tanks 1920-Jan 2005 **PCFT**

Canadian Heritage maintains an inventory of all known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Transport Canada Fuel Storage Tanks 1970-March 2007 **TCFT**

With the provinces of BC, MB, NB, NF, ON, PE, and QC; Transport Canada currently owns and operates 90 fuel storage tanks. This inventory will also include The Pickering Lands, which refers to the 7,530 hectares (18,600 acres) of land in Pickering, Markham and Uxbridge - owned by the Government of Canada since 1972. Properties on this land has been leased by the government since 1975, falls under the Site Management Policy of Transport Canada, but administered by Public Works and Government Services Canada. Our inventory provides information on the site name, location, tank age, capacity and fuel type.

Private Source Databases:

Anderson's Waste Disposal Sites 1860s-Present **ANDR**

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the *Ontario MOE Waste Disposal Site Inventory*, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. *Please note that the data is not warranted to be complete, exhaustive or authoritive. The information was collected for research purposes only.*

Automobile Wrecking & Supplies **2001-Feb 2009** **AUWR**

This database provides an inventory of all known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Chemical Register **1992, 1999-Feb 2009** **CHEM**

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

ERIS Historical Searches **1999-Oct 2009** **EHS**

EcoLog ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Canadian Mine Locations **1998-2009** **MINE**

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Oil and Gas Wells **Oct 2001-2009** **OGW**

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickles' database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Canadian Pulp and Paper **1999, 2002, 2004, 2005, 2009** **PAP**

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Retail Fuel Storage Tanks **2000-Feb 2009** **RST**

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks. Information is provided on company name, location and type of business.

Scott's Manufacturing Directory **1992-Sept 2009** **SCT**

Scott's Directories is a data bank containing information on over 70,000 manufacturers in Ontario. Even though Scott's listings are voluntary, it is the most comprehensive database of Ontario manufacturers available. Information concerning a company's address, plant size, and main products are included in this database. This database begins with 1992 information and is updated annually.

Anderson's Storage Tanks **1915-1953*** **TANK**

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. *Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.*

APPENDIX IV

PHOTOGRAPHS

Photo 1 – View of the Site facing northeast, showing the surrounding land use (Canadian National Railway) north/northeast of the Site.

Photo 2 – View of the surrounding land use east of the Site.

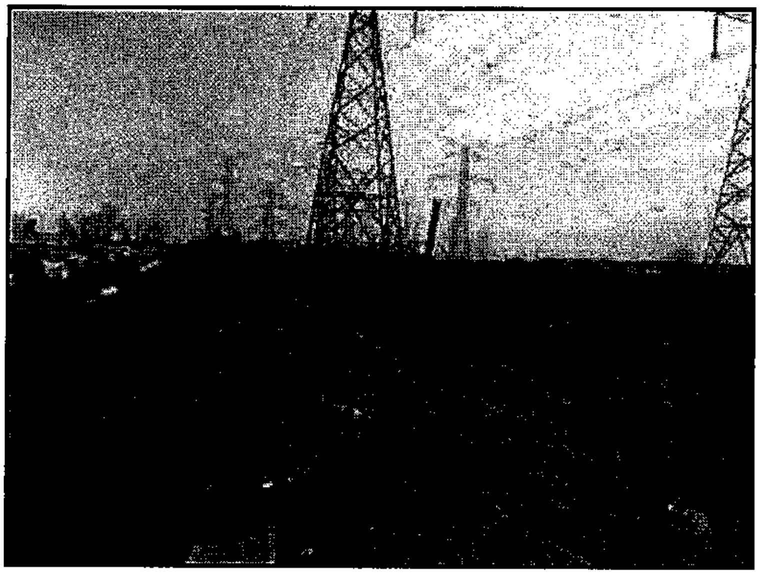


Photo 3 – View of the surrounding land use west of the Site.

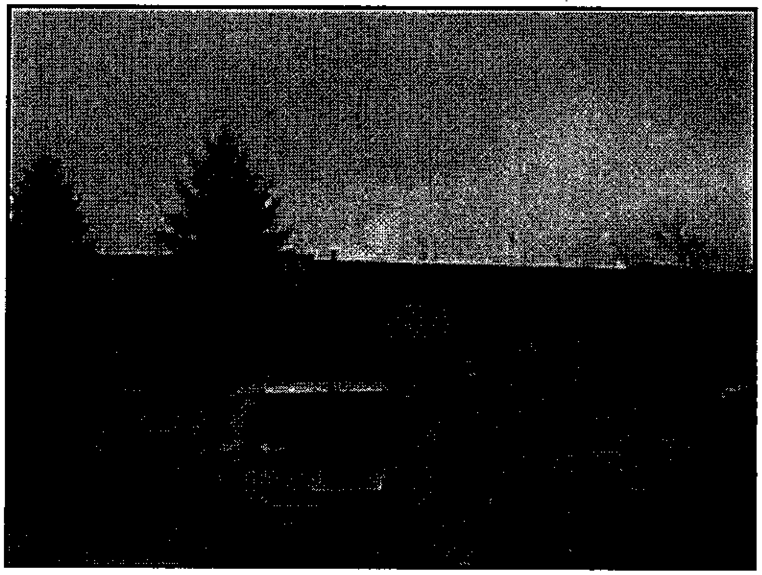


Photo 4 – View of the surrounding property northwest of the Site.

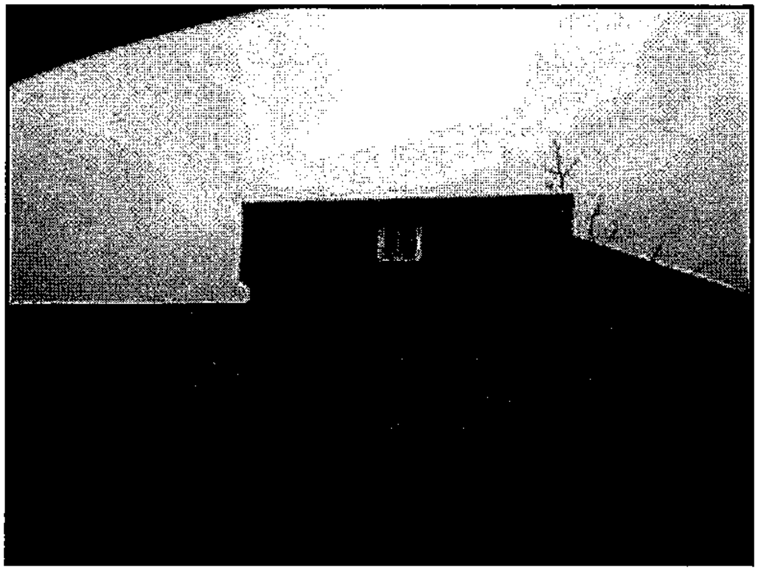


Photo 3 – View of the surrounding property south of the Site (2600 Steeles Avenue West).

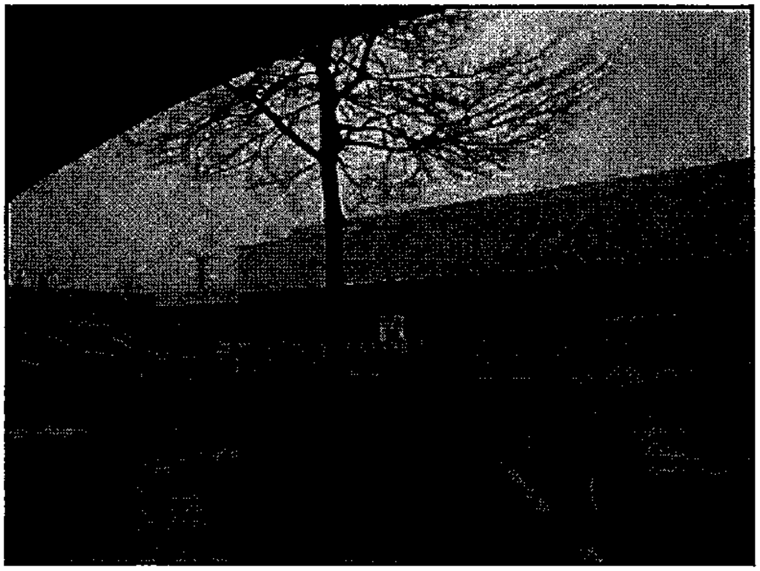


Photo 3 – View of the surrounding property south of the Site (2720 Steeles Avenue West).

APPENDIX V
QUALIFICATIONS OF ASSESSOR

Tracey-Ann Bullock, B.Sc (Hons), Project Technologist

Tracey-Ann Bullock is a Project Technologist within the Environmental Due Diligence & Remediation ("EDR") Group in Pinchin's Mississauga office. Ms. Bullock obtained an honours Bachelor of Science degree in Geoscience from McMaster University in 2009. Prior to joining Pinchin's Environmental Due Diligence & Remediation Group, she worked as a Team Leader with the Environmental Sciences Group as a scientific advisor to the Department of National Defence on the DEW Line Cleanup Project. Ms. Bullock has gained experience conducting Phase I and II Environmental Site Assessments, site remediation programs, long-term monitoring programs, field sampling of soil and groundwater, and preparation of professional reports. In addition, Ms. Bullock's experience with managing soil remediation projects has lead to experience with a variety of environmental contaminants including petroleum hydrocarbons, metals, and PCBs.

Appendix 1D

Phase I Environmental Site Assessment, Part of Lot 1, Concession 4 - Pinchin Environmental Ltd.

DRAFT
Phase I Environmental Site Assessment
Part of Lot 1, Concession 4
Vaughan, Ontario

Prepared for:
City of Vaughan c/o The Sernas Group Inc.
c/o Shad & Associates Inc.
83 Citation Drive,
Unit 9
Vaughan, Ontario
L4K 2Z6

Attention: Mr. Houshang Shad

February 4, 2010

Pinchin File: 57167.001

EXECUTIVE SUMMARY

Pinchin Environmental Ltd. ("Pinchin") was retained on January 19, 2010 by Mr. Houshang Shad of Shad & Associates Inc. ("Client"), on behalf of The Sernas Group Inc., and the City of Vaughan, to conduct a Phase I Environmental Site Assessment ("ESA") of the property identified as Part of Lot 1, Concession 4, Vaughan, Ontario (hereafter referred to as the "Site"). At the time of Pinchin's Site visit, the Site was vacant and developed with a stormwater management pond.

Pinchin was advised by the Client that the purpose of the Phase I ESA was to assess potential issues of environmental concern in relation to the potential redevelopment of the Site.

The Phase I ESA was completed in general accordance with the Canadian Standards Association ("CSA") document entitled "*Phase I Environmental Site Assessment, CSA Standard Z768-01*" dated November 2001, including a review of readily available historical records, a review of readily accessible regulatory records, a Site visit, interviews, an evaluation of information and reporting, subject to the limitations outlined in Section 8.0 of this report.

Based on the results of the Phase I ESA completed by Pinchin, the following could give rise to potential subsurface impacts in connection with the Site:

- A stormwater management pond was located on Site. This stormwater management pond and associated sediment from surrounding properties could give rise to potential soil impacts in connection with the Site; and
- United Parcel Service Canada Limited ("UPS"), located at 2900 Steeles Avenue West, had been registered with the MOE as a generator (Generator # ON0178514) of various hazardous wastes including inorganic and organic laboratory chemicals, aliphatic solvents, petroleum distillates, halogenated and non-halogenated pesticides, oil skimmings and sludges, and waste oils and lubricants from 1988 to 1990 and from 1992 until as of June 2009. This property is located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the distance between this property and the Site, as well as the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation may give rise to potential subsurface impacts in connection with the Site.

Based on the findings noted above, Pinchin recommends completing a Phase II ESA at the Site.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.
This report has been issued without having received a response from the Ontario Ministry of the Environment ("MOE"). Once a response is received, the information will be reviewed by Pinchin and, if there is any information that represents a potential issue of environmental concern, a copy of the response will be forwarded to the Client under separate cover. Our conclusions and recommendations may be amended based on this information.

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background

Pinchin Environmental Ltd. ("Pinchin") was retained on January 19, 2010 by Mr. Houshang Shad of Shad & Associates Inc. ("Client"), on behalf of The Sernas Group Inc., and the City of Vaughan, to conduct a Phase I Environmental Site Assessment ("ESA") of the property identified as Part of Lot 1, Concession 4, Vaughan, Ontario (hereafter referred to as the "Site"). At the time of Pinchin's Site visit, the Site was vacant and developed with a stormwater management pond.

Pinchin was advised by the Client that the purpose of the Phase I ESA was to assess potential issues of environmental concern in relation to the potential redevelopment of the Site.

1.2 Scope of Work

The Phase I ESA was completed in general accordance with the Canadian Standards Association ("CSA") document entitled "*Phase I Environmental Site Assessment, CSA Standard Z768-01*" dated November 2001, including a review of readily available historical and regulatory records, a Site visit, interviews, an evaluation of information and reporting, all subject to the limitations outlined in Section 8.0 of this report.

2.0 SITE DESCRIPTION

2.1 Site Location and Physical Description

As indicated on Figure 1 (Key Map), the Site is located on the north side of Steeles Avenue West approximately 130 metres ("m") east of Jane Street in Vaughan, Ontario. The Site is situated in an area that consists of predominantly commercial and residential land uses. Figure 2 illustrates the Site and surrounding area.

A summary of the physical description of the Site is provided below:

Topic	Findings
Site Area	1.2 hectares (2.97 acres).
Buildings on-Site	None. The Site was vacant and undeveloped.
Number of Floors (Including ground level)	Not applicable.
Subsurface Levels	Not applicable.
Approx. Footprint Area of Buildings	Not applicable.
Approx. Total Area of Buildings	Not applicable.
Heating / Cooling	Not applicable.
Elevators	Not applicable.

Topic	Findings
Emergency Generators	Not applicable.
Landscaped / Grassed/Bare Ground Areas	The Site consisted of vegetated land.
Paved or Other Sealed Surface Materials	Not applicable.

2.2 Topographic, Geologic and Hydrogeologic Setting

Topic	Findings
Topography of Site and Surrounding Area	The Site gradually sloped south/southeast.
Site Grade Relative to the Adjoining Properties	The Site was approximately 5 m lower in elevation than the adjoining properties, as it was a stormwater management pond.
Subsurface Soils	Halton Till (silt to silty clay matrix with high carbonate content).
Fill Materials	None observed.
Bedrock Type	Shale, limestone, dolostone and siltstone of the Georgian Bay Formation.
Inferred Bedrock Depth	Unknown based on the information reviewed.
Inferred Groundwater Depth	Unknown based on the information reviewed.
Nearest Open Water Body	Black Creek is located approximately 150 m south/southwest of the Site. Lake Ontario is located approximately 16 km south/southeast of the Site.
Inferred Groundwater Flow Direction	South based on topography.

2.3 Site Operations

The Site consisted of vacant land developed with a stormwater management pond.

3.0 HISTORICAL RECORDS REVIEW

3.1 Site Interviews and Records

There was no Site Representative available at the time of the Site visit.

3.2 Aerial Photographs

Copies of aerial photographs dated 1954, 1984, 2003 and 2007 were obtained from the National Air Photo Library in Ottawa, Ontario, and the online City of Vaughan GIS System, and reviewed by Pinchin. A summary of information obtained with respect to the Site is provided in the following table:

Year of Photograph	Site
1954 - 1984	The Site appeared to consist of vacant, agricultural/undeveloped land.
2003 - 2007	The Site appeared to consist of vacant, undeveloped land.

A summary of information obtained with respect to the surrounding area is provided in the following table:

Year of Photograph	North	East	South	West
1954 - 1984	Vacant undeveloped/ agricultural land.	Vacant undeveloped/ agricultural land.	Steeles Avenue West appeared to be constructed south of the Site.	Vacant undeveloped/ agricultural land, followed by Jane Street.
2003 - 2007	A large commercial building and associated parking lot appeared to be constructed at 2900 Steeles Avenue West.	A large commercial building appeared to be constructed at 2900 Steeles Avenue West.	Similar to 1984.	Similar to 1984.

Based on Pinchin's review of the above-noted aerial photographs, nothing was observed that is likely to give rise to potential subsurface impacts in connection with the Site.

3.3 RMS Information

Pinchin contacted Risk Management Services ("RMS") to obtain copies of Fire Insurance Plans ("FIPs") related to the Site and surrounding area, as well as Property Underwriters' Reports ("PURs") and Property Underwriters' Plans ("PUPs") related to the Site. No records related to the Site and surrounding area were provided for Pinchin's review by RMS.

3.4 City Directories

City directories for the years 1967 to 2001 were reviewed by Pinchin at the Toronto Reference Library in Toronto, Ontario. A summary of information obtained with respect to the Site is provided in the following table:

Year(s)	Occupant Listings for Site Address
1967 - 2001	Not listed.

In general, the city directories indicated that the surrounding area has been historically occupied by commercial and residential uses since 1967.

No historical dry cleaning operations, retail fuel outlets or other operations of potential environmental concern were identified.

Based on Pinchin's review of the above-noted city directories, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site.

3.5 Previous Environmental Reports

No previous reports (i.e., Phase I ESAs, geological or geotechnical reports) were provided for Pinchin's review.

3.6 Historical Summary

Based on the results of the historical review, nothing was identified that is likely to give rise to potential subsurface impacts in connection with the Site.

4.0 REGULATORY INFORMATION AND CORRESPONDENCE

4.1 Site Regulatory Information

Pinchin was not provided regulatory information with respect to the Site.

4.2 Ontario Ministry of the Environment

An Ontario Ministry of the Environment ("MOE") Freedom of Information request was submitted to the MOE for information on file with respect to the Site. Specifically, the MOE was asked what information it has regarding historical spills, orders, investigations/prosecutions, waste generator numbers/classes and Certificates-of-Approval ("C-of-As"). At the time of writing this report, no response had been received from the MOE. When a formal response is received, it will be reviewed by Pinchin. If there is any information that represents a potential issue of environmental concern, a copy of the response will be forwarded to the Client under separate cover. Our conclusions and recommendations may be amended based on this information. A copy of Pinchin's request submitted to the MOE is provided in Appendix II of this report.

Pinchin conducted a search of the MOE *Brownfields Environmental Site Registry.* Based on the results of Pinchin's search, a Record of Site Condition ("RSC") has not been filed for the Site or neighbouring properties, within an 1800 m radius of the Site.

4.3 Technical Standards & Safety Authority

The Technical Standards & Safety Authority ("TSSA") was contacted to establish the status of the Site with respect to its files, to identify outstanding instructions, incident reports, fuel/oil spills or contamination records associated with the Site. Based on e-mail correspondence with Mr. Carlien Buist of the TSSA on February 2, 2010, no information was on file with respect to the Site.

4.4 EcoLog ERIS

Pinchin submitted a request to EcoLog Environmental Risk Information Services Ltd. ("ERIS") for a review of the following databases, as they pertain to the Site and surrounding properties:

- Inventory of PCB Storage Sites, dated 1987 to October 2004;
- Waste Generators Summary, dated 1986 to June 2009;
- Waste Disposal Sites – MOE CA Inventory, dated 1970 to September 2002; and
- Ontario Spills, dated 1988 to 2008.

In addition, Pinchin reviewed the following publications prepared by INTERA for the MOE, dated April 1987:

- "*Inventory of Coal and Gasification Plant Waste Sites in Ontario*"; and
- "*Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario*".

A copy of the EcoLog ERIS report is provided in Appendix III. Information obtained from the above-noted sources indicated the following:

- The Site was not listed in any of the above-noted databases reviewed by Pinchin;
- United Parcel Service Canada Limited ("UPS"), located at 2900 Steeles Avenue West, had been registered with the MOE as a generator (Generator # ON0178514) of various hazardous wastes including inorganic and organic laboratory chemicals, aliphatic solvents, petroleum distillates, halogenated and non-halogenated pesticides, oil skimmings and sludges, and waste oils and lubricants from 1988 to 1990 and from 1992 until as of June 2009. This property is located adjacent to the north/east Site boundaries and is inferred to be hydraulically up/transgradient relative to the Site. Based on the distance between this property and the Site, as well as the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation may give rise to potential subsurface impacts in connection with the Site;
- Additional surrounding properties were registered with the MOE as waste generators. However, based on the information provided within the EcoLog ERIS report, the location/distance between these properties and the Site, as well as the inferred direction of groundwater flow, it is Pinchin's opinion that the potential issues of concern associated with these listings are unlikely to give rise to potential subsurface impacts in connection with the Site;
- The Ontario Spills database indicated that on October 14, 1992, 180 litres of waste oil spilled onto the ground from a storage tank at UPS (the adjoining property to the north/east), resulting in a possible environmental impact. On November 13, 1992, 40 litres of gasoline spilled onto the ground due to a hose leak at the UPS property. It is unclear if these releases entered the Site;
- The Ontario Spills database indicated that on February 16, 1999, 90 litres of diesel spilled onto the ground and ditch from a trail derailment, resulting in a possible environmental impact. The spill was located approximately 230 m north of the Site and is inferred to be hydraulically upgradient relative to the Site. Based on the distance between this release and the Site, it is Pinchin's opinion that this historical spill is unlikely to give rise to potential subsurface impacts in connection with the Site;
- The Ontario Spills database indicated that on October 10, 1996, a sewage overflow from the sanitary sewer system spilled onto the ground at Black Creek Pioneer Village located on the southeast corner of the intersection between Steeles Avenue West and Jane Street. The spill was located approximately 40 m south/southwest of the Site and is inferred to be hydraulically downgradient relative to the Site. Based on the inferred direction of groundwater flow, it is Pinchin's opinion that this historical spill is unlikely to give rise to potential subsurface impacts in connection with the Site; and

- The Ontario Spills database indicated that on June 25, 2003, 25 litres of ethylene glycol (antifreeze) spilled onto the road and into a catch basin located just west of Jane Street on Steeles Avenue West. The spill was located approximately 200 m west/southwest of the Site and is inferred to be hydraulically transgradient relative to the Site. Based on the distance between this spill and the Site, it is Pinchin's opinion that this historical spill is unlikely to give rise to potential subsurface impacts in connection with the Site.

Based on Pinchin's review of the above-noted information sources, the following could give rise to potential subsurface impacts in connection with the Site:

- UPS, located at 2900 Steeles Avenue West, had been registered with the MOE as a generator (Generator # ON0178514) of various hazardous wastes including inorganic and organic laboratory chemicals, aliphatic solvents, petroleum distillates, halogenated and non-halogenated pesticides, oil skimmings and sludges, and waste oils and lubricants from 1988 to 1990 and from 1992 until as of June 2009. This property is located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the distance between this property and the Site, as well as the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation may give rise to potential subsurface impacts in connection with the Site; and
- The Ontario Spills database indicated that on October 14, 1992, 180 litres of waste oil spilled onto the ground from a storage tank at UPS (the adjoining property to the north/east), resulting in a possible environmental impact. On November 13, 1992, 40 litres of gasoline spilled onto the ground due to a hose leak at the UPS property. It is unclear if these releases entered the Site.

4.5 Regulatory Information Summary

Based on the regulatory information reviewed, the following could give rise to potential subsurface impacts in connection with the Site:

- UPS, located at 2900 Steeles Avenue West, had been registered with the MOE as a generator (Generator # ON0178514) of various hazardous wastes including inorganic and organic laboratory chemicals, aliphatic solvents, petroleum distillates, halogenated and non-halogenated pesticides, oil skimmings and sludges, and waste oils and lubricants from 1988 to 1990 and from 1992 until as of June 2009. This property is located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the distance between this property and the Site, as well as the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation may give rise to potential subsurface impacts in connection with the Site; and

- The Ontario Spills database indicated that on October 14, 1992, 180 litres of waste oil spilled onto the ground from an UST at UPS, resulting in a possible environmental impact. The spill was located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. The Ontario Spills database indicated that on November 13, 1992, 40 litres of gasoline spilled onto the ground due to a hose leak at UPS. The spill was located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the volume of the release, the inferred direction of groundwater flow, and the distance between this property and the Site, it is Pinchin's opinion that these historical spills may give rise to potential subsurface impacts in connection with the Site.

5.0 SITE VISIT

Ms. Tracey-Ann Bullock of Pinchin (see Appendix V for assessor qualifications) conducted a Site visit on January 25, 2010. The Site visit included a walk-through of the Site. At the time of the Site visit, the ground surface was wet, with minimal snow cover, and the weather was raining. The Site visit was documented with notes and photographs. The results of the Site visit are discussed below. Photographs of some of the features noted during the Site visit are attached in Appendix IV.

5.1 Hazardous Materials

No hazardous materials were observed on-Site during the Site visit.

5.2 Storage Tanks

5.2.1 Aboveground Storage Tanks

No aboveground storage tanks ("ASTs") were observed on-Site. However, Pinchin was unaccompanied at the time of the Site visit. Therefore, a representative knowledgeable about the Site was not available to confirm or deny the presence of a former or current AST located at the Site.

5.2.2 Underground Storage Tanks

No evidence of underground storage tanks ("USTs") (i.e., fill/vent pipes) were observed on-Site. However, Pinchin was unaccompanied at the time of the Site visit. Therefore, a representative knowledgeable about the Site was not available to confirm or deny the presence of a former or current UST located at the Site.

5.3 Water and Wastewater

Topic	Findings
Water Supply Source	Not applicable.
Water Use	None observed.
Sanitary/Process Wastewater Receptor	No sanitary or process wastewater was generated at the Site.

Topic	Findings
Pits, Sumps or Lagoons	No pits, sumps or lagoons were observed on-Site.
Grease Traps	None observed.
Oil/Water Separators	None observed.
Storm Water Flow and Receptor	No catch basins or sewers were observed on-Site. Storm water would likely run overland and percolate naturally through the soil or collect in the on-Site storm water management pond.
Wells	None observed.
Watercourses, Ditches or Standing Water	None observed, however the Site was used as a storm water management pond.

5.4 Polychlorinated Biphenyls

The use of polychlorinated biphenyls ("PCBs") as dielectric fluids in electrical equipment such as transformers, fluorescent lamp ballasts and capacitors was common up to about 1980. The Federal Chlorobiphenyls Regulation, SOR/91-152, prohibits the use of PCBs in the aforementioned electrical equipment installed after July 1, 1980.

PCBs were not considered an issue as the Site was undeveloped.

5.5 Asbestos-Containing Materials

Asbestos-containing materials ("ACMs") are commonly found in building construction materials (particularly in older buildings constructed prior to 1985). Friable asbestos (friable is defined as a material that can be crumbled, powdered or pulverized by hand pressure) was widely used in sprayed fireproofing until 1973, and in decorative or finishing plasters, and thermal systems insulation until the early 1980s. Non-friable or manufactured asbestos products were widely used in building construction including in vinyl floor tiles, sheet flooring, ceiling tiles, pipe gaskets, roofing materials, asbestos cement boards, and numerous other products until the mid-1980s. A very limited number of non-friable asbestos products in limited quantities are still in use currently in building construction. The application of friable asbestos was banned by Ontario Regulation 654/85, which came into effect March 1985. On November 1, 2005, this regulation was most recently updated and changed to Ontario Regulation 278/05.

ACMs were not considered an issue as the Site was undeveloped.

5.6 Lead Containing Paints

Although paints containing lead were banned from uses on exterior or interior surfaces of buildings, furniture or household products in the 1970s, various commercial paints (e.g., road paint) are still known to contain lead.

Lead-containing paints were not considered an issue as the Site was undeveloped.

5.7 Ozone-Depleting Substances

Ozone-depleting substances were not considered an issue as the Site was undeveloped.

5.8 Radon

Radon was not considered an issue as the Site was undeveloped. In addition, the geology of the area is not considered an issue with respect to radon generation.

5.9 Mould or Microbial Contamination

The presence of mould or other microbiological contamination in buildings has become a concern to building tenants and owners due to potential health effects on occupants and users. Provincial Ministries of Labour have recently issued guidelines on enforced regulations to protect the health of construction workers who are exposed to mould in the course of building renovation. The presence of water leaks or high humidity can cause the growth or amplification of mould within building environments.

Mould and microbial contamination was not considered an issue as the Site was undeveloped.

5.10 Air Emissions

Air emissions were not considered an issue as the Site was undeveloped.

5.11 Staining and Stressed Vegetation

No evidence of historical chemical discharges or releases (i.e., staining or stressed vegetation) was observed during the Site visit.

5.12 Non-Hazardous Wastes

Non-hazardous wastes were not produced as the Site was undeveloped.

6.0 ACTIVITIES ON ADJACENT PROPERTIES

The Site was located in an urban area that was developed with commercial and residential land uses. A description of the adjacent properties is summarized in the following table, based on Pinchin's observations from the Site and publicly accessible locations:

	NORTH	EAST	SOUTH	WEST
OPERATION OR ACTIVITY	UPS (2900 Steeles Avenue West), followed by Canadian National Railway that runs northeast to southwest.	UPS (2900 Steeles Avenue West).	Steeles Avenue West followed by Black Creek Pioneer Village.	Forested areas followed by Jane Street.

	NORTH	EAST	SOUTH	WEST
DIRECTION WITH RESPECT TO INFERRED GROUNDWATER FLOW	Upgradient.	Transgradient.	Downgradient.	Transgradient.
VISIBLE EMISSIONS	None observed.	None observed.	None observed.	None observed.
VISIBLE OUTDOOR STORAGE OF HAZARDOUS MATERIALS	None observed.	None observed.	None observed.	None observed.

Based on Pinchin's observations of the adjacent properties, nothing was observed that is likely to give rise to potential subsurface impacts in connection with the Site.

7.0 FINDINGS AND RECOMMENDATIONS

Based on the results of the Phase I ESA completed by Pinchin, the following could give rise to potential subsurface impacts in connection with the Site:

- A stormwater management pond was located on Site. This stormwater management pond and associated sediment from surrounding properties could give rise to potential soil impacts in connection with the Site;
- UPS, located at 2900 Steeles Avenue West, had been registered with the MOE as a generator (Generator # ON0178514) of various hazardous wastes including inorganic and organic laboratory chemicals, aliphatic solvents, petroleum distillates, halogenated and non-halogenated pesticides, oil skimmings and sludges, and waste oils and lubricants from 1988 to 1990 and from 1992 until as of June 2009. This property is located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the distance between this property and the Site, as well as the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation may give rise to potential subsurface impacts in connection with the Site; and
- The Ontario Spills database indicated that on October 14, 1992, 180 litres of waste oil spilled onto the ground from an UST at UPS, resulting in a possible environmental impact. The spill was located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. The Ontario Spills database indicated that on November 13, 1992, 40 litres of gasoline spilled onto the ground due to a hose leak at UPS. The spill was located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the volume of the release, the inferred direction of groundwater flow, and the distance between this property and the Site, it is Pinchin's opinion that these historical spills may give rise to potential subsurface impacts in connection with the Site.

8.0 STANDARD LIMITATIONS

This Phase I ESA was performed in order to identify potential issues of environmental concern associated with the Site identified as Part of Lot 1, Concession 4, Vaughan, Ontario, at the time of the Site visit. This Phase I ESA was performed in general accordance with currently acceptable practices for completing Phase I ESAs and specific Client requests, as applicable to this Site. This report was prepared for the sole use of the Client. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the sole responsibility of the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Such reliance will only be provided by Pinchin following written authorization from Client. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed.

The information provided in this report is based upon analysis of available documents, records and drawings, and personal interviews. In evaluating the Site, Pinchin has relied in good faith on information provided by other individuals noted in this report. Pinchin has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the current owner/occupant. Pinchin accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted, or contained in reports that were reviewed. The scope of work for this Phase I ESA did not include an intrusive investigation for designated substances (i.e., asbestos, mould, etc.) and, therefore, these materials may be present in concealed areas.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

The CSA document entitled "*Phase I Environmental Site Assessment, CSA Standard Z768-01*" dated November 2001, does not apply to environmental auditing or environmental management systems. Therefore, with respect to Site operations and conditions, compliance with applicable Federal, Provincial or Municipal acts, regulations, laws and/or statutes was not evaluated as part of the Phase I ESA.

9.0 CLOSURE

The conclusions and recommendations represent the best judgement of the assessor based on the Site conditions observed on January 25, 2010 and current environmental standards.

This report has been issued without having received a response to a request for information from the MOE. Our conclusions and recommendations may be amended based on information obtained from this regulatory agency.

We trust that the information provided in this report meets your current requirements. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,

PINCHIN ENVIRONMENTAL LTD.

DRAFT

per: Tracey-Ann Bullock, B.Sc.
Project Technologist
Environmental Due Diligence &
Remediation
tbullock@pinchin.com

DRAFT

per: Andy Vanin, P. Eng.
Operations Manager
Environmental Due Diligence &
Remediation
avanin@pinchin.com

TB/AV/ih

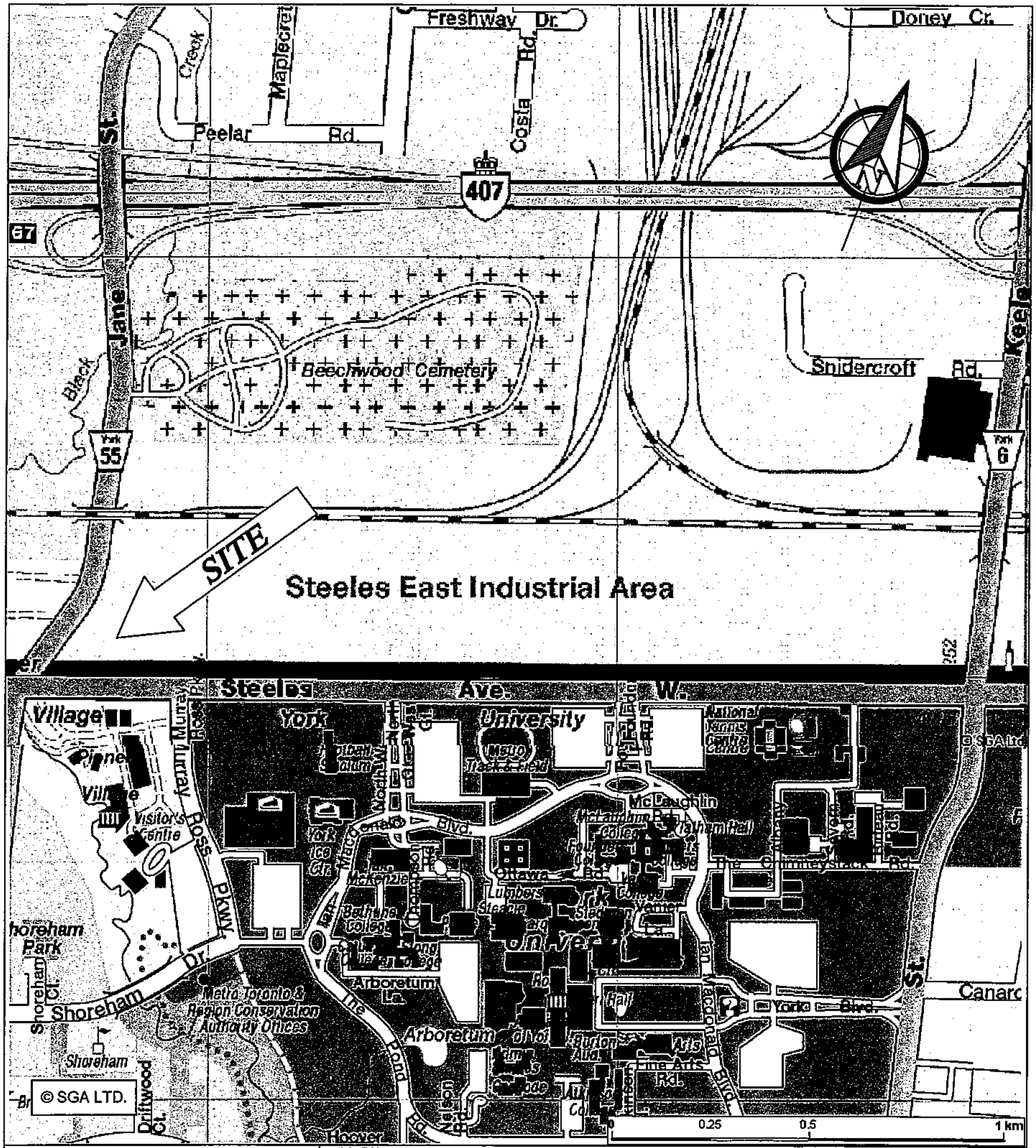
10.0 REFERENCES

The following documents, persons or organizations provided information used in this report:

1. EcoLog ERIS report entitled "*Un-named, Jane St & Steeles Ave W, Vaughan, Ontario*" dated January 26, 2010 (ERIS Project # 20100120022).
2. Risk Management Services.
3. Ontario Geological Survey 1991. Bedrock Geology of Ontario, southern sheet; Ontario Geological Survey, Map 2544, scale 1:1,000,000.
4. Barnett, P.J., Cowan, W.R. and Henry, A.P. 1991. Quaternary Geology of Ontario, Southern Sheet; Ontario Geological Survey, Map 2556, scale 1:1,000,000.
5. National Air Photo Library, Ottawa, Ontario.
6. City of Vaughan GIS System:
    - http://www.vaughanmaps.ca/Default.aspx
7. Toronto Reference Library, Toronto, Ontario.
8. Technical Standards & Safety Authority.
9. Ontario Ministry of the Environment.
10. MOE Brownfields Environmental Site Registry.

J:\57000s\57167 Shad\57167.001 Jane\Phase I\Report\57167.001_DRAFT_Ph I ESA_Part Lot 1, Concession 4, Vaughan, ON_Feb. 3, 2010.docx

FIGURES



PINCHIN
ENVIRONMENTAL

PROJECT NAME
PHASE I ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
CITY OF VAUGHAN

PROJECT LOCATION
PART OF LOT 1, CONCESSION 4, VAUGHAN, ONTARIO

FIGURE NAME
KEY MAP

FIGURE NO.
1

SCALE
AS SHOWN

PROJECT NO.
57167.001

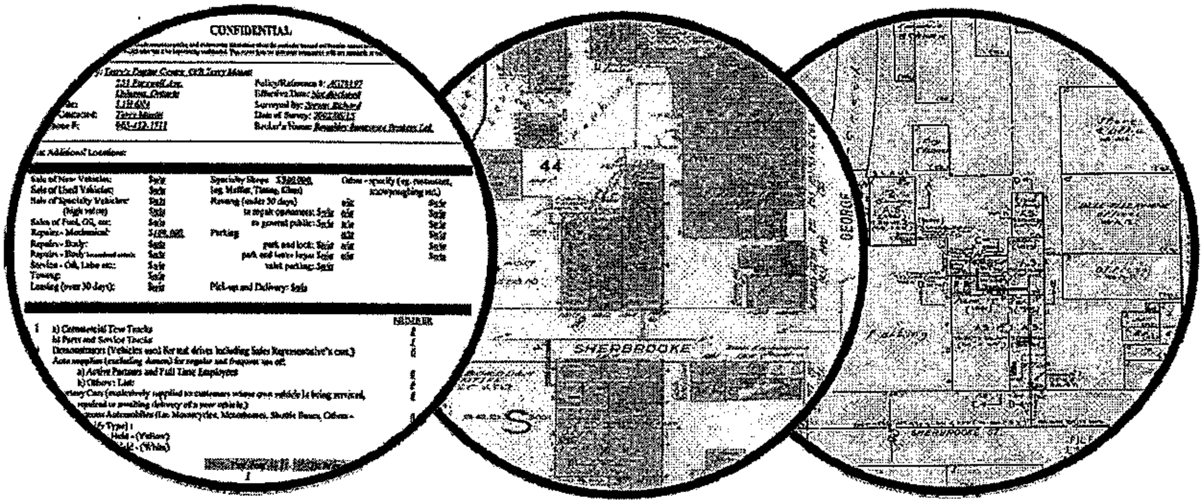
DATE:
FEB. 2010

APPENDIX I

RMS RESPONSE

HEIRS™

Historical
Environmental
Information
Reporting
System



Site Address:
Part Lot 1, Concession 4
Vaughan, ON

Project No:
57167.001

Requested by:
Irene Hutchison
Pinchin Environmental

Date Completed:
January 29, 2010

RISK MANAGEMENT SERVICES
An **SCM** Company

150 Commerce Valley Drive W
Thornhill, ON L3T 7Z3
Tel: (905) 882-6300 ext 5410
www.scm-rms.ca

Report Completed By:
Vanessa Ode

HEIRS™

Historical
Environmental
Information
Reporting
System

NO RECORDS FOUND

Site Address:
Part Lot 1, Concession 4
Vaughan, ON

Project No:
57167.001

APPENDIX II

CORRESPONDENCE WITH REGULATORY AGENCIES

Ontario

Ministry of
Environment
and Energy

Freedom of Information Request

This form is for requesting documents which are in the Ministry's files on environmental concerns related to properties. Please refer to the guide on the completion and use of this form. Our fax no. is (416) 314-4285.

Requester Data

Name, Title, Company Name and Mailing Address of Requester

Irene Hutchison
Pinchin Environmental Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5
Email Address: ihutchison@pinchin.com

Telephone/Fax Nos.	Your Project/Reference No.	Signature of Requester
Tel : 905-363-1340 Fax : 905-363-0681	57167.001	

For Ministry Use Only

FOI Request No.

Date Request Received

Fee Paid $

☐ ACCT ☐ CHQ ☑ VISA ☐ CASH

CNR	ER	NOR	SWR	WCR
SAC	IEB	EAA	EMR	SWA

Request Parameters

Municipal Address / Lot, Concession, Geographic Township **(Municipal address essential for cities, towns or regions)**

Part of Lot 1, Concession 4, Vaughan, Ontario

Present Property Owner(s) and Date(s) of Ownership

City of Vaughan

Previous Property Owner(s) and Date(s) of Ownership

Present/Previous Tenant(s),(if applicable)

Search Parameters Files older than 2 years may require $60.00 retrieval cost. There is no guarantee that records responsive to your request will be located.	**Specify Year(s) Requested**
Environmental concerns (General correspondence, occurrence reports, abatement)	ALL YEARS
Orders	ALL YEARS
Spills	ALL YEARS
Investigations/prosecutions ▸ ***Owner and tenant information must be provided***	ALL YEARS
Waste Generator number/classes	ALL YEARS

Certificates of Approval ▸ Proponent information must be provided

1987 and prior records are searched manually. **Search fees in excess of $300.00** could be incurred, depending on the types and years to be searched. Specify Certificates of Approval number (s) (if known). **If supporting documents are also required, mark SD box** and specify type e.g. maps, plans, reports, etc.

	SD	Specify Year(s) Requested
air - *emissions*	YES	ALL YEARS
water - *mains, treatment, ground level, standpipes & elevated storage, pumping stations (local & booster)*	YES	ALL YEARS
sewage - *sanitary, storm, treatment, stormwater, leachate & leachate treatment & sewage pump stations*	YES	ALL YEARS
waste water - *industrial discharge*	YES	ALL YEARS
waste sites - *disposal, landfill sites, transfer stations, processing sites, incinerator sites*	YES	ALL YEARS
waste systems - *haulers: sewage, non-hazardous & hazardous waste, mobile waste processing units, PCB destruction*	YES	ALL YEARS
pesticides - *licenses*	NO	

A $5.00 non-refundable application fee, payable to the Minister of Finance, is mandatory. The cost of locating on-site and/or preparing any record is $30.00/hour and 20 cents/page for photocopying and you will be contacted for approval for fees in excess of $30.00.

APPENDIX III

ECOLOG ERIS

DATABASE
REPORTS

Canada's Primary Environmental Risk Information Service

Project Site:	Un-named Jane St & Steeles Ave W Vaughan, ON
Client:	Irene Hutchison Pinchin Environmental 2470 Milltower Court Mississauga, ON L5N7W5
ERIS Project No:	20100120022
Report Type:	Custom Report - .25km Search Radius
Prepared By:	Mark Mattei mmattei@eris.ca
Date:	January 26, 2010

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ECOLOG ERIS

12 Concorde Place, Suite 800 Toronto, Ontario M3C 4J2
416-510-5204 • Fax: 416-510-5133 Toll Free: 1-866-517-5204 • www.eris.ca • info@eris.ca

Table of Contents

Order Number:	20100120022
Site Name:	Un-named
Site Address:	Jane St & Steeles Ave W Vaughan, ON
Report Type:	Custom Report, 0.25 km Search Radius

Report Summary

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Number of Mappable Records Surrounding the Site

Database		Selected	On-site	Within 0.25	0.25km to 0.25km	Total
AAGR	Abandoned Aggregate Inventory	N	0	0	0	0
AGR	Aggregate Inventory	N	0	0	0	0
AMIS	Abandoned Mine Information System	N	0	0	0	0
ANDR	Anderson's Waste Disposal Sites	N	0	0	0	0
AUWR	Automobile Wrecking & Supplies	N	0	0	0	0
BORE	Borehole	N	0	17	0	17
CA	Certificates of Approval	N	0	3	0	3
CFOT	Commercial Fuel Oil Tanks	N	0	0	0	0
CHEM	Chemical Register	N	0	0	0	0
COAL	Coal Gasification Plants	N	0	0	0	0
CONV	Compliance and Convictions	N	0	0	0	0
DRL	Drill Hole Database	N	0	0	0	0
EBR	Environmental Registry	N	0	1	0	1
EEM	Environmental Effects Monitoring	N	0	0	0	0
EHS	ERIS Historical Searches	N	0	6	0	6
EIIS	Environmental Issues Information System	N	0	0	0	0
FCON	Federal Convictions	N	0	0	0	0
FCS	Contaminated Sites on Federal Land	N	0	0	0	0
FOFT	Fisheries & Oceans Fuel Storage Tanks	N	0	0	0	0
FST	Fuel Storage Tank	N	0	2	0	2
GEN	Ontario Regulation 347 Waste Generators Summary	Y	0	20	0	20
IAFT	Indian & Northern Affairs Fuel Tanks	N	0	0	0	0
MINE	Canadian Mine Locations	N	0	0	0	0
MNR	Mineral Occurrences	N	0	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	N	0	0	0	0
NCPL	Non-Compliance Reports	N	0	0	0	0
NDFT	National Defence & Canadian Forces Fuel Storage Tanks	N	0	0	0	0
NDSP	National Defence & Canadian Forces Spills	N	0	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	N	0	0	0	0
NEES	National Environmental Emergencies System (NEES)	N	0	0	0	0
NPCB	National PCB Inventory	N	0	1	0	1
NPRI	National Pollutant Release Inventory	N	0	0	0	0
OGW	Oil and Gas Wells	N	0	0	0	0
OOGW	Ontario Oil and Gas Wells	N	0	0	0	0
OPCB	Inventory of PCB Storage Sites	Y	0	0	0	0
PAP	Canadian Pulp and Paper	N	0	1	0	1
PCFT	Parks Canada Fuel Storage Tanks	N	0	0	0	0
PES	Pesticide Register	N	0	1	0	1
PRT	Private and Retail Fuel Storage Tanks	N	0	4	0	4
REC	Ontario Regulation 347 Waste Receivers Summary	N	0	0	0	0
RSC	Record of Site Condition	N	0	0	0	0
RST	Retail Fuel Storage Tanks	N	0	0	0	0

Report Summary

Order Number: 20100120022
Site Name: Un-named
Site Address: Jane St & Steeles Ave W Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Database		Selected	On-site	Within 0.25	0.25km to 0.25km	Total
SCT	Scott's Manufacturing Directory	N	0	26	0	26
SPL	Ontario Spills	Y	0	14	0	14
SRDS	Wastewater Discharger Registration Database	N	0	0	0	0
TANK	Anderson's Storage Tanks	N	0	0	0	0
TCFT	Transport Canada Fuel Storage Tanks	N	0	0	0	0
WDS	Waste Disposal Sites - MOE CA Inventory	Y	0	0	0	0
WDSH	Waste Disposal Sites - MOE 1991 Historical Approval Inventory	Y	0	0	0	0
WWIS	Water Well Information System	N	0	7	0	7
		TOTAL	0	103	0	103

The databases chosen by the client as per the submitted order form are denoted in the 'Selected' column in the above table. Counts have been provided outside the primary buffer area for cursory examination only. These records have not been examined or verified, therefore, they are subject to change.

ECOLOG ERIS

Pinpointing Your Environmental Risks

12 Concorde Pl, Suite 800 North York, ON M3C 4J2
416-510-5204

Project Property: Un-named
Jane St && Steeles Ave W
Vaughan, ON

ERIS Project #: 20100120022

Date: JAN-26-2010

LEGEND

- ⬚ Project Property
- ▲ Database Location

Points of Interest

- Chimney
- ○ Silo

Pipe & Transmission Lines

- Pipeline
- Transmission Line
- Transmission Tower
- Transformer Station

Rail

- Railway - Main
- Railway - Sidetrack
- Railway - Abandoned
- Bridge
- Tunnel

Transportation - Other

- Embankment
- Trail
- Runway

Hydrographic Features

- Permanent Waterway
- Intermittent Waterway
- ■ Open Reservoir
- Dyke/Levee
- Dam
- Breakwall
- Wetland

Landuse Classifications

- Open Area
- Residential
- Commercial
- Resource and Industrial
- Government and Institutional
- Parks and Recreational
- Waterbody

Recreation

- Golf Course/Driving Range
- Park/Sports Field
- Other Recreation Area
- Sports/Race Track
- Cemetery
- Campground

Vegetation

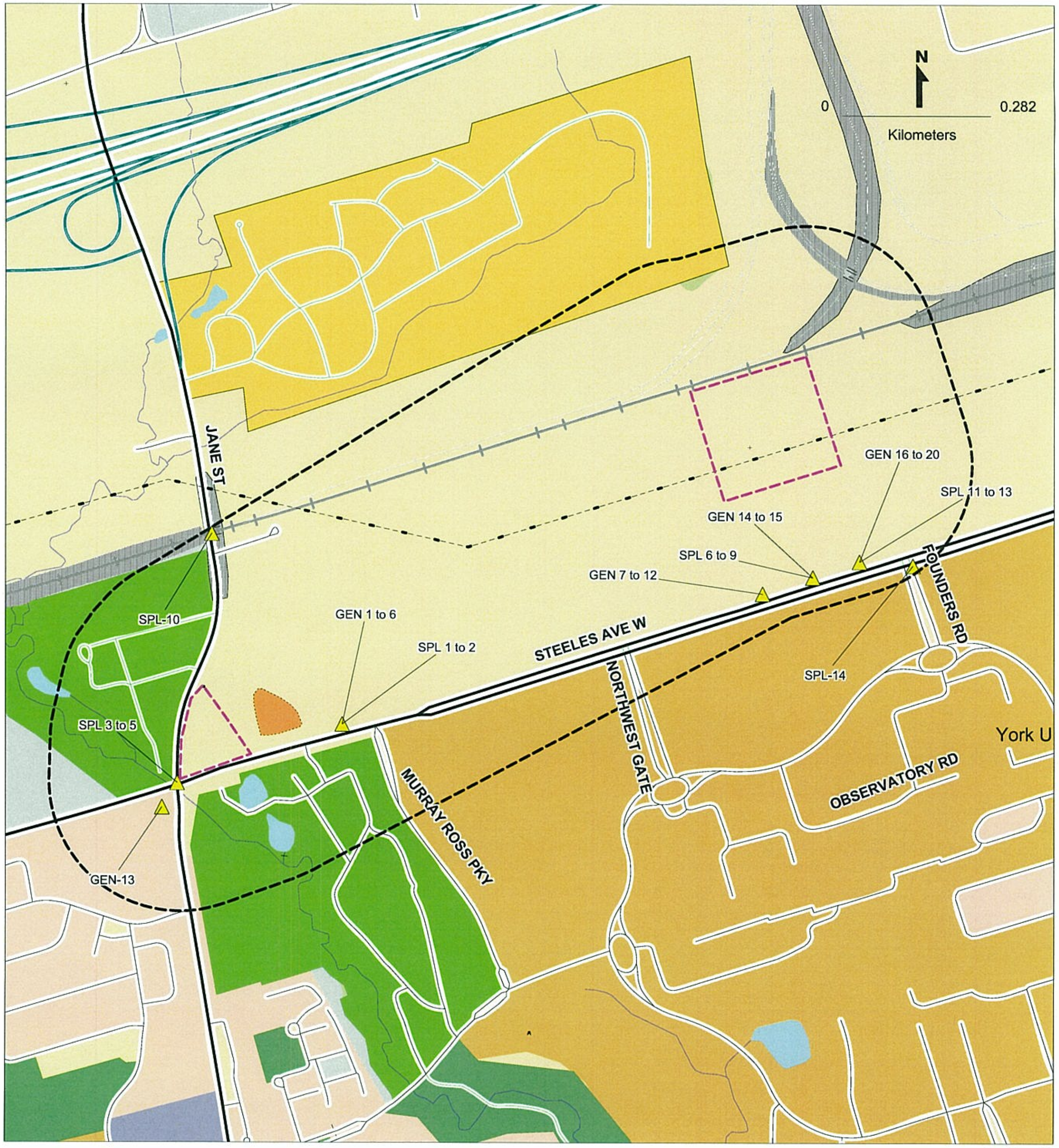
- Wooded Area
- Orchard
- Vineyard

Industrial Resources

- Conveyor
- Crane: Moveable
- Crane: Stationary
- ● Tank
- Rock Cut
- Auto Wrecker
- Lumber Yard
- Pit

This diagram is to be used solely for relative street location purposes.
It may not accurately portray street or site positions.

SITE DIAGRAM



Section ii

Site Report

Order Number: 20100525021
Site Name: OPA 620 Steeles Corridor
Site Address: Steeles Corridor, Jane to Keele Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

FOR COMPLETE INFORMATION, REFER TO DETAIL REPORT

A search has been conducted for this site (address) and company name. No records were found, within the database(s) selected, that meet either of these criteria.

ECOLOG ERIS

Pinpointing Your Environmental Risks

12 Concorde Pl, Suite 800 North York, ON M3C 4J2
416-510-5204

Project Property: OPA 620 Steeles Corridor
Steeles Corridor, Jane to Keele
Vaughan, ON

ERIS Project #: 20100525021

Date: JUN-03-2010

LEGEND

Project Property

△ Database Location

Points of Interest

Chimney

○ Silo

Pipe & Transmission Lines

Pipeline

Transmission Line

Transmission Tower

Transformer Station

Rail

Railway - Main

Railway - Sidetrack

Railway - Abandoned

Bridge

Tunnel

Transportation - Other

Embankment

Trail

Runway

Hydrographic Features

Permanent Waterway

Intermittent Waterway

■ Open Reservoir

Dyke/Levee

Dam

Breakwall

Wetland

Landuse Classifications

Open Area

Residential

Commercial

Resource and Industrial

Government and Institutional

Parks and Recreational

Waterbody

Recreation

Golf Course/Driving Range

Park/Sports Field

Other Recreation Area

Sports/Race Track

Cemetery

Campground

Vegetation

Wooded Area

Orchard

Vineyard

Industrial Resources

Conveyor

Crane: Moveable

Crane: Stationary

● Tank

Rock Cut

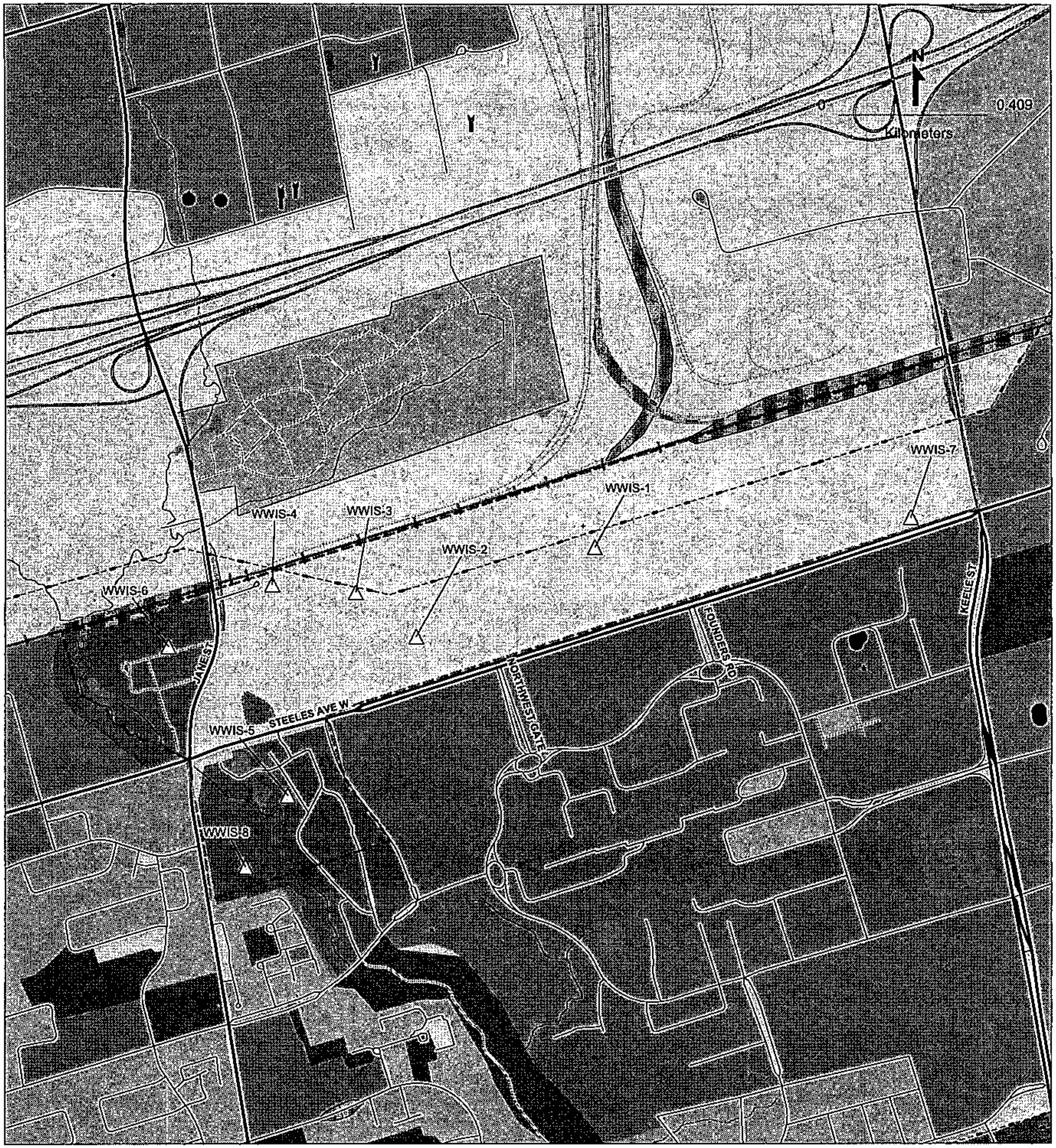
Auto Wrecker

Lumber Yard

Pit

This diagram is to be used solely for relative street location purposes.
It may not accurately portray street or site positions.

SITE DIAGRAM



Detail Report

Order Number:	20100120022
Site Name:	Un-named
Site Address:	Jane St & Steeles Ave W Vaughan ON
Report Type:	Custom Report, 0.25 km Search Radius

If information is required for sites located beyond the selected address, please contact your ERIS representative.

Ontario Regulation 347 Waste Generators Summary

Ontario Spills

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-1	UNITED PARCEL SERVICE CANADA LTD	2900 STEELES AVENUE WEST VAUGHAN L4K 3S2	4842	COURIER SERV. IND.	148	INORGANIC LABORATORY CHEMICALS
			Generator #:	ON0178514	212	ALIPHATIC SOLVENTS
			Approval Yrs:	97	213	PETROLEUM DISTILLATES
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES
GEN-2	UNITED PARCEL SERVICE CANADA LIMITED	2900 Steeles Ave West Concord L4K 3S2			112	Acid solutions - containing heavy metals
			Generator #: **Approval Yrs:**	ON0178514 As of June 2009	122	Alkaline slutions - containing other metals and non-metals (not cyanide)
					145	Wastes from the use of pigments, coatings and paints
					148	Misc. wastes and inorganic chemicals
					212	Aliphatic solvents and residues
					213	Petroleum distillates
					221	Light fuels
					251	Waste oils/sludges (petroleum based)
					252	Waste crankcase oils and lubricants
					263	Misc. waste organic chemicals
					331	Waste compressed gases including cylinders
GEN-3	UNITED PARCEL SERVICE CANADA LTD.	2900 STEELS AVE. WEST CONCORD L4K 3S2	6351	GARAGES(GEN. REPAIR)	213	PETROLEUM DISTILLATES
			Generator #: **Approval Yrs:**	ON0178514 88,89,90	252	WASTE OILS & LUBRICANTS

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-4	UNITED PARCEL SERVICE CANADA LTD. 39-292	2900 STEELES AVENUE WEST VAUGHAN L4K 3S2	4842	COURIER SERV. IND.	148	INORGANIC LABORATORY CHEMICALS
			Generator #:	ON0178514	212	ALIPHATIC SOLVENTS
			Approval Yrs:	92,93,94,95,96	213	PETROLEUM DISTILLATES
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES
GEN-5	UNITED PARCEL SERVICE CANADA LIMITED	2900 STEELES AVENUE WEST VAUGHAN L4K 3S2	4842	COURIER SERV. IND.	145	PAINT/PIGMENT/COATING RESIDUES
			Generator #:	ON0178514	148	INORGANIC LABORATORY CHEMICALS
			Approval Yrs:	98,99,00,01	212	ALIPHATIC SOLVENTS
					213	PETROLEUM DISTILLATES
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-6	UNITED PARCEL SERVICE CANADA LIMITED	2900 Steeles Ave West Concord L4K 3S2			122	ALKALINE WASTES - OTHER METALS
			Generator #:	ON0178514	112	ACID WASTE - HEAVY METALS
			Approval Yrs:	02,03,04,05,06,07,08	122	ALKALINE WASTES - OTHER METALS
					122	ALKALINE WASTES - OTHER METALS
					331	WASTE COMPRESSED GASES
					145	PAINT/PIGMENT/COATING RESIDUES
					148	INORGANIC LABORATORY CHEMICALS
					212	ALIPHATIC SOLVENTS
					213	PETROLEUM DISTILLATES
					221	LIGHT FUELS
					242	HALOGENATED PESTICIDES
					251	OIL SKIMMINGS & SLUDGES
					252	WASTE OILS & LUBRICANTS
					263	ORGANIC LABORATORY CHEMICALS
					269	NON-HALOGENATED PESTICIDES
GEN-7	WAJAX FLUID POWER,(OUT OF BUSINESS)	2720 STEELES AVENUE WEST VAUGHAN L4K 4N5	3999	OTHER MANU. PROD.	213	PETROLEUM DISTILLATES
			Generator #:	ON0160109	241	HALOGENATED SOLVENTS
			Approval Yrs:	98	252	WASTE OILS & LUBRICANTS
					253	EMULSIFIED OILS
GEN-8	DYNESCO INC.(SEE & USE ON0160109) 12-494	2720 STEELES AVE. W. VAUGHAN L4K 4N5	3999	OTHER MANU. PROD.	213	PETROLEUM DISTILLATES
			Generator #:	ON0764902	241	HALOGENATED SOLVENTS
			Approval Yrs:	92,93,94,95,96,97,98	252	WASTE OILS & LUBRICANTS
					253	EMULSIFIED OILS

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-9	DYNESCO INC.	2720 STEELES AVE. W. NORTH YORK L4K 4N5	3999 **Generator #:** **Approval Yrs:**	OTHER MANU. PROD. ON0764902 90	213 241 252 253	PETROLEUM DISTILLATES HALOGENATED SOLVENTS WASTE OILS & LUBRICANTS EMULSIFIED OILS
GEN-10	WAJAX FLUID POWER	2720 STEELES AVE. W. VAUGHAN L4K 4N5	3999 **Generator #:** **Approval Yrs:**	OTHER MANU. PROD. ON0160109 94,95	213 241 252 253	PETROLEUM DISTILLATES HALOGENATED SOLVENTS WASTE OILS & LUBRICANTS EMULSIFIED OILS
GEN-11	WAJAX FLUID POWER (OUT OF BUSINESS)	2720 STEELES AVE. W. VAUGHAN L4K 4N5	3999 **Generator #:** **Approval Yrs:**	OTHER MANU. PROD. ON0160109 96,97	213 241 252 253	PETROLEUM DISTILLATES HALOGENATED SOLVENTS WASTE OILS & LUBRICANTS EMULSIFIED OILS
GEN-12	INTERWOOD MARKETING GROUP	2720 STEELES AVENUE WEST VAUGHAN L4K 4S3	4799 **Generator #:** **Approval Yrs:**	OTHER STOR./WARE. ON1842700 94,95,96,97,98,99,00,01	148 263	INORGANIC LABORATORY CHEMICALS ORGANIC LABORATORY CHEMICALS
GEN-13	CANADIAN TENNIS ASSOCIATION	3111 STEELES AVENUE WEST NORTH YORK M3J 3H2	9642 **Generator #:** **Approval Yrs:**	PRO. ATHLETES, ETC. ON1789200 93,94,95,96,97,98	145 213	PAINT/PIGMENT/COATING RESIDUES PETROLEUM DISTILLATES
GEN-14	Northview Print & Copy Inc.	2700 STEELES AVENUE WEST, UNIT 1 CONCORD L4K 3C8	**Generator #:** **Approval Yrs:**	ON2337700 02,03,04	264	PHOTOPROCESSING WASTES
GEN-15	BETA REPRODUCTION INC.	2700 STEELES AVENUE WEST, UNIT 1 VAUGHAN L4K 3C8	7796 **Generator #:** **Approval Yrs:**	DUPLICATING SERV. ON2337700 97,98,99,00,01	264	PHOTOPROCESSING WASTES

Ontario Regulation 347 Waste Generators Summary

Map Key	Company	Address	SIC Code	SIC Description	Waste Code	Waste Description
GEN-16	ICI CANADA INC.	2600 STEELES AVENUE WEST VAUGHAN L4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON0003996 97,99,00,01	145 148	PAINT/PIGMENT/COATING RESIDUES INORGANIC LABORATORY CHEMICALS
GEN-17	ICI CANADA INC	2600 STEELES AVENUE WEST VAUGHAN L4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON0003996 98	145 148	PAINT/PIGMENT/COATING RESIDUES INORGANIC LABORATORY CHEMICALS
GEN-18	CLAIRTONE PROFESSIONAL PAINTS	2600 STEELES AVENUE WEST CONCORD L4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON1400200 90	145	PAINT/PIGMENT/COATING RESIDUES
GEN-19	ST. CLAIR PAINT AND WALLPAPER 08-851	2600 STEELES AVENUE WEST,VAUGHAN CONCORD K4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON1400200 92,93,94,95,96	145	PAINT/PIGMENT/COATING RESIDUES
GEN-20	ST. CLAIR PAINT(SEE & USE ON0003996)	2600 STEELES AVENUE WEST,VAUGHAN CONCORD K4K 3C8	3751 **Generator #:** **Approval Yrs:**	PAINT & VARNISH IND. ON1400200 97,98	145	PAINT/PIGMENT/COATING RESIDUES

Ontario Spills

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-1	UNITED PARCEL SERVICE	UNDERGROUND TANK BESIDE MAINTENANCE GARAGE AT 2900 STEELES AVE. WEST VAUGHAN CITY	77580	10/14/1992	10/15/1992		
			Incident Summary:	UNITED PARCEL SERVICE - 180 L OF WASTE OIL TO GROUND FROM TANK.			
			Incident Cause:	CONTAINER OVERFLOW			
			Incident Reason:	INTENTIONAL/PLANNED			
			Nature of Impact:	Soil contamination			
			Receiving Medium:	LAND			
			Environmental Impact:	POSSIBLE			
SPL-2	PETRO-CANADA	2900 STEELES AVENUE/JANE STREET UNITED PARCEL, NORTH SIDE OF STEELES TANK TRUCK (CARGO) VAUGHAN CITY	78781	11/13/1992	11/13/1992		
			Incident Summary:	PETRO-CANADA - 40L GASOLINE TO GROUND WHEN PIPING BROKE OFF TRUCK.			
			Incident Cause:	PIPE/HOSE LEAK			
			Incident Reason:	ERROR			
			Nature of Impact:				
			Receiving Medium:	LAND			
			Environmental Impact:	NOT ANTICIPATED			
SPL-3	NORTH YORK WORKS	STEELES AVE WEST/JANE ST AT BLACK CREEK PIONEER VILLAGE. SANITARY SEWER SYSTEM TORONTO CITY	132902	10/10/1996	10/10/1996		
			Incident Summary:	NORTH YORK WORKS- SEWAGE OVERFLOW FROM SANITARY MANHOLE TO GR'ND,CLEANING			
			Incident Cause:	OTHER CAUSE (N.O.S.)			
			Incident Reason:	EQUIPMENT FAILURE			
			Nature of Impact:	Soil contamination			
			Receiving Medium:	LAND			
			Environmental Impact:	POSSIBLE			
SPL-4	CLAIRTONE PROFESSIONAL PAINTS	BLACK CREEK SHOREHAM & JANE, STEELES AND JANE CONCORD PLANT 2600 STEELES AVENUE WEST VAUGHAN CITY	56050	8/22/1991	8/22/1991		
			Incident Summary:	CLAIRTONE PROFESSIONAL PAINTS: THINNER IN BLACK CREEK			
			Incident Cause:	UNDERGROUND TANK LEAK			
			Incident Reason:	CORROSION			
			Nature of Impact:	Surface Water Pollution			
			Receiving Medium:	WATER			
			Environmental Impact:	POSSIBLE			
SPL-5	Toronto Transit Commission	CATCHBASIN ON STEELES JUST WEST OF JANE STREET<UNOFFICIAL> TORONTO	8786-5NUNEV	6/25/2003	6/25/2003	ETHYLENE GLYCOL (ANTIFREEZE)	25 L
			Incident Summary:	TTC-25 L Antifreeze to Road,15 L to CB			
			Incident Cause:				
			Incident Reason:				
			Nature of Impact:				
			Receiving Medium:	Water			
			Environmental Impact:	Not Anticipated			

Ontario Spills

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-6	TRANSPORT TRUCK	NEAR 2700 STEELES AVE. WEST MOTOR VEHICLE (OPERATING FLUID) TORONTO CITY	46557	2/11/1991	2/11/1991		
			Incident Summary: TRANSPORT TRUCK RUPTURED SADDLE TANK; 675 L DIESELFUEL TO ROAD/SEWER **Incident Cause:** OTHER TRANSPORTATION ACCIDENT **Incident Reason:** ERROR **Nature of Impact:** Other **Receiving Medium:** LAND **Environmental Impact:** CONFIRMED				
SPL-7	TRANSPORT TRUCK	HUMBER RIVER, FROM 2700 STEELES AVE WEST, PARKING LOT EAST OF JANE ST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	223747	4/5/2002	4/5/2002		
			Incident Summary: LEVIGNE TRANSPORT: 350L DIESEL TO PKG LOT, 200 TOSTORMS.W/D,F/D,W/D. **Incident Cause:** OTHER CONTAINER LEAK **Incident Reason:** ERROR **Nature of Impact:** Water course or lake **Receiving Medium:** LAND **Environmental Impact:** CONFIRMED				
SPL-8	BFI	2700 STEELES AVE WEST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	129705	11/29/1990	11/29/1990		
			Incident Summary: BFI:100L HYDRAULIC OIL TO GROUND AND SEWER DUE TO RUPTURED HOSE ON TRUCK **Incident Cause:** PIPE/HOSE LEAK **Incident Reason:** OVERSTRESS/OVERPRESSURE **Nature of Impact:** Water course or lake **Receiving Medium:** LAND / WATER **Environmental Impact:** POSSIBLE				
SPL-9	TRANSPORT TRUCK	REAR OF 2700 STEELES AVE WEST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	164779	2/18/1999	2/18/1999		
			Incident Summary: MCKEVITT TRUCKING-228 L DIESEL TO PVMT FRM FUEL TANK.NO C-B'S IMPACTED. **Incident Cause:** OTHER TRANSPORTATION ACCIDENT **Incident Reason:** ERROR **Nature of Impact:** **Receiving Medium:** LAND **Environmental Impact:** NOT ANTICIPATED				
SPL-10	CANADIAN NATIONAL RAILWAY	AT JANE & STEELES JUST WEST OF CN'S YARD TRAIN TORONTO CITY	164711	2/16/1999	2/16/1999		
			Incident Summary: CN RAIL-90 L DIESEL ONTO GROUND & DITCH DUE TO TRAIN DERAILMENT.CLEANED. **Incident Cause:** DERAILMENT **Incident Reason:** UNKNOWN **Nature of Impact:** Soil contamination **Receiving Medium:** LAND **Environmental Impact:** POSSIBLE				

Ontario Spills

Map Key	Company	Address	Ref No.	Incident Dt	MOE Reported Dt	Contaminant Name	Contaminant Quantity
SPL-11	TRANSPORT TRUCK	2600 STEELES AVENUE WEST MOTOR VEHICLE (OPERATING FLUID) VAUGHAN CITY L4K 3C8	74512	8/10/1992	8/10/1992		
			Incident Summary:	TRANSPORT TRUCK: 300 L DIESEL FUEL TO LAND			
			Incident Cause:	OTHER CONTAINER LEAK			
			Incident Reason:	OTHER			
			Nature of Impact:	Water course or lake			
			Receiving Medium:	LAND			
			Environmental Impact:	POSSIBLE			
SPL-12	ICI PAINTS (CANADA) INC.	ICI CANADA- NW CRN OF PROPERTY-YARD VAUGHAN PLANT 8200 KEELE STREET VAUGHAN CITY	208602	8/10/2001	8/10/2001		
			Incident Summary:	ICI PAINTS(CANADA)INC.- 23-45 L OF SHELLSOL 7 TO CONC CONTAINMENT.CLEANED			
			Incident Cause:	UNKNOWN			
			Incident Reason:	UNKNOWN			
			Nature of Impact:	Soil contamination			
			Receiving Medium:	Land			
			Environmental Impact:	Possible			
SPL-13	ICI PAINTS (CANADA) INC.	ICI PAINT - WHAREHOUSE, 2600 STEELES AVE. VAUGHAN PLANT 8200 KEELE STREET VAUGHAN CITY	210320	8/2/2001	8/29/2001		
			Incident Summary:	BACKENTRY -ICI PAINTS: 180 L PAINT TO GROUND. CLEANED.			
			Incident Cause:	OTHER CAUSE (N.O.S.)			
			Incident Reason:	DAMAGE BY MOVING EQUIPMENT			
			Nature of Impact:	Soil contamination			
			Receiving Medium:	Land			
			Environmental Impact:	Confirmed			
SPL-14	TRANSPORT TRUCK	CB AT CORNER OF STEELES & FOUNDERS RD AT YORK U CAMPUS. MOTOR VEHICLE (OPERATING FLUID) TORONTO CITY	153436	3/18/1998	3/18/1998		
			Incident Summary:	BON L INC-2-4 L DIESEL TOROADWAY & CATCHBASIN,FD &WORKS,CLEANED-UP.			
			Incident Cause:	OTHER CONTAINER LEAK			
			Incident Reason:	ERROR			
			Nature of Impact:				
			Receiving Medium:	LAND / WATER			
			Environmental Impact:	NOT ANTICIPATED			

Appendix: Ontario Database Descriptions

EcoLog Environmental Risk Information Services Ltd can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to EcoLog ERIS at the time of update. Note: Databases denoted with "*" indicates that the database will no longer be updated. See the individual database descriptions for more information.

Provincial Government Source Databases:

Abandoned Aggregate Inventory Up to Sept 2002 AAGR

The MAAP Program maintains a database of all abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.

Aggregate Inventory Up to Mar 2008 AGR

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. Please note that the database is only referenced by lot\concession and city/town location. The databases provides information regarding the registered owner/operator, location, status, licence type, and maximum tonnage.

Abandoned Mines Information System 1800-2005 AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Borehole 1875-Jul 2009 BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc.
For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Certificates of Approval 1985-Sept 2002* (for current CofA info please check the EBR Database) CA

This database contains the following types of approvals: Certificates of Approval (Air) issued under Section 9 of the Ontario EPA; Certificates of Approval (Industrial Wastewater) issued under Section 53 of the Ontario Water Resources Act ("OWRA"); and Certificates of Approval (Municipal/Provincial Sewage and Waterworks) issued under Sections 52 and 53 of the OWRA. For more current Certificate of Approval information please see the EBR database, which will include information such as 'Approval for discharge into the natural environment other than water (i.e. Air) (EPA s.9)', and Approval for sewage works (OWRA s.53(1)).

TSSA Commercial Fuel Oil Tanks 1948-2009 CFOT

Since May 2002, Ontario developed a new act where it became mandatory for fuel oil tanks to be registered with Technical Standards & Safety Authority (TSSA). This data would include all commercial underground fuel oil tanks in Ontario with fields such as location, registration number, tank material, age of tank and tank size.

Coal Gasification Plants 1987, 1988* **COAL**

This inventory of all known and historical coal gasification plants was collected by the Ministry of Environment. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, landuse, soil condition, site operators/occupants, site description, and potential environmental impacts. This information is effective to 1988, but the program has since been discontinued.

Compliance and Convictions 1989-2009 **CONV**

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Drill Holes 1886-2005 **DRL**

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Environmental Registry 1994-2009 **EBR**

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, licence, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes things like; Approval for discharge into the natural environment other than water (i.e. Air), Permit to Take Water (PTTW), Certificate of Property Use (CPU), Approval for a waste disposal site, Order for preventative measures.(EPA s. 18), Order for conformity with Act for waste disposal sites.(EPA s. 44), Order for remedial work.(EPA s. 17) and many more.

TSSA Fuel Storage Tanks Current to Dec 2008 **FST**

The Technical Standards & Safety Authority (TSSA), under the *Technical Standards & Safety Act* of 2000 maintains a database of registered private and retail fuel storage tanks in Ontario with fields such as location, tank status, license date, tank type, tank capacity, fuel type, installation year and facility type.

Ontario Regulation 347 Waste Generators Summary 1986-Jun 2009 **GEN**

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Mineral Occurrences 1846-Sept 2008 **MNR**

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the planimetric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

<u>Non-Compliance Reports</u> 1992(water only), 1994-2007 **NCPL**

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

<u>Ontario Oil and Gas Wells</u> 1800-Aug 2009 **OOGW**

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. Information available for all wells in the ERIS database include well owner/operator, location, permit start date, well cap date, licence number, status, depth and the primary target (rock unit) of the well being drilled.

<u>Ontario Inventory of PCB Storage Sites</u> 1987-Oct 2004 **OPCB**

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

<u>Pesticide Register</u> 1988-Nov 2008 **PES**

The Ontario Ministry of Environment maintains a database of all manufacturers and vendors of registered pesticides.

<u>Private and Retail Fuel Storage Tanks</u> 1989-1996* **PRT**

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

<u>Ontario Regulation 347 Waste Receivers Summary</u> 1986-2008 **REC**

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

<u>Record of Site Condition</u> 1997-Sept 2001, Oct 2004-2009 **RSC**

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use, such as residential, proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up. Information available includes Registration Number, Filing Owner, Property Address, Filing Date and Municipality.

Ontario Spills **1988-2008** **SPL**

This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Wastewater Discharger Registration Database **1990-2008** **SRDS**

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Waste Disposal Sites - MOE CA Inventory **1970-Sept 2002** **WDS**

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. For more current information for Waste Disposal Sites please see the EBR database, which will include information such as 'Approval for a waste disposal site (EPA s.27)' and 'Approval for use of a former waste disposal site (EPA s.46)'.

Waste Disposal Sites - MOE 1991 Historical Approval Inventory **Up to Oct 1990*** **WDSH**

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Water Well Information System **1955-May 2009** **WWIS**

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. Geographic coordinates are reliable according to the given percentage. Wells that are identified with lot and concession only are now also included in the database and is no longer provided as a separate report.

Federal Government Source Databases: Diagram Identifier:

Environmental Effects Monitoring **1992-2007*** **EEM**

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Environmental Issues Inventory System **1992-2001*** **EIIS**

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Federal Convictions 1988-Jun 2007 **FCON**

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Contaminated Sites on Federal Land June 2000-Sept 2009 **FCS**

The Treasury Board of Canada Secretariat maintains an inventory of all known contaminated sites held by various Federal departments and agencies. This inventory does not include properties owned by Crown corporations, but does contain non-federal sites for which the Government of Canada has accepted some or all financial responsibility. All sites have been classified through a system developed by the Canadian Council of Ministers of the Environment. The database provides information on company name, location, site ID #, property use, classification, current status, contaminant type and plan of action for site remediation.

Fisheries & Oceans Fuel Tanks 1964-Sept 2003 **FOFT**

Fisheries & Oceans Canada maintains an inventory of all aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Indian & Northern Affairs Fuel Tanks 1950-Aug 2003 **IAFT**

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of all aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

National Analysis of Trends in Emergencies System (NATES) 1974-1994* **NATE**

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

National Defence & Canadian Forces Fuel Tanks Up to May 2001* **NDFT**

The Department of National Defence and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

National Defence & Canadian Forces Spills Mar 1999-Jul 2009 **NDSP**

The Department of National Defence and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

National Defence & Canadian Forces Waste Disposal Sites 2001-April 2007 **NDWD**

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

National Environmental Emergencies System (NEES) 1974-2003 **NEES**

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for all previous Environment Canada spill datasets. NEES is composed of the historic datasets – or Trends – which dates from approximately 1974 to present. **NEES Trends** is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

National PCB Inventory 1988-June 2004 **NPCB**

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. All federal out-of-service PCB containing equipment and all PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites.

National Pollutant Release Inventory 1993-2007 **NPRI**

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers of 178 specified substances.

Parks Canada Fuel Storage Tanks 1920-Jan 2005 **PCFT**

Canadian Heritage maintains an inventory of all known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Transport Canada Fuel Storage Tanks 1970-March 2007 **TCFT**

With the provinces of BC, MB, NB, NF, ON, PE, and QC; Transport Canada currently owns and operates 90 fuel storage tanks. This inventory will also include The Pickering Lands, which refers to the 7,530 hectares (18,600 acres) of land in Pickering, Markham and Uxbridge - owned by the Government of Canada since 1972. Properties on this land has been leased by the government since 1975, falls under the Site Management Policy of Transport Canada, but administered by Public Works and Government Services Canada. Our inventory provides information on the site name, location, tank age, capacity and fuel type.

Private Source Databases:

Anderson's Waste Disposal Sites 1860s-Present **ANDR**

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the *Ontario MOE Waste Disposal Site Inventory*, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. *Please note that the data is not warranted to be complete, exhaustive or authoritive. The information was collected for research purposes only.*

Automobile Wrecking & Supplies 2001-Feb 2009 **AUWR**

This database provides an inventory of all known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Chemical Register 1992, 1999-Feb 2009 **CHEM**

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

ERIS Historical Searches 1999-Oct 2009 **EHS**

EcoLog ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Canadian Mine Locations 1998-2009 **MINE**

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Oil and Gas Wells Oct 2001-2009 **OGW**

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickles' database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Canadian Pulp and Paper 1999, 2002, 2004, 2005, 2009 **PAP**

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Retail Fuel Storage Tanks 2000-Feb 2009 **RST**

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks. Information is provided on company name, location and type of business.

Scott's Manufacturing Directory 1992-Sept 2009 **SCT**

Scott's Directories is a data bank containing information on over 70,000 manufacturers in Ontario. Even though Scott's listings are voluntary, it is the most comprehensive database of Ontario manufacturers available. Information concerning a company's address, plant size, and main products are included in this database. This database begins with 1992 information and is updated annually.

Anderson's Storage Tanks 1915-1953* **TANK**

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. *Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.*

APPENDIX IV

PHOTOGRAPHS

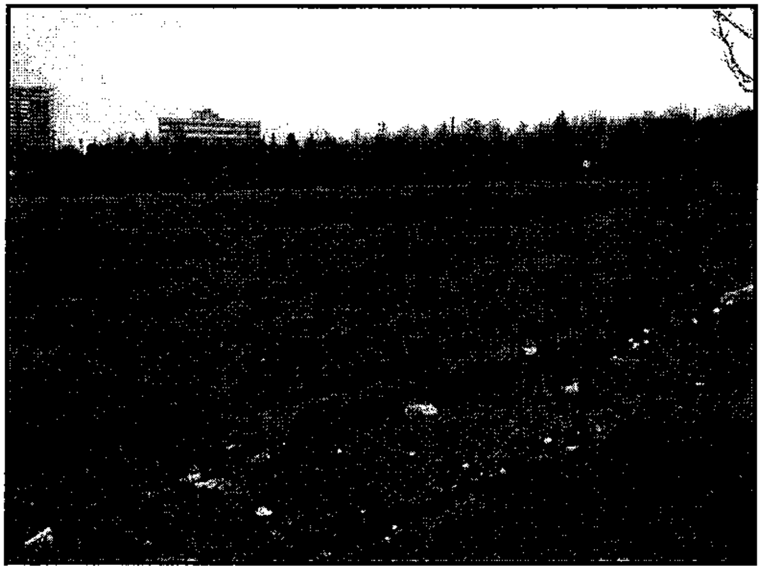


Photo 1 – View of the north portion of the Site facing west, with the surrounding property to the west in the background.

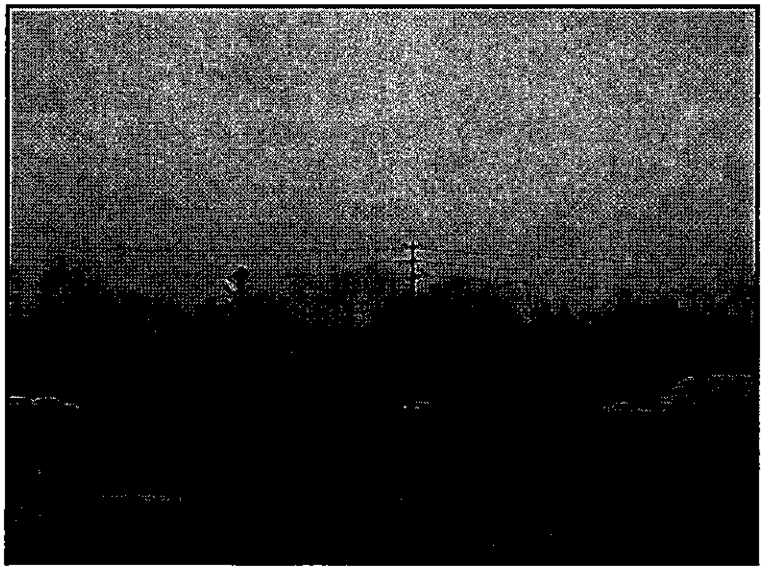


Photo 2 – View of the south portion of the Site facing south, with Steeles Avenue West in the background.

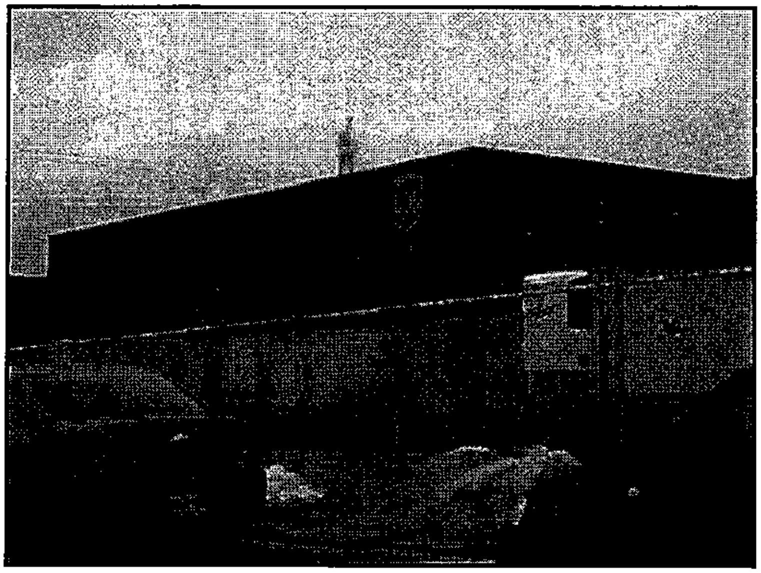


Photo 3 – View of the surrounding land use north/east of the Site (UPS, located at 2900 Steeles Avenue West).

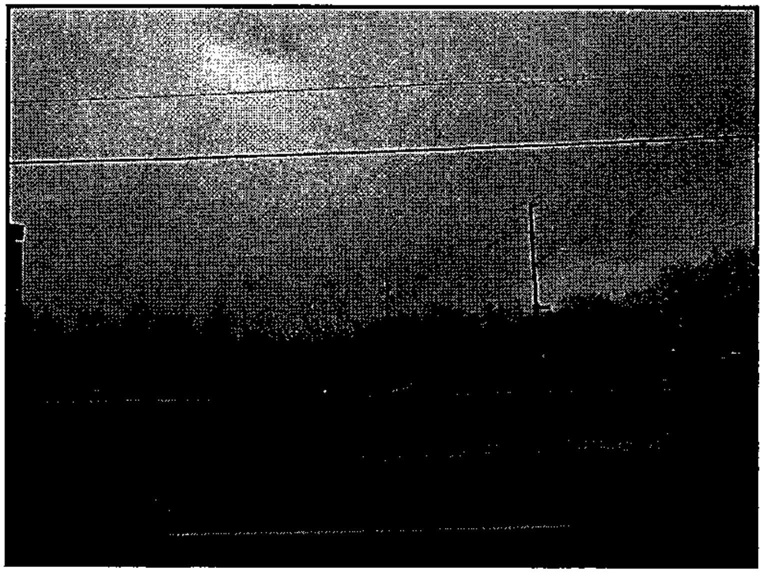
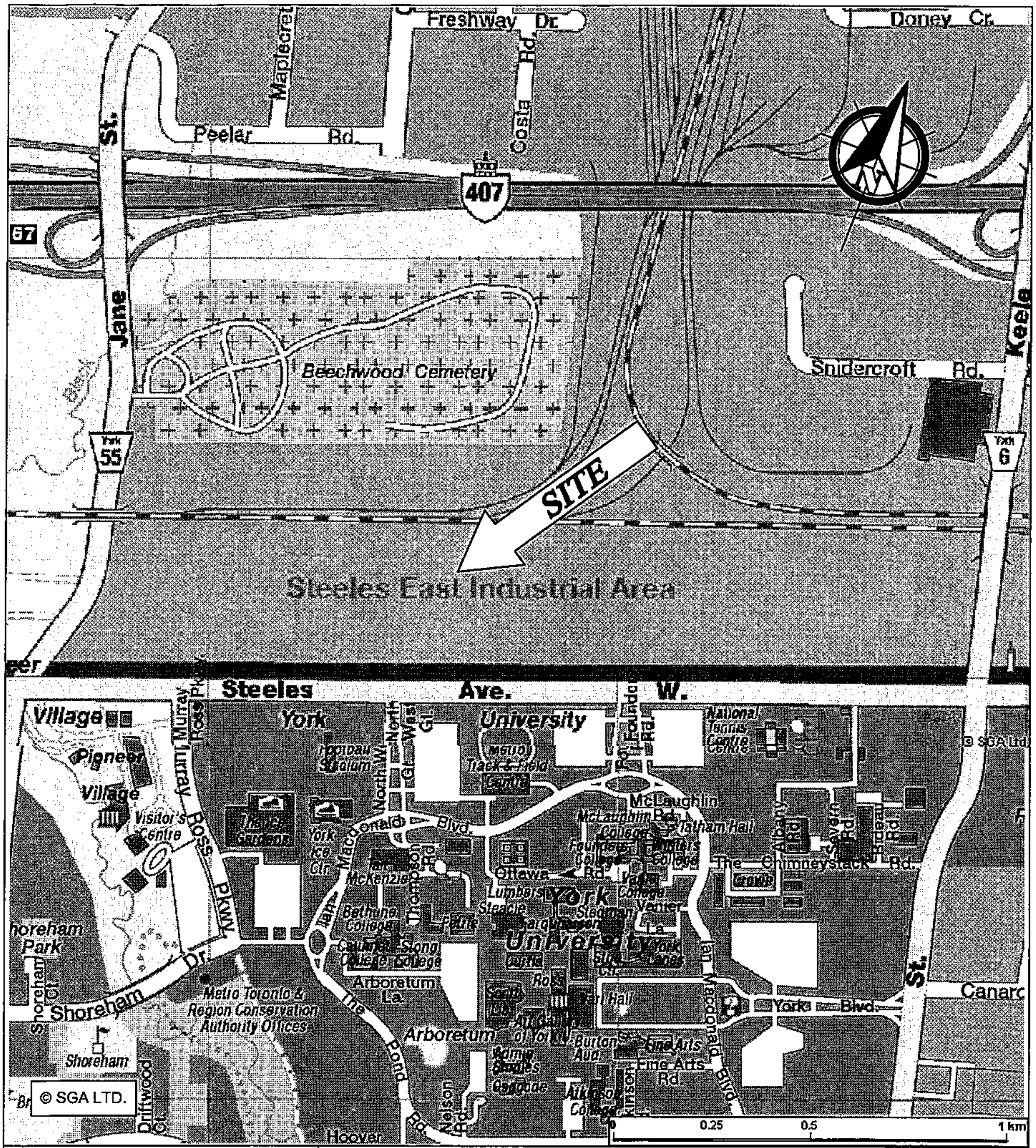


Photo 4 – View of the surrounding land uses west of the Site (vacant, undeveloped land and Jane Street).

APPENDIX V
QUALIFICATIONS OF ASSESSOR

Tracey-Ann Bullock, B.Sc (Hons), Project Technologist

Tracey-Ann Bullock is a Project Technologist within the Environmental Due Diligence & Remediation ("EDR") Group in Pinchin's Mississauga office. Ms. Bullock obtained an honours Bachelor of Science degree in Geoscience from McMaster University in 2009. Prior to joining Pinchin's Environmental Due Diligence & Remediation Group, she worked as a Team Leader with the Environmental Sciences Group as a scientific advisor to the Department of National Defence on the DEW Line Cleanup Project. Ms. Bullock has gained experience conducting Phase I and II Environmental Site Assessments, site remediation programs, long-term monitoring programs, field sampling of soil and groundwater, and preparation of professional reports. In addition, Ms. Bullock's experience with managing soil remediation projects has lead to experience with a variety of environmental contaminants including petroleum hydrocarbons, metals, and PCBs.



PINCHIN ENVIRONMENTAL

PROJECT NAME
PHASE I ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
CITY OF VAUGHAN

PROJECT LOCATION
7100 KEELE STREET, VAUGHAN, ONTARIO

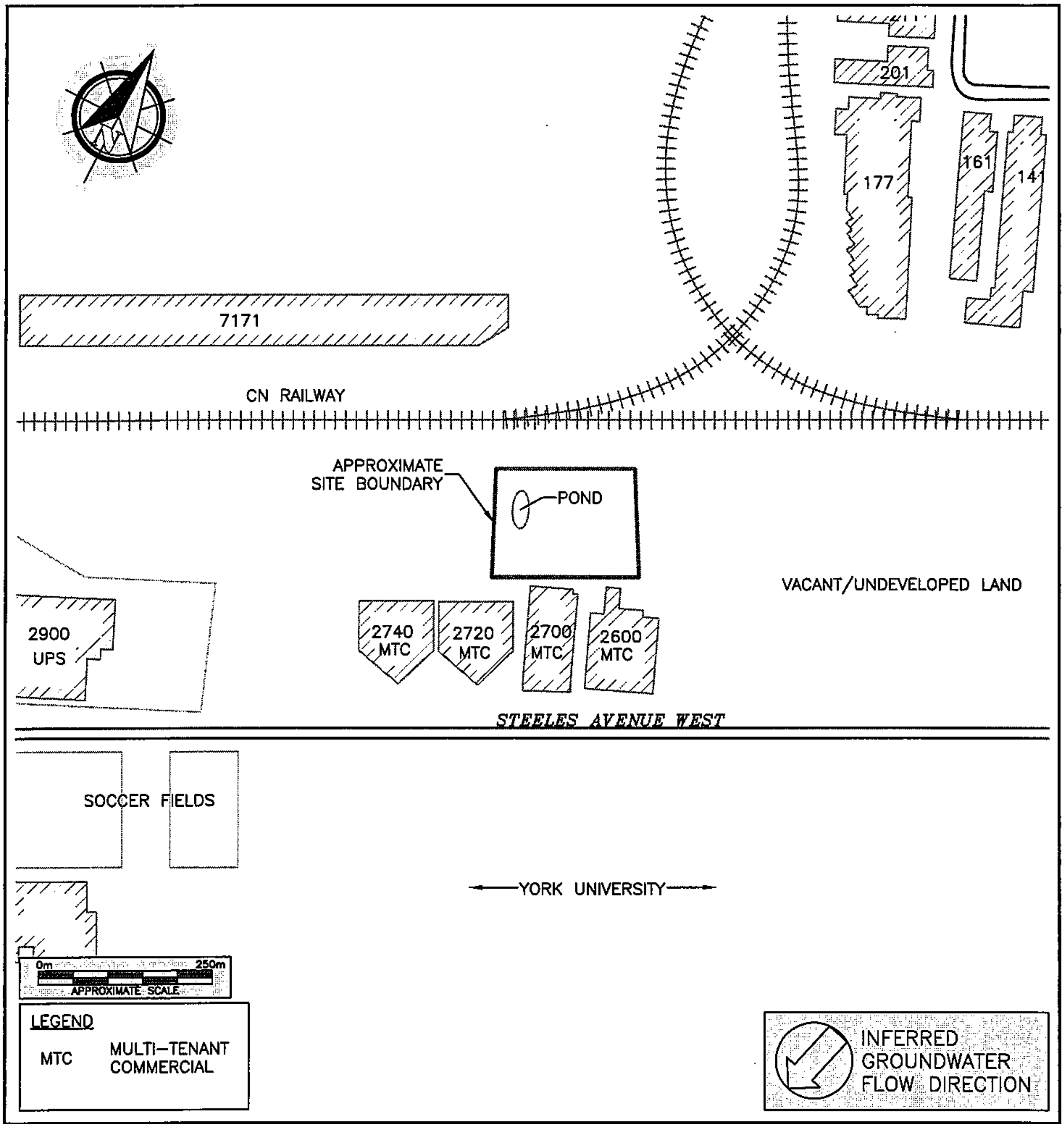
FIGURE NAME
KEY MAP

FIGURE NO.
1

SCALE
AS SHOWN

PROJECT NO.
57167.002

DATE:
FEB. 2010



PINCHIN ENVIRONMENTAL

PROJECT NAME
PHASE I ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
CITY OF VAUGHAN

PROJECT LOCATION
7100 KEELE STREET, VAUGHAN, ONTARIO

FIGURE NAME
SITE AND SURROUNDING LAND USE PLAN

FIGURE NO.
2

APPROXIMATE SCALE
AS SHOWN

PROJECT NO.
57167.002

DATE
FEB. 2010

Appendix 1E

Phase II Environmental Site Assessment, Part of Lot 1, Concession 4
- Pinchin Environmental Ltd.

Phase II Environmental Site Assessment

Part of Lot 1, Concession 4

Vaughan, Ontario

City of Vaughan c/o The Sernas Group Inc.
c/o Shad & Associates Inc.
83 Citation Drive, Unit 9
Vaughan, Ontario
L4K 2Z6

Attention: Mr. Houshang Shad

July 20, 2010

Pinchin File: 57167.003

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

1.0 Introduction

Pinchin Environmental Ltd. ("Pinchin") was retained by Shad and Associates Inc. ("Client") on behalf of The Sernas Group Inc. and the City of Vaughan, to conduct a Phase II Environmental Site Assessment ("ESA") at the property located at Part of Lot 1, Concession 4, Vaughan, Ontario (hereafter referred to as the "Site"). The Site has been developed with a storm water management pond. A Key Map is provided in Figure 1 (all Figures are provided within Appendix I).

The work was completed to assess potential issues of environmental concern in relation to the potential redevelopment of the Site.

This Phase II ESA was completed in general accordance with the Canadian Standards Association ("CSA") document entitled "*Phase II Environmental Site Assessment, CSA Standard Z769-00 (reaffirmed 2004)*" (the "CSA Standard").

1.1 Background

Pinchin completed a Phase I ESA of the Site, the findings of which are provided in the draft report entitled "*Draft Phase I Environmental Site Assessment, Part of Lot 1, Concession 4, Vaughan , Ontario*" prepared for the Client and dated February 4, 2010 ("Pinchin Phase I ESA Report"). Based on the findings of the Pinchin Phase I ESA Report, the following potential issues of environmental concern were identified:

- A stormwater management pond was located on Site. This stormwater management pond and associated sediment from surrounding land. Suburban stormwater management ponds collect sediment that could give rise to potential impacts in connection with the Site;
- UPS, located at 2900 Steeles Avenue West, had been registered with the MOE as a generator (Generator # ON0178514) of various hazardous wastes including inorganic and organic laboratory chemicals, aliphatic solvents, petroleum distillates, halogenated and non-halogenated pesticides, oil skimmings and sludges, and waste oils and lubricants from 1988 to 1990 and from 1992 until as of June 2009. This property is located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the distance between this property and the Site, as well as the inferred groundwater flow direction, it is Pinchin's opinion that this off-Site operation could give rise to potential subsurface impacts in connection with the Site; and
- The Ontario Spills database indicated that on October 14, 1992, 180 litres of waste oil spilled onto the ground from an UST at UPS, resulting in a possible environmental impact. The spill was located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. The Ontario Spills database indicated that on November 13, 1992, 40 litres of gasoline spilled onto the ground due to a hose leak at UPS. The spill was located adjacent to the north/east Site boundary and is inferred to be hydraulically up/transgradient relative to the Site. Based on the volume of the release, the inferred direction of groundwater flow, and the distance between this property and the Site, it is Pinchin's opinion that these historical spills could give rise to potential subsurface impacts in connection with the Site.

Based on the above-noted potential environmental concerns, Pinchin recommended completing a Phase II ESA to assess the soil and groundwater at the Site.

1.2 Scope of Work

The following scope of work for this Phase II ESA was developed to assess soil and groundwater conditions at the Site:

- Retained the services of a privately contracted utility locate company in order to determine the location of underground services such as sewer pipes, electrical wires, natural gas pipes, telephone, communication cables and underground equipment in the vicinity of the work area;
- Retained the services of an Ontario Ministry of the Environment ("MOE") Licensed Well Contractor, in accordance with the Ontario Well Regulation 903 (as amended to O.Reg. 389/08) to conduct all borehole drilling and monitoring well installation activities;
- Advanced four (4) boreholes at the Site, three (3) of which were completed as groundwater monitoring wells. The boreholes were advanced to a maximum depth of 7.92 metres below ground surface ("mbgs");
- Field screened confirmatory soil samples using the headspace methodology by using a Photoionization Detector ("PID") calibrated to isobutylene standard and a gas meter (eg. RKI Eagle) calibrated to a hexane standard, as well as visual and olfactory considerations;
- Obtained one (1) most-apparent "worst case" soil sample from each of the boreholes and submitted select samples for laboratory analysis of petroleum hydrocarbons ("PHCs") fractions 1 through 4 ("F1-F4"), volatile organic compounds ("VOCs") and inorganics (metals);
- Submitted two (2) soil samples for pH analysis and one (1) soil sample for grain size analysis, in order to confirm the appropriate standards identified in the MOE document entitled, "*Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act*" dated March 2004 (the "*MOE Standards*");
- Submitted one (1) representative composite soil sample for the analysis of leachate concentrations of inorganics, VOCs, polychlorinated biphenyls ("PCBs") and benzo(a)pyrene in accordance with the Toxicity Characteristic Leaching Procedure ("TCLP") as per Ontario Regulation 347/90 (as amended by Ontario Regulation 558/00) in order to characterize the soil for off-Site disposal purposes;
- Conducted groundwater monitoring of the newly installed monitoring wells. Groundwater samples collected from the newly installed monitoring wells were submitted for laboratory analysis of PHCs (F1-F4), VOCs and inorganics (metals);
- Evaluated the results of the soil and groundwater analyses (by comparing to the currently applicable and newly released *MOE Standards*); and
- Prepared a factual report (this report) detailing the findings of the Phase II ESA and recommendations.

2.0 Methodology

2.1 Borehole Investigation

The investigation methodology was conducted in general accordance with the MOE document entitled "*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*" dated December 1996 (the "*MOE Sampling Guideline*") and Ontario Regulation 153/04.

Pinchin retained Strata Soil Sampling Inc. ("Strata") to drill four (4) boreholes at the Site on June 24 and June 29, 2010. Three (3) were completed as groundwater monitoring wells (see Figure 2 for locations of wells). The boreholes were advanced to a maximum depth of 7.92 mbgs using a Geo-probe model 6620DT direct push drill rig.

Soil samples were collected at continuous intervals (during direct-push drilling) using disposable polyvinyl chloride ("PVC") soil sample liners. Discrete soil samples were collected from the sample liners and containerized in laboratory-supplied glass sampling jars. Subsurface soil conditions were logged on-Site by Pinchin personnel at the time of drilling. Soil samples were visually classified and were analyzed in the field for petroleum/solvent-derived vapour concentrations using a PID and Gastech.

A description of the subsurface stratigraphy encountered during the drilling program is documented in the borehole logs included in Appendix II.

2.2 Monitoring Well Installation

The monitoring wells were constructed with 38 mm (1.5 inch) inner diameter ("ID") flush-threaded schedule 40 PVC risers followed by a length (see Table2 for reference) of No. 10 slot PVC screen that was installed in an attempt to traverse the water table. The screens were sealed using threaded caps and the riser was sealed at the surface with a lockable J-Plug cap. Silica sand was placed around and above the screened interval to form a filter pack around the well screen. A layer of bentonite was placed above the silica sand and was extended to ground surface to minimize flow from the surface into the well. A protective steel monument casing was installed over the riser pipe and secured in place using concrete.

The monitoring well construction details are provided in Table 1 (all Tables are provided within Appendix III).

2.3 Elevation Survey

Pinchin personnel completed a relative elevation survey of the newly installed groundwater monitoring wells on July 5, 2010, using a Topcon rotating laser level and laser sensor. A temporary benchmark was used to determine the relative elevation of the top of the monitoring well casings and the ground surface. The temporary benchmark used was the top of a utility sewer cover located adjacent to the east Site boundary (as indicated on Figure 2), which was arbitrarily assigned the elevation of 100.000 m. These elevation measurements represent a relative (not a geodetic) elevation. A summary of the elevation data is presented in Table 1.

2.4 Sampling and Laboratory Analysis

2.4.1 Soil

Soil samples collected from the boreholes were field screened for petroleum/solvent-derived vapour concentrations using a PID and Gastech. Organic vapour concentrations measured in the soil samples during the drilling investigation are presented on the borehole logs. One (1) most apparent "worst case" soil sample based on vapour concentrations, visual, and olfactory considerations was collected from each of the boreholes and placed into laboratory-prepared sample bottles, and stored in coolers with ice. Select samples were submitted to Maxxam Analytics Inc. ("Maxxam") in Mississauga for laboratory analysis of PHCs (F1-F4), VOCs and inorganics (metals). Formal chain of custody records were maintained between Pinchin and the staff at Maxxam. A summary of the soil samples collected and submitted for laboratory analyses is presented in Table 3.

2.4.2 Groundwater

The newly-installed groundwater monitoring wells were monitored for groundwater levels and the presence of non-aqueous phase liquids ("NAPL") using an interface probe. The interface probe was cleaned with a solution of Alconox detergent and potable water prior to and after each measurement. The measured depths to groundwater are provided in Table 2.

Groundwater sampling was accomplished by utilizing dedicated waterra tubing for each monitoring well to draw the groundwater sample to the surface.

Prior to the collection of groundwater samples, the monitoring wells were purged of three (3) to five (5) well casing volumes or until dry, in accordance with Pinchin's standard field practices. Upon groundwater recovery, representative groundwater samples were obtained and placed in laboratory prepared bottles, preserved in coolers with ice, and submitted for laboratory analyses.

On July 5, 2010, groundwater samples were collected from the newly-installed groundwater monitoring wells MW01 to MW03. The groundwater samples were placed into laboratory-prepared sample bottles and stored in coolers with ice. Groundwater samples were submitted to Maxxam for laboratory analysis PHCs (F1-F4), VOCs and inorganics (metals). Formal chain of custody records were maintained between Pinchin and the staff at Maxxam.

A summary of the groundwater samples collected and submitted for laboratory analyses is presented in Table 3.

2.5 Quality Assurance/Quality Control Protocols

Quality assurance/quality control ("QA/QC") protocols were followed during the borehole drilling, soil and groundwater sampling activities to ensure that representative samples were obtained. Field QA/QC protocols that were employed include:

- Sample collection and handling procedures were performed in general accordance with the *MOE Sampling Guideline*;
- Use of dedicated and disposable nitrile gloves for all sample handling;
- Extraction of soil samples from the interior of the sampling device (where possible), rather than from areas in contact with the sampler walls to minimize the chance of cross-contamination;
- Soil and groundwater samples collected were placed in laboratory-supplied glass sample jars;
- Prior to collecting groundwater samples, the wells were developed by purging three (3) to five (5) well casing volumes. Upon completion of developing activities, the wells were allowed sufficient time to recover prior to sampling;
- Upon collection, all field samples were kept at the required temperature and maintained en route to the laboratory; and
- Laboratory QA/QC consisted of lot replicate samples, surrogate recoveries and matrix spikes.

2.6 Site Condition Standards

The Site is currently vacant and developed as a stormwater management pond located within the City of Vaughan. It is Pinchin's understanding that the stormwater management pond is scheduled for decommissioning. Further, it is Pinchin's understanding that drinking water for the Site and surrounding area is supplied by municipal services, with Lake Ontario serving as the water source.

As indicated in Table 4, one (1) representative soil sample was collected from a borehole advanced at the Site and submitted for 75 μm single-sieve grain size analysis. Based on the results of the analysis, 66% of the soil sample was <0.075 mm and as such considered to be of a fine texture. Therefore, the soil at the Site can be considered as medium to fine textured for the purposes of the *MOE Standards.*

As indicated in Table 4, two (2) representative soil samples were collected from the boreholes advanced at the Site and submitted for pH analysis. The *MOE Standards* indicate that a Site is classified as sensitive if the pH values of the surface soil (less than 1.5 mbgs) are less than 5 or greater than 9, and subsurface soils (greater than 1.5 mbgs) are less than 5 or greater than 11. Based on the analytical results, pH values of the surface and subsurface soil do not indicate that the property is a "sensitive site".

Therefore, based on the above information, the appropriate Site Condition Standard is *"Soil, Ground Water and Sediment Standards for Use Under part XV.1 of the Environmental Protection Act" - "Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition"*, dated March 9, 2004 (*"Current Table 3 Standards"*) for:

- Medium and fine textured soils; and
- Industrial/commercial/community property use; or
- Residential/parkland/institutional property use (depending on the intended future land use).

As such, all analytical results have been compared to the *Current Table 3 Standards.*

Pinchin notes that the MOE has recently amended Ontario Regulation 153/04, and as such, many of the values stipulated within the *MOE Standards* have changed. As of December 29, 2009, the amendments made to the regulation were formally filed with the government of Ontario; however, the site condition standards (*"Future MOE Standards"*) do not come into force until July 1, 2011. The applicable *Future MOE Standards* which would apply to the Site are the *Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition ("Future Table 3 Standards").* Pinchin has also compared the analytical results to the *Future Table 3 Standards.*

3.0 Results

3.1 Site Geology and Hydrogeology

Data collected during the borehole drilling program indicated that the soil stratigraphy at the Site was observed to generally consist of native material comprised of silt followed by sandy silt, silty sand, sand and/or clayey silt to a maximum depth of approximately 7.92 mbgs. A description of the subsurface stratigraphy encountered during borehole advancement is documented in the borehole logs (Appendix II).

Groundwater monitoring was conducted on July 5, 2010. No NAPL was detected in the newly-installed groundwater monitoring wells at the time of monitoring. The depth to groundwater measured within the monitoring wells ranged from 4.20 metres below top of casing ("m bTOC") (MW03) to 5.92 m bTOC (MW01). The calculated groundwater elevations within the groundwater monitoring wells ranged between 93.93 m relative to Site benchmark ("mREL") (MW03) to 95.91 mREL (MW02).

The surveyed groundwater elevation data indicated that groundwater at the Site was flowing in a south-westerly direction. The groundwater elevation data is presented in Table 2.

3.2 Subsurface Conditions and Vapour Concentrations

Soil vapour headspace concentrations measured in the soil samples collected during the soil sampling are presented in the borehole logs. As noted, soil vapour headspace readings obtained from the PID ranged from 0.5 parts per million ("ppm") (BH/MW03 and BH/MW04) to 4.0 ppm (BH/MW02). Soil vapour headspace readings obtained from the Gastech ranged from <5 ppm (BH/MW02, BH/MW03 and BH/MW04) to 35 ppm (BH/MW01). No visual and/or olfactory observations of PHC/solvent-like contamination were observed by Pinchin during the drilling and sampling program.

3.3 Analytical

3.3.1 Soil

The summary of the soil analytical results for PHCs (F1–F4), VOCs and inorganics (metals), along with the *Current Table 3 Standards* and the *Future Table 3 Standards* are presented in Table 5 through Table 7. The laboratory certificate of analysis is presented in Appendix IV.

As indicated in Table 5 through Table 7, soil sample analytical results indicated concentrations of PHCs (F1-F4), VOCs and inorganics (metals) were below the *Current Table 3 Standards* and the *Future Table 3 Standards.*

3.3.2 TCLP

The summary of the TCLP analytical results along with the applicable *Schedule 4 Criteria* can be found in Table 8.

As indicated in Table 8, soil sample analytical results indicated that concentrations were below the applicable *Schedule 4 Criteria* listed in Ontario Regulation 347/08. Based on these findings, the soil is suitable for off-Site disposal as non-hazardous.

3.3.3 Groundwater

The summary of the groundwater analytical results for PHCs (F1-F4), VOCs and inorganics (metals) along with *Current Table 3 Standards* and the *Future Table 3 Standards* are presented in Table 9 through Table 11. The laboratory certificate of analysis is presented in Appendix IV.

As indicated in Table 9, there are no values stipulated under the *Current Table 3 Standards* for PHCs (F1-F4) in groundwater. However, concentrations of PHCs (F1-F4) were below the laboratory reportable detection limits and the *Future Table 3 Standards.*

As indicated in Table 10 and Table 11, groundwater sample laboratory results indicated that concentrations of VOCs and inorganics (metals) (for those groundwater samples submitted) were below the *Current Table 3 Standards* and the *Future Table 3 Standards.*

4.0 Summary and Conclusions

Pinchin completed a Phase II ESA at the Site to assess soil and groundwater conditions for the potential redevelopment of the Site. The Site is currently used as a storm water management pond. Based on the work completed as part of this Phase II ESA, the following conclusions are made:

- Pinchin retained Strata to advance four (4) boreholes at the Site, three (3) of which were completed as groundwater monitoring wells. The boreholes were advanced to a maximum depth of 7.92 mbgs;
- The soil stratigraphy at the Site was observed to generally consist of native material comprised of silt followed by sandy silt, silty sand, sand and/or clayey silt to a maximum depth of approximately 7.92 mbgs;
- Groundwater monitoring was conducted on July 5, 2010. No NAPL was present in the wells at the time of monitoring. The calculated groundwater elevations within the groundwater monitoring wells ranged between 93.93 mREL (MW03) to 95.91 mREL (MW02);
- Pinchin compared the analytical results to the *Current and Future MOE Table 3 Standards*:
  - Medium and fine textured soils; and
  - Industrial/commercial/community property use; and
  - Residential/parkland/institutional property use (depending on the intended future land use).
- Soil sample analysis indicated that concentrations of PHCs (F1-F4), VOCs and inorganics (metals) were below the *Current Table 3 Standards* and the *Future Table 3 Standards*; and
- Pinchin noted that there are no values stipulated under the *Current Table 3 Standards* for PHCs (F1-F4) in groundwater. However, concentrations of PHCs (F1-F4) were below the laboratory reportable detection limits and the *Future Table 3 Standards*. Concentrations of VOCs and inorganics (metals) (for those groundwater samples submitted) were below the *Current Table 3 Standards* and the *Future Table 3 Standards*.

Based on the findings of this Phase II ESA, no further assessment is required at this time. Pinchin however, recommends that at the time of re-development, sediment samples be collected and assessed for geotechnical and environmental purposes as per development needs.

5.0 Disclaimer

This Phase II ESA was performed for City of Vaughan c/o The Sernas Group Inc. c/o Shad and Associates Inc. ("Client") in order to confirm the presence or absence of environmental impacts at the Site. The term recognized environmental condition means the presence or likely presence of any hazardous substance on a property under conditions that indicate an existing release, past release, or a material threat of a release of a hazardous substance into structures on the property or into the ground, groundwater, or surface water of the property. This Phase II ESA does not quantify the extent of the current and/or recognized environmental condition or the cost of any remediation.

Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples have been analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions on the property. Performance of this Phase II ESA to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions on the property, and recognizes reasonable limits on time and cost.

This Phase II ESA was performed in general accordance with currently acceptable practices for environmental site investigations, specific Client requests, and the project budget, as applicable to this property.

It must be noted that the scope of work completed by Pinchin, as part of this assessment, may not be sufficient (in and of itself) to meet the reporting requirements for the submission of a Record of Site Condition ("RSC") in accordance with Ontario Regulation 153/04 (if required). If an RSC is an intended end product of work conducted at the Site, further consultation and/or work may be required.

Any use of this report by another party other than the Client, or any reliance on or decisions made based on the findings described in this report, are the sole responsibility of such parties, and Pinchin accepts no responsibility for damages, suffered by any such party as a result of decisions made or actions conducted based on this report. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

6.0 Signature Page

We trust that the foregoing information is satisfactory for your present requirements.

Should you have any questions about the report or require additional information, please contact the undersigned.

Yours truly,

PINCHIN ENVIRONMENTAL LTD.

lmb1731

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LB/MC/RT/db

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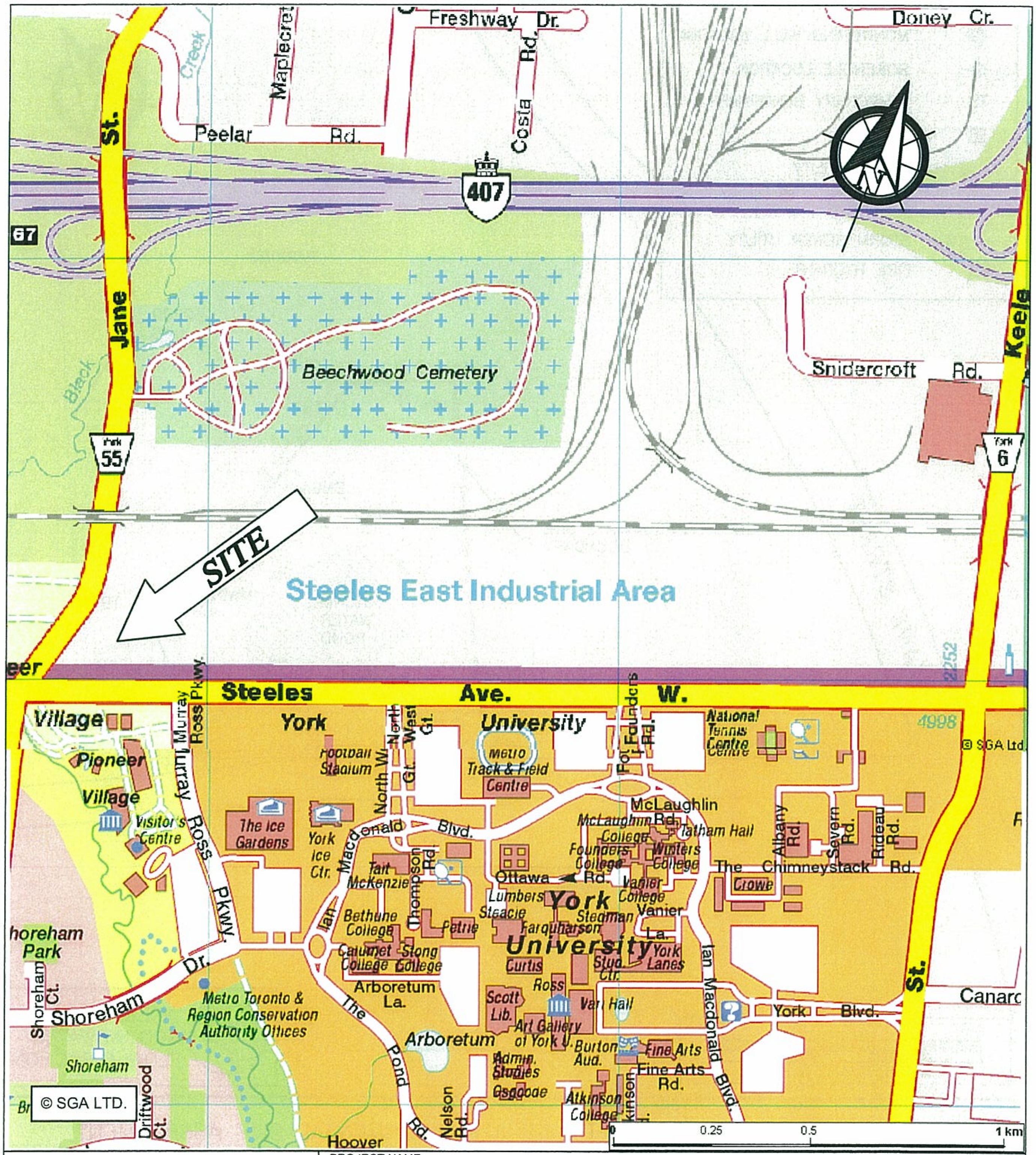
APPENDIX I

FIGURES



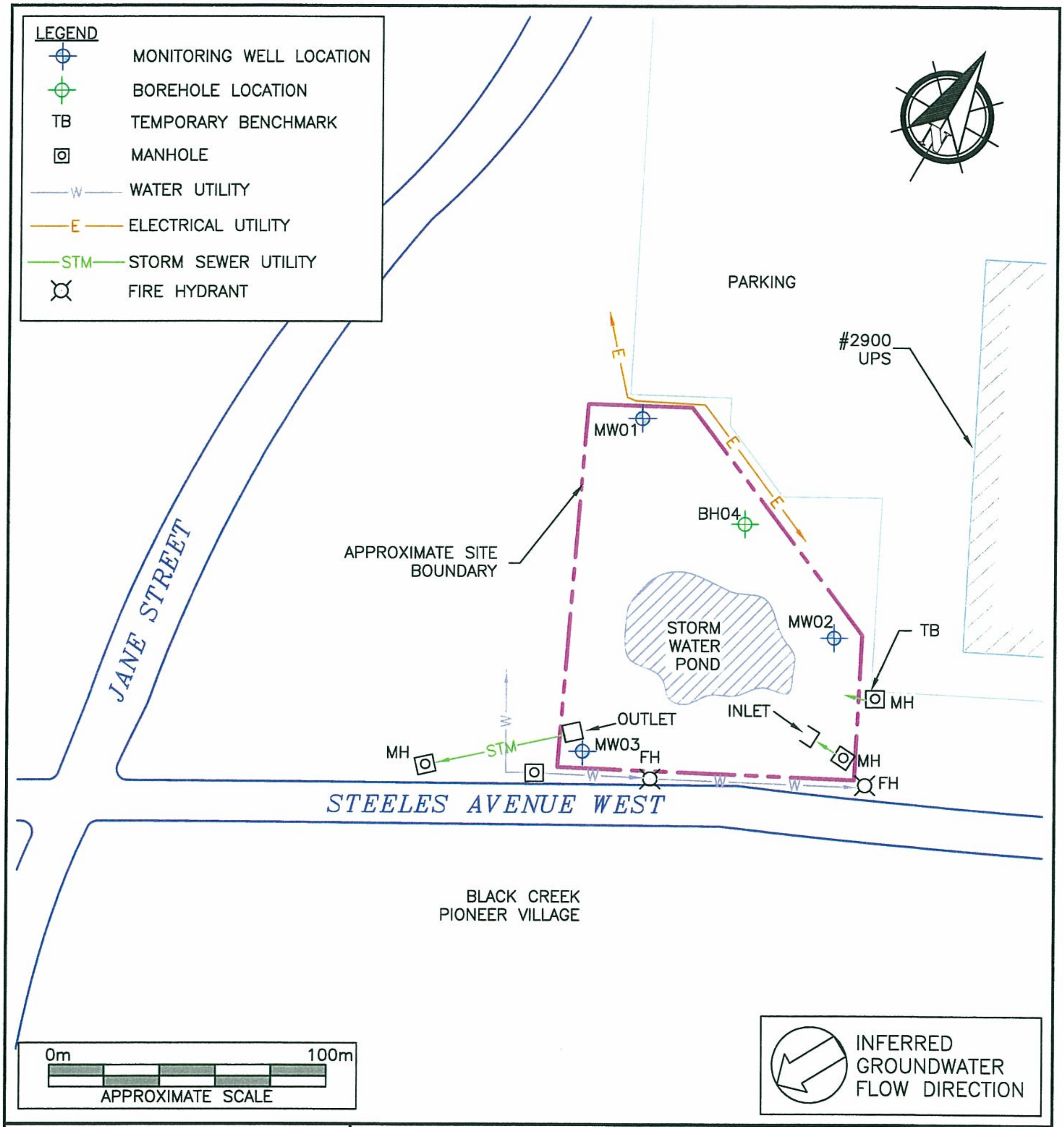
PINCHIN
ENVIRONMENTAL

PROJECT NAME
PHASE II ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
CITY OF VAUGHAN c/o THE SERNAS GROUP INC.

PROJECT LOCATION
PART OF LOT 1, CONCESSION 4, VAUGHAN, ONTARIO

FIGURE NAME			FIGURE NO.
KEY MAP			1
SCALE	PROJECT NO.	DATE:	
AS SHOWN	57167.003	JULY 2010	



PINCHIN ENVIRONMENTAL

PROJECT NAME	PHASE II ENVIRONMENTAL SITE ASSESSMENT
CLIENT NAME	CITY OF VAUGHAN c/o THE SERNAS GROUP INC.
PROJECT LOCATION	PART OF LOT 1, CONCESSION 4, VAUGHAN, ONTARIO
FIGURE NAME	BOREHOLE AND MONITORING WELL LOCATION PLAN

APPROXIMATE SCALE	PROJECT NO.	DATE	FIGURE NO.
AS SHOWN	57167.003	JULY 2010	2

APPENDIX II

BOREHOLE LOGS

Log of Borehole: BH/MW01

Project #: 57167.003 **Logged By:** LB

Project: Phase II Environmental Site Assessment

Client: City of Vaughan c/o The Sernas Group Inc.

Location: Part of Lot 1, Concession 4, Vaughan, Ontario

Drill Date: June 24, 2010 **Project Manager:** MC

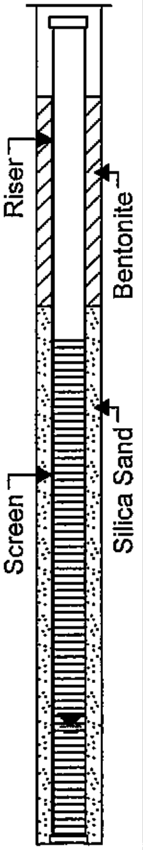
SUBSURFACE PROFILE

Description	Depth (m)
Ground Surface	0.00
TOP SOIL/GRASS	
SILT Brown, damp.	3.66
SANDY SILT Brown, moist.	4.88
SILTY SAND Brown, damp.	6.71
SAND Brown, damp.	7.01
End of Borehole	

Soil vapour concentration = PID/Gastech value.

Groundwater level = 5.92 m bTOC, July 5, 2010.

Monitoring Well Details



SAMPLE

Sampler #	Recovery (%)	N-Value	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
1	90	NA	S1	1.7/10	
			S2	2.0/10	
2	100	NA	S3	1.2/5	Metals
			S4	1.1/<5	
3	100	NA	S5	1.1/<5	
			S6	0.6/<5	
4	100	NA	S7	1.0/5	
			S8	1.0/5	
5	100	NA	S9	1.2/30	
			S10	2.9/25	
6	100	NA	S11	1.0/35	PHCs VOCs
			S12	0.8/20	

Contractor: Strata Soil Sampling Inc.

Drilling Method: Direct Push 6620DT

Well Casing Size: 38 mm (1.5")

Pinchin Environmental Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5

Grade Elevation: 100.28

Top of Casing Elevation: 101.00

Sheet: 1 of 1

Log of Borehole: BH/MW02

Project #: 57167.003 **Logged By:** LB

Project: Phase II Environmental Site Assessment

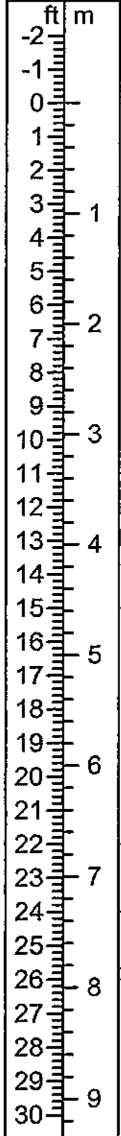
Client: City of Vaughan c/o The Sernas Group Inc.

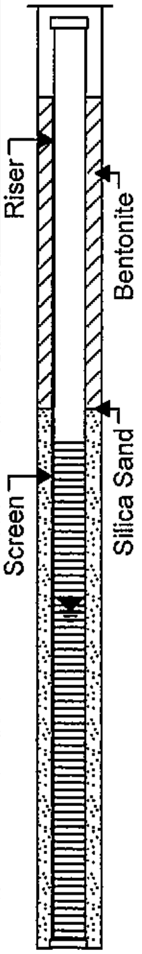
Location: Part of Lot 1, Concession 4, Vaughan, Ontario

Drill Date: June 29, 2010 **Project Manager:** MC

SUBSURFACE PROFILE

SAMPLE





Depth	Symbol	Description	Depth (m)	Monitoring Well Details	Sampler #	Recovery (%)	N-Value	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
		Ground Surface	0.00							
		TOP SOIL/GRASS								
		SILT Brown, damp.			1	70	NA	S1	1.2/<5	
								S2	0.7/5	
					2	100	NA	S3	0.5/5	
								S4	0.5/5	
		Becoming greyish-brown from 2.4 m.			3	90	NA	S5	0.5/5	Metals
			3.35					S6	0.5/10	
		SANDY SILT Greyish-brown, moist.			4	100	NA	S7	2.3/15	
			4.57					S8	1.4/5	
		SILT Greyish-brown, damp.			5	100	NA	S9	1.1/5	
								S10	3.4/5	
		Becoming brown with trace sand from 5.8 m.			6	100	NA	S11	4.0/10	
			6.71					S12	2.4/5	
		SANDY SILT Brown, wet.	7.32		7	100	NA	S13	2.4/15	PHCs
		CLAYEY SILT Grey, wet.	7.92					S14	2.9/5	VOCs
		End of Borehole Soil vapour concentration = PID/Gastech value. Groundwater level = 4.82 m bTOC, July 5,								

Contractor: Strata Soil Sampling Inc.

Drilling Method: Direct Push 6620DT

Well Casing Size: 38 mm (1.5")

Pinchin Environmental Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5

Grade Elevation: 99.92

Top of Casing Elevation: 100.73

Sheet: 1 of 1

Log of Borehole: BH/MW03

Project #: 57167.003 **Logged By:** LB

Project: Phase II Environmental Site Assessment

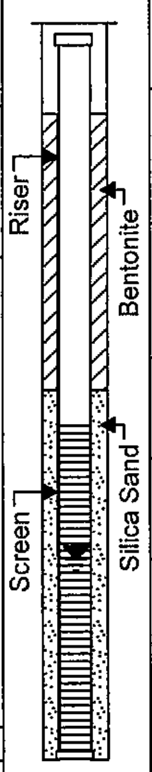
Client: City of Vaughan c/o The Sernas Group Inc.

Location: Part of Lot 1, Concession 4, Vaughan, Ontario

Drill Date: June 24, 2010 **Project Manager:** MC

SUBSURFACE PROFILE

Description	Depth (m)
Ground Surface	0.00
TOP SOIL/GRASS	
SILT Brown, moist.	1.52
SANDY SILT Brown, moist. Becoming moist to wet from 4.3 m.	5.79
SAND Brown, wet.	6.10
End of Borehole	



Soil vapour concentration = PID/Gastech value.

Groundwater level = 4.20 m bTOC, July 5, 2010.

SAMPLE

Sampler #	Recovery (%)	N-Value	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
1	80	NA	S1	3.4/<5	
			S2	1.1/<5	pH
2	100	NA	S3	0.5/<5	
			S4	0.5/<5	Metals
3	100	NA	S5	1.7/5	
			S6	1.7/<5	
4	100	NA	S7	1.5/25	PHCs
			S8	2.9/15	VOCs
5	100	NA	S9	2.3/5	
			S10	2.1/5	pH
6	100	NA	S11	0.7/10	
			S12	0.9/15	

Contractor: Strata Soil Sampling Inc.

Drilling Method: Direct Push 6620DT

Well Casing Size: 38 mm (1.5")

Pinchin Environmental Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5

Grade Elevation: 97.29

Top of Casing Elevation: 98.13

Sheet: 1 of 1

PINCHIN ENVIRONMENTAL

Log of Borehole: BH04

Project #: 57167.003 **Logged By:** LB

Project: Phase II Environmental Site Assessment

Client: City of Vaughan c/o The Sernas Group Inc.

Location: Part of Lot 1, Concession 4, Vaughan, Ontario

Drill Date: June 24, 2010 **Project Manager:** MC

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth (m)	Monitoring Well Details
0 / 0		Ground Surface	0.00	
		TOP SOIL/GRASS		No Monitoring Well Installed
		SILT Brown, moist. Trace sand from 1.7 m. Becoming greyish-brown and moist from 3.1 m.	5.18	
		SANDY SILT Brown, moist.	6.10	
		CLAYEY SILT Brown, wet.	6.71	
		SAND Brownish-grey, wet.	7.01	
		End of Borehole Soil vapour concentration = PID/Gastech value.		

SAMPLE

Sampler #	Recovery (%)	N-Value	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
1	90	NA	S1	0.5/5	
			S2	0.5/<5	
2	100	NA	S3	0.5/<5	
			S4	1.1/<5	Metals
3	90	NA	S5	1.5/15	
			S6	0.5/5	Grain Size
4	100	NA	S7	1.7/5	
			S8	1.7/5	
5	100	NA	S9	1.5/<5	
			S10	1.5/<5	
6	100	NA	S11	2.3/15	
			S12	2.1/20	PHCs VOCs

Contractor: Strata Soil Sampling Inc.

Drilling Method: Direct Push 6620DT

Well Casing Size: NA

Pinchin Environmental Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

APPENDIX III

SUMMARY TABLES

TABLE 1
MONITORING WELL CONSTRUCTION DETAILS
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Well Number	*Easting**	*Northing**	*Surveyed TOC Elevation (mREL)*	*Surveyed Ground Elevation (mREL)*	*Calculated Difference Between Ground and TOC (m)*	*Length of Screen (m)*
MW01	NM	NM	101.00	100.28	0.72	4.60
MW02	NM	NM	100.73	99.92	0.81	4.60
MW03	NM	NM	98.13	97.29	0.84	3.10

Notes:

mREL	Indicates Groundwater Elevation (metres) Relative to Site Benchmark
TOC	Indicates Top of Casing
*	Easting and Northing Reference Taken from Southwest Corner of Site, (metres)
NM	Not Measured

TABLE 2
GROUNDWATER ELEVATION DATA
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Well Number	*Date (dd/mm/yyyy)*	*NAPL Level Measurement from TOC (m)*	*Water Level Measurement From TOC (m)*	*Product Thickness (m)*	*Calculated Water Level Elevation (mREL)*
MW01	05/07/2010	ND	5.92	ND	95.08
MW02	05/07/2010	ND	4.82	ND	95.91
MW03	05/07/2010	ND	4.20	ND	93.93

Notes:

mREL	Indicates Groundwater Elevation (metres) Relative To Site Benchmark
NAPL	Non-Aqueous Phase Liquid
ND	Not Detected
TOC	Indicates Top of Casing

TABLE 3
SAMPLES SUBMITTED FOR CHEMICAL ANALYSIS
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Samples			*Parameters*											
Borehole ID	*Sample ID*	*Sample Depth Range (m)*	*SOIL SAMPLES*	*PHCs (F1-F4)*	*VOCs*	*Metals*	*pH*	*Grain Size Analysis*	*TCLP*	*GROUNDWATER SAMPLES*	*PHCs (F1-F4)*	*VOCs*	*Metals*	*Rationale*
BH/MW01	BH01 S3	1.2 - 1.8				●								Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW01	BH01 S11	6.1 - 6.6		●	●									Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW01	MW01	-									●	●	●	Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW02	BH02 S5	2.4 - 3.1				●								Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW02	BH02 S13	6.7 - 7.3		●										Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW02	BH02 S14	7.3 - 7.9			●									Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW02	MW02	-									●	●	●	Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW03	BH03 S4	1.8 - 2.4				●								Downgradient and adjacent to the on-Site stormwater management pond.
BH/MW03	BH03 S7	3.4 - 3.8		●										Downgradient and adjacent to the on-Site stormwater management pond.
BH/MW03	BH03 S8	3.8 - 4.3			●									Downgradient and adjacent to the on-Site stormwater management pond.
BH/MW03	pH-01	0.6 - 1.2					●							Confirmation of MOE Standards.
BH/MW03	pH-02	4.7 - 5.2					●							Confirmation of MOE Standards.
BH/MW03	MW03	-									●	●	●	Downgradient and adjacent to the on-Site stormwater management pond.
BH/MW04	BH04 S4	1.8 - 2.4				●								Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW04	BH04 S12	6.6 - 7.0		●	●									Downgradient of the northeast adjacent property where potential subsurface impacts were identified.
BH/MW04	Grain Size	3.1 - 3.7						●						Confirmation of MOE Standards.
TCLP	TCLP-01	Composite							●					Characterization of excess soil cuttings.

Notes:

PHCs (F1-F4)	Petroleum Hydrocarbons (Fraction 1 to Fraction 4)
VOCs	Volatile Organic Compounds
TCLP	Toxicity Characteristic Leaching Procedure

TABLE 4
pH AND GRAIN SIZE ANALYSIS FOR SOIL
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*Units*	*MOE (2004) Current Table 3 Standards**	*MOE (2009) Future Table 3 Standards**	*Sample Designation* *Sample Collection Date (dd/mm/yyyy)* *Sample Depth (mbgs)*		
				pH-01	*pH-02*	*Grain Size*
				24/06/2010	*24/06/2010*	*24/06/2010*
				0.6 - 1.2	*4.7 - 5.2*	*3.1 - 3.7*
				Surface	*Sub-Surface*	*Native*
pH		Surface: 5 < pH < 9 Subsurface: 5 < pH < 11	Surface: 5 < pH < 9 Subsurface: 5 < pH < 11	7.48	7.64	NA
Sieve #200 <0.075 mm	%	50%	50%	NA	NA	66
Sieve #200 >0.075 mm	%	50%	50%	NA	NA	34
					Grain Size	**FINE**

Notes:

MOE (2004) Current Table 3 Standards* Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004,

MOE (2009) Future Standards* Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009.

BOLD	Environmentally Sensititive Area (Based Upon pH of Surface Soil)
BOLD	Environmentally Sensititive Area (Based Upon pH of Sub-Surface Soil)
RDL	Reportable Detection Limit
NA	Not Analysed
mbgs	Metres Below Ground Surface

TABLE 5
PETROLEUM HYDROCARBON AND POLYCHLORINATED BIPHENYLS ANALYSIS FOR SOIL
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*RDL*	*MOE (2004) Current Table 3 Standards (residential/ parkland)**	*MOE (2009) Future Table 3 Standards (residential/ parkland)**	*MOE (2004) Current Table 3 Standards (commerical/ industrial)***	*MOE (2009) Future Table 3 Standards (commercial/ industrial)***	*Sample Designation*			
						Sample Collection Date (dd/mm/yyyy)			
						Sample Depth (mbgs)			
						BH01 S11	*BH02 S13*	*BH03 S7*	*BH04 S12*
						24/06/2010	*29/06/2010*	*24/06/2010*	*24/06/2010*
						6.1 - 6.6	*6.7 - 7.3*	*3.4 - 3.8*	*6.6 - 7.0*
Benzene	0.02	25	0.17	25	0.4	NA	<0.02	<0.02	NA
Toluene	0.02	150	6	150	78	NA	<0.02	<0.02	NA
Ethylbenzene	0.02	500	15	1000	19	NA	<0.02	<0.02	NA
o-Xylene	0.02	210	NV	210	NV	NA	<0.02	<0.02	NA
p+m-Xylene	0.04	210	NV	210	NV	NA	<0.04	<0.04	NA
Total Xylenes	0.04	210	25	210	30	NA	<0.04	<0.04	NA
Petroleum Hydrocarbons F1 (C_6 - C_{10})	10	260	65	660	65	<10	<10	<10	<10
Petroleum Hydrocarbons F2 (>C_{10} - C_{16})	10	900	150	1500	250	<10	<10	<10	<10
Petroleum Hydrocarbons F3 (>C_{16} - C_{34})	10	800	1300	2500	2500	<10	20	<10	<10
Petroleum Hydrocarbons F4 (>C34-C50)	10	5600	5600	6600	6600	<10	11	<10	<10

Notes:

MOE (2004) Current Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.
MOE (2009) Future Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Use.
MOE (2004) Current Table 3 Standards**	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Industrial / Commercial / Community Property Use.
MOE (2009) Future Table 3 Standards**	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Industrial / Commercial / Community Property Use.

BOLD	Exceeds 2004 and 2009 Site Condition Standard
BOLD	Exceeds 2004 Site Condition Standard
BOLD	Exceeds 2009 Site Condition Standard
RDL	Reportable Detection Limit
BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
NA	Not Analysed
Units	All Units in µg/g Unless Otherwise Noted.
mbgs	Metres Below Ground Surface

TABLE 6
VOLATILE ORGANIC COMPOUND ANALYSIS FOR SOIL
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	RDL	*MOE (2004) Current Table 3 Standards (residential/ parkland)**	*MOE (2009) Future Table 3 Standards (residential/ parkland)**	*MOE (2004) Current Table 3 Standards (commerical/ industrial)***	*MOE (2009) Future Table 3 Standards (commercial/ industrial)***	*Sample Designation*			
						Sample Collection Date (dd/mm/yyyy)			
						Sample Depth (mbgs)			
						BH01 S11	*BH02 S14*	*BH03 S8*	*BH04 S12*
						24/06/2010	*29/06/2010*	*24/06/2010*	*24/06/2010*
						6.1 - 6.6	*7.3 - 7.9*	*3.8 - 4.3*	*6.6 - 7.0*
Acetone	0.1	3.8	28	3.8	28	<0.1	<0.1	<0.1	<0.1
Benzene	0.002	25.0	0.17	25.0	0.4	0.003	<0.002	0.004	0.003
Bromodichloromethane	0.002	14	13	25	18	<0.002	<0.002	<0.002	<0.002
Bromoform	0.002	14.0	0.3	14.0	1.7	<0.002	<0.002	<0.002	<0.002
Bromomethane	0.003	0.38	0.05	0.38	0.05	<0.003	<0.003	<0.003	<0.003
Carbon Tetrachloride	0.002	0.64	0.12	0.64	1.50	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	0.002	30.0	2.7	30.0	2.7	<0.002	<0.002	<0.002	<0.002
Chloroform	0.002	4.9	0.2	4.9	0.2	<0.002	<0.002	<0.002	<0.002
Dibromochloromethane	0.002	10	9	18	13	<0.002	<0.002	<0.002	<0.002
1,2-Dichlorobenzene	0.002	30	4	30	9	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	0.002	30	6	30	12	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	0.002	30	0.097	30	1	<0.002	<0.002	<0.002	<0.002
Dichlorodifluoromethane (FREON 12	0.005	NV	25	NV	25	<0.005	NA	<0.005	<0.005
1,1-Dichloroethane	0.002	100	11	140	21	<0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	0.002	0.01	0.05	0.14	0.05	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethylene	0.002	0.015	0.05	0.015	0.48	<0.002	<0.002	<0.002	<0.002
Cis-1,2-Dichloroethylene	0.002	2.3	30	2.3	37	<0.002	<0.002	<0.002	<0.002
Trans-1,2-Dichloroethylene	0.002	4.1	0.75	4.1	9.3	<0.002	<0.002	<0.002	<0.002
1,2-Dichloropropane	0.002	0.12	0.09	0.12	0.68	<0.002	<0.002	<0.002	<0.002
Cis-1,3-Dichloropropylene	0.002	0.041	0.083	0.041	0.21	<0.002	<0.002	<0.002	<0.002
Trans-1,3-Dichloropropylene	0.002	0.041	0.083	0.041	0.21	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	0.002	500	15	1000	19	0.002	<0.002	0.002	<0.002
Ethylene Dibromide	0.002	0.01	0.05	0.02	0.05	<0.002	<0.002	<0.002	<0.002
Hexane	0.005	NV	34	NV	88	0.036	NA	0.034	0.027
Methyl Ethyl Ketone	0.03	38	44	38	88	<0.03	<0.03	<0.03	<0.03
Methylene Chloride	0.003	120	0.96	200	2	<0.003	<0.003	<0.003	<0.003
Methyl Isobutyl Ketone	0.03	69	4.3	69	210	<0.03	<0.03	<0.03	<0.03
Methyl-t-Butyl Ether	0.002	100	1.4	410	3.2	<0.002	<0.002	<0.002	<0.002
Styrene	0.002	7.7	2.2	7.7	43	<0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	0.002	0.12	0.05	0.12	0.11	<0.002	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	0.002	0.23	0.05	0.23	0.09	<0.002	<0.002	<0.002	<0.002
Toluene	0.002	150	6	150	78	0.013	0.007	0.013	0.012
Tetrachloroethylene	0.002	0.45	2.3	0.45	21	<0.002	<0.002	<0.002	<0.002
1,1,1-Trichloroethane	0.002	34	3.4	34	12	<0.002	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	0.002	2.3	0.1	3.1	0.1	<0.002	<0.002	<0.002	<0.002
Trichloroethylene	0.002	3.9	0.52	3.9	0.61	<0.002	<0.002	<0.002	<0.002
Vinyl Chloride	0.002	0.0075	0.022	0.0075	0.25	<0.002	<0.002	<0.002	<0.002
m-Xylene & p-Xylene	0.002	210	NV	210	30	0.012	0.007	0.013	0.012
o-Xylene	0.002	210	NV	210	30	0.003	<0.002	0.003	0.003
Total Xylenes	0.002	210	25	210	30	0.015	0.007	0.016	0.015
Trichlorofluoromethane (FREON 11)	0.002	NV	5.8	NV	5.8	<0.002	NA	<0.002	<0.002

Notes:

MOE (2004) Current Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.
MOE (2009) Future Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Use.
MOE (2004) Current Table 3 Standards**	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Industrial / Commercial / Community Property Use.
MOE (2009) Future Table 3 Standards**	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Industrial / Commercial / Community Property Use.

▨ BOLD	Exceeds 2004 and 2009 Site Condition Standard
▨ BOLD	Exceeds 2004 Site Condition Standard
▨ BOLD	Exceeds 2009 Site Condition Standard
RDL	Reportable Detection Limit
▨ BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
NA	Not Analysed
Units	All Units in µg/g Unless Otherwise Noted.
mbgs	Metres Below Ground Surface

TABLE 7
INORGANIC ANALYSIS FOR SOIL
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*RDL*	*MOE (2004) Current Table 3 Standards (residential/ parkland)**	*MOE (2009) Future Table 3 Standards (residential/ parkland)**	*MOE (2004) Current Table 3 Standards (commerical/ industrial)***	*MOE (2009) Future Table 3 Standards (commercial/ industrial)***	*Sample Designation*			
						Sample Collection Date (dd/mm/yyyy)			
						Sample Depth (mbgs)			
						BH01 S3	*BH02 S5*	*BH03 S4*	*BH04 S4*
						24/06/2010	*29/06/2010*	*24/06/2010*	*24/06/2010*
						1.2 - 1.8	*2.4 - 3.1*	*1.8 - 2.4*	*1.8 - 1.4*
Antimony	0.2	13	7.5	44	50	<0.2	<0.2	<0.2	<0.2
Arsenic	1	25	18	50	18	2	2	3	2
Barium	0.5	1000	390	2000	670	70	85	64	64
Beryllium	0.2	1.2	5	1.2	10	0.4	0.5	0.5	0.4
Boron	5	1.5	1.5	NV	120	<5	NA	<5	<5
Cadmium	0.1	12	1.2	12	1.9	<0.1	<0.1	<0.1	<0.1
Chromium (Total)	1	1000	160	1000	160	15	19	17	16
Cobalt	0.1	50	22	100	100	7.4	9.4	6.7	7.2
Copper	0.5	300	180	300	300	15	19	15	16
Lead	1	200	120	1000	120	7	9	7	7
Molybdenum	0.5	40	6.9	40	40	<0.5	<0.5	<0.5	<0.5
Nickel	0.5	200	130	200	340	15	21	16	15
Selenium	0.5	10	2.4	10	5.5	<0.5	<0.5	<0.5	<0.5
Silver	0.2	25	25	50	50	<0.2	<0.2	<0.2	<0.2
Thallium	0.05	4.1	1	32	3.3	0.09	0.12	0.11	0.09
Uranium	0.05	N V	23	NV	33	0.41	NA	0.34	0.38
Vanadium	5	250	86	250	86	24	26	23	24
Zinc	5	800	340	800	340	33	48	38	37

Notes:

MOE (2004) Current Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.
MOE (2009) Future Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Use.
MOE (2004) Current Table 3 Standards**	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Industrial / Commercial / Community Property Use.
MOE (2009) Future Table 3 Standards**	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for Industrial / Commercial / Community Property Use.

BOLD	Exceeds 2004 and 2009 Site Condition Standard
BOLD	Exceeds 2004 Site Condition Standard
BOLD	Exceeds 2009 Site Condition Standard
RDL	Reportable Detection Limit
BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
NA	Not Analysed
Units	All Units in µg/g Unless Otherwise Noted.
mbgs	Metres Below Ground Surface

TABLE 8
TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) ANALYSIS FOR SOIL
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*RDL*	*Schedule 4*$^{++}$	*Sample Designation* *Sample Collection Date (dd/mm/yyyy)*
			TCLP-01
			24/6/2010
METALS			
Leachable Arsenic (As)	0.2	2.5	<0.2
Leachable Barium (Ba)	0.2	100.0	0.8
Leachable Boron (B)	0.1	500.0	<0.1
Leachable Cadmium (Cd)	0.05	0.5	<0.05
Leachable Chromium (Cr)	0.1	5.0	<0.1
Leachable Lead (Pb)	0.1	5.0	<0.1
Leachable Mercury (Hg)	0.001	0.1	<0.001
Leachable Selenium (Se)	0.1	1.0	<0.1
Leachable Silver (Ag)	0.01	5	<0.01
Leachable Uranium (U)	0.01	10.0	<0.01
VOLATILE ORGANIC COMPOUNDS			
Benzene	0.02	0.5	<0.02
Carbon Tetrachloride	0.02	0.5	<0.02
Chlorobenzene	0.02	8	<0.02
Chloroform	0.02	10	<0.02
1,2-Dichlorobenzene	0.05	20	<0.05
1,4-Dichlorobenzene	0.05	0.5	<0.05
1,2-Dichloroethane	0.05	0.5	<0.05
1,1-Dichloroethylene	0.02	1.4	<0.02
Dichloromethane	0.2	5	<0.2
Methyl Ethyl Ketone	0.5	200	<0.5
Tetrachloroethylene	0.02	3	<0.02
Trichloroethylene	0.02	5	<0.02
Vinyl Chloride	0.02	0.21	<0.02
INORGANICS			
Leachable Fluoride	0.1	150	0.2
Leachable Free Cyanide	0.002	20	<0.002
Leachable Nitrite and Nitrate	0.1	1000	<0.1
Final pH	NA	NA	6.15
Initial pH	NA	NA	9.38
POLYCHLORINATED BIPHENYLS			
Total PCBs	0.003	0.003	<0.003
SEMIVOLATILE ORGANICS			
Benzo(a)pyrene	0.001	0.001	<0.001

Notes:

Schedule 4^{++}	Leachate Quality Criteria, Ontario Regulation 217/08, Regulation to Amend Regulation 347 of the Revised Regulations of Ontario, 1990, Made Under the Environmental Protection Act, September 20, 2000.

BOLD	Exceeds Schedule 4 Criteria
RDL	Reportable Detection Limit
BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
mbgs	Metres Below Ground Surface
NA	Not Applicable
Units	All Values Reported in Units of mg/L

TABLE 9
PETROLEUM HYDROCARBON AND POLYCHLORINATED BIPHENYLS ANALYSIS FOR GROUNDWATER
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*RDL*	*MOE (2004) Current Table 3 Standards**	*MOE (2009) Future Table 3 Standards**	*Sample Designation*		
				Sample Collection Date (dd/mm/yyyy)		
				MW01	*MW02*	*MW03*
				5/7/2010	*5/7/2010*	*5/7/2010*
Petroleum Hydrocarbons F1 (C_6 - C_{10})	100	NV	750	<100	<100	<100
Petroleum Hydrocarbons F2 (>C_{10} - C_{16})	100	NV	150	<100	<100	<100
Petroleum Hydrocarbons F3 (>C_{16} - C_{34})	100	NV	500	<100	<100	<100
Petroleum Hydrocarbons F4 (>C34 - C50)	100	NV	500	<100	<100	<100

Notes:

MOE (2004) Current Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
MOE (2009) Future Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.

BOLD	Exceeds 2004 and 2009 Site Condition Standard
BOLD	Exceeds 2004 Site Condition Standard
BOLD	Exceeds 2009 Site Condition Standard
RDL	Reportable Detection Limit
BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
NA	Not Analysed
Units	All Units in μg/L Unless Otherwise Noted.
mbgs	Metres Below Ground Surface

TABLE 10
VOLATILE ORGANIC COMPOUND ANALYSIS FOR GROUNDWATER
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*RDL*	*MOE (2004) Current Table 3 Standards**	*MOE (2009) Future Table 3 Standards**	*Sample Designation*		
				Sample Collection Date (dd/mm/yyyy)		
				MW01	*MW02*	*MW03*
				5/7/2010	*5/7/2010*	*5/7/2010*
Acetone	10	3300	130000	19	<10	<10
Benzene	0.1	12000	430	<0.1	<0.1	<0.1
Bromodichloromethane	0.1	50000	85000	<0.1	<0.1	<0.1
Bromoform	0.2	5200	770	<0.2	<0.2	<0.2
Bromomethane	0.5	16	56	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.1	100	8	<0.1	<0.1	<0.1
Chlorobenzene	0.1	500	630	<0.1	<0.1	<0.1
Chloroform	0.1	2700	22	<0.1	<0.1	<0.1
Dibromochloromethane	0.2	50000	82000	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.2	7600	9600	<0.2	<0.2	<0.2
1,3-Dichlorobenzene	0.2	7600	9600	<0.2	<0.2	<0.2
1,4-Dichlorobenzene	0.2	7600	67	<0.2	<0.2	<0.2
Dichlorodifluoromethane (FREON 12)	0.5	NV	4400	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.1	50000	3100	<0.1	<0.1	<0.1
1,2-Dichloroethane	0.2	110	12	<0.2	<0.2	<0.2
1,1-Dichloroethylene	0.1	4.1	17	<0.1	<0.1	<0.1
Cis-1,2-Dichloroethylene	0.1	70	17	<0.1	<0.1	<0.1
Trans-1,2-Dichloroethylene	0.1	100	17	<0.1	<0.1	<0.1
1,2-Dichloropropane	0.1	58	140	<0.1	<0.1	<0.1
Cis-1,3-Dichloropropylene	0.2	24	45	<0.2	<0.2	<0.2
Trans-1,3-Dichloropropylene	0.2	24	45	<0.2	<0.2	<0.2
Ethylbenzene	0.1	50000	2300	<0.1	<0.1	<0.1
Ethylene Dibromide	0.2	21	1	<0.2	<0.2	<0.2
Hexane	0.5	NV	520	<0.5	<0.5	<0.5
Methyl Ethyl Ketone	5	50000	1500000	<5	<5	<5
Methylene Chloride	0.5	50000	5500	<0.5	<0.5	<0.5
Methyl Isobutyl Ketone	5	50000	580000	<5	<5	<5
Methyl-t-Butyl Ether	0.2	50000	1400	0.3	0.3	<0.2
Styrene	0.2	5900	9100	<0.2	<0.2	<0.2
1,1,1,2-Tetrachloroethane	0.1	38	28	<0.1	<0.1	<0.1
1,1,2,2-Tetrachloroethane	0.2	140	15	<0.2	<0.2	<0.2
Toluene	0.2	37000	18000	<0.2	<0.2	<0.1
Tetrachloroethylene	0.1	5.0	17.0	<0.1	<0.1	<0.2
1,1,1-Trichloroethane	0.1	200	6700	<0.1	<0.1	<0.1
1,1,2-Trichloroethane	0.2	50000	30	<0.2	<0.2	<0.2
Trichloroethylene	0.1	50	17	<0.1	<0.1	<0.1
Vinyl Chloride	0.2	1.3	1.7	<0.2	<0.2	<0.2
m-Xylene & p-Xylene	0.1	35000	4200	<0.1	<0.1	<0.1
o-Xylene	0.1	35000	4200	<0.1	<0.1	<0.1
Total Xylenes	0.1	35000	4200	<0.1	<0.1	<0.1
Trichlorofluoromethane (FREON 11)	0.2	NV	2500	<0.2	<0.2	<0.2

Notes:

MOE (2004) Current Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
MOE (2009) Future Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.

BOLD	Exceeds 2004 and 2009 Site Condition Standard
BOLD	Exceeds 2004 Site Condition Standard
BOLD	Exceeds 2009 Site Condition Standard
RDL	Reportable Detection Limit
BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
NA	Not Analysed
Units	All Units in µg/L Unless Otherwise Noted.
mbgs	Metres Below Ground Surface

TABLE 11
INORGANIC ANALYSIS FOR GROUNDWATER
City of Vaughan
Part of Lot 1, Concession 4, Vaughan, Ontario

Parameter	*RDL*	*MOE (2004) Current Table 3 Standards**	*MOE (2009) Future Table 3 Standards**	*Sample Designation*		
				Sample Collection Date (dd/mm/yyyy)		
				MW01	*MW02*	*MW03*
				5/7/2010	*5/7/2010*	*5/7/2010*
Antimony	0.5	16000	20000	<0.5	<0.5	<0.5
Arsenic	1	480	1900	1	1	<1
Barium	5	23000	29000	700	480	69
Beryllium	0.5	53	67	<0.5	<0.5	<0.5
Boron	10	50000	45000	15	13	14
Cadmium	0.1	11	2.7	<0.1	<0.1	<0.1
Chromium (Total)	5	2000	810	<5	<5	<5
Cobalt	0.5	100	66	3.7	3.6	1.9
Copper	1	23	87	2	1	2
Lead	0.5	32	25	<0.5	<0.5	<0.5
Molybdenum	1	7300	9200	<1	<1	9
Nickel	1	1600	490	8	9	6
Selenium	2	50	63	<2	<2	<2
Silver	0.1	1.2	1.5	<0.1	<0.1	<0.1
Sodium	100	NV	490000	380000	410000	26000
Thallium	0.05	400	510	<0.05	<0.05	<0.05
Vanadium	1	200	250	1	2	2
Zinc	5	1100	1100	6	13	<5

Notes:

MOE (2004) Current Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
MOE (2009) Future Table 3 Standards*	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, July 27, 2009, Table 3 Standards, Medium and Fine Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.

BOLD	Exceeds 2004 and 2009 Site Condition Standard
BOLD	Exceeds 2004 Site Condition Standard
BOLD	Exceeds 2009 Site Condition Standard
RDL	Reportable Detection Limit
BOLD	RDL Exceeds Site Condition Standard
ND	Not Detected Above Laboratory RDL
NV	No Value Available for Site Condition Standard
NA	Not Analysed
Units	All Units in µg/L Unless Otherwise Noted.
mbgs	Metres Below Ground Surface

APPENDIX IV

LABORATORY CERTIFICATES OF ANALYSIS

Your Project #: 57167.003
Your C.O.C. #: 00579368

Attention: Lindsay Bell
Pinchin Environmental Ltd
2470 Milltower Crt
Mississauga, ON
L5N 7W5

Report Date: 2010/07/05

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B082882
Received: 2010/06/25, 08:18

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydro. CCME F1 & BTEX in Soil	3	2010/06/26	2010/06/29	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	3	2010/06/29	2010/06/30	CAM SOP-00316	CCME CWS
Acid Extr. Metals (aqua regia) by ICPMS	3	2010/07/02	2010/07/02	CAM SOP-00447	EPA 6020
MOISTURE	4	N/A	2010/06/30	CAM SOP-00445	McKeague 2nd ed 1978
pH CaCl2 EXTRACT	2	2010/07/02	2010/07/02	CAM SOP-00413	SM 4500 H
Sieve, 75um (1)	1	N/A	2010/07/02	CAM SOP-00467	
Volatile Organic Compounds in Soil	1	2010/06/28	2010/06/30	CAM SOP-00226	EPA 8260 modified
Volatile Organic Compounds in Soil	2	2010/06/28	2010/07/01	CAM SOP-00226	EPA 8260 modified

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) The Sieve test has been validated in accordance with ISO Guide 17025 requirements. SCC accreditation pending.

Encryption Key

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

RENATA SPENA, Project Manager
Email: Renata.Spena@maxxamanalytics.com
Phone# (905) 817-5700 Ext:5818

==

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 #: B082882
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

RESULTS OF ANALYSES OF SOIL

Maxxam ID		GH4876	GH4878	GH4879	GH4881	GH4882	GH4883	GH4884	GH4884		
Sampling Date		2010/06/24	2010/06/24	2010/06/24	2010/06/24	2010/06/24	2010/06/24	2010/06/24	2010/06/24		
	Units	**BH01 S11**	**BH03 S7**	**BH03 S8**	**BH04 S12**	**PH-01**	**PH-02**	**GRAIN SIZE**	**GRAIN SIZE Lab-Dup**	**RDL**	**QC Batch**
Inorganics											
Moisture	%	12	11	13	13					1	2194021
Available (CaCl2) pH	pH					7.48	7.64				2195277
Miscellaneous Parameters											
Grain Size	%							FINE	FINE	N/A	2195756
Sieve - #200 (<0.075mm)	%							66	64	N/A	2195756
Sieve - #200 (>0.075mm)	%							34	36	N/A	2195756

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B082882
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		GH4875		GH4877		GH4880		
Sampling Date		2010/06/24		2010/06/24		2010/06/24		
	Units	BH01 S3	QC Batch	BH03 S4	QC Batch	BH04 S4	RDL	QC Batch
Metals								
Acid Extractable Antimony (Sb)	ug/g	<0.2	2195381	<0.2	2195175	<0.2	0.2	2195262
Acid Extractable Arsenic (As)	ug/g	2	2195381	3	2195175	2	1	2195262
Acid Extractable Barium (Ba)	ug/g	70	2195381	64	2195175	64	0.5	2195262
Acid Extractable Beryllium (Be)	ug/g	0.4	2195381	0.5	2195175	0.4	0.2	2195262
Acid Extractable Boron (B)	ug/g	<5	2195381	<5	2195175	<5	5	2195262
Acid Extractable Cadmium (Cd)	ug/g	<0.1	2195381	<0.1	2195175	<0.1	0.1	2195262
Acid Extractable Chromium (Cr)	ug/g	15	2195381	17	2195175	16	1	2195262
Acid Extractable Cobalt (Co)	ug/g	7.4	2195381	6.7	2195175	7.2	0.1	2195262
Acid Extractable Copper (Cu)	ug/g	15	2195381	15	2195175	16	0.5	2195262
Acid Extractable Lead (Pb)	ug/g	7	2195381	7	2195175	7	1	2195262
Acid Extractable Molybdenum (Mo)	ug/g	<0.5	2195381	<0.5	2195175	<0.5	0.5	2195262
Acid Extractable Nickel (Ni)	ug/g	15	2195381	16	2195175	15	0.5	2195262
Acid Extractable Selenium (Se)	ug/g	<0.5	2195381	<0.5	2195175	<0.5	0.5	2195262
Acid Extractable Silver (Ag)	ug/g	<0.2	2195381	<0.2	2195175	<0.2	0.2	2195262
Acid Extractable Thallium (Tl)	ug/g	0.09	2195381	0.11	2195175	0.09	0.05	2195262
Acid Extractable Uranium (U)	ug/g	0.41	2195381	0.34	2195175	0.38	0.05	2195262
Acid Extractable Vanadium (V)	ug/g	24	2195381	23	2195175	24	5	2195262
Acid Extractable Zinc (Zn)	ug/g	33	2195381	38	2195175	37	5	2195262

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GH4876	GH4879	GH4881		
Sampling Date		2010/06/24	2010/06/24	2010/06/24		
	Units	**BH01 S11**	**BH03 S8**	**BH04 S12**	**RDL**	**QC Batch**
Volatile Organics						
Acetone (2-Propanone)	ug/g	<0.1	<0.1	<0.1	0.1	2192029
Benzene	ug/g	0.003	0.004	0.003	0.002	2192029
Bromodichloromethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Bromoform	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Bromomethane	ug/g	<0.003	<0.003	<0.003	0.003	2192029
Carbon Tetrachloride	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Chlorobenzene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Chloroform	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Dibromochloromethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,2-Dichlorobenzene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,3-Dichlorobenzene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,4-Dichlorobenzene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Dichlorodifluoromethane (FREON 12)	ug/g	<0.005	<0.005	<0.005	0.005	2192029
1,1-Dichloroethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,2-Dichloroethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,1-Dichloroethylene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
cis-1,2-Dichloroethylene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
trans-1,2-Dichloroethylene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,2-Dichloropropane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
cis-1,3-Dichloropropene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
trans-1,3-Dichloropropene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Ethylbenzene	ug/g	0.002	0.002	<0.002	0.002	2192029
Ethylene Dibromide	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Hexane	ug/g	0.036	0.034	0.027	0.005	2192029
Methylene Chloride(Dichloromethane)	ug/g	<0.003	<0.003	<0.003	0.003	2192029
Methyl Isobutyl Ketone	ug/g	<0.03	<0.03	<0.03	0.03	2192029
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.03	<0.03	<0.03	0.03	2192029
Methyl t-butyl ether (MTBE)	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Styrene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,1,1,2-Tetrachloroethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,1,2,2-Tetrachloroethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Tetrachloroethylene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Toluene	ug/g	0.013	0.013	0.012	0.002	2192029
1,1,1-Trichloroethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029
1,1,2-Trichloroethane	ug/g	<0.002	<0.002	<0.002	0.002	2192029

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B082882
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GH4876	GH4879	GH4881		
Sampling Date		2010/06/24	2010/06/24	2010/06/24		
	Units	BH01 S11	BH03 S8	BH04 S12	RDL	QC Batch
Trichloroethylene	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Vinyl Chloride	ug/g	<0.002	<0.002	<0.002	0.002	2192029
p+m-Xylene	ug/g	0.012	0.013	0.012	0.002	2192029
o-Xylene	ug/g	0.003	0.003	0.003	0.002	2192029
Xylene (Total)	ug/g	0.015	0.016	0.015	0.002	2192029
Trichlorofluoromethane (FREON 11)	ug/g	<0.002	<0.002	<0.002	0.002	2192029
Surrogate Recovery (%)						
4-Bromofluorobenzene	%	93	92	90		2192029
D4-1,2-Dichloroethane	%	89	86	89		2192029
D8-Toluene	%	108	106	105		2192029

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		GH4876	GH4878	GH4881		
Sampling Date		2010/06/24	2010/06/24	2010/06/24		
	Units	**BH01 S11**	**BH03 S7**	**BH04 S12**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons						
Benzene	ug/g		<0.02		0.02	2193292
Toluene	ug/g		<0.02		0.02	2193292
Ethylbenzene	ug/g		<0.02		0.02	2193292
o-Xylene	ug/g		<0.02		0.02	2193292
p+m-Xylene	ug/g		<0.04		0.04	2193292
Total Xylenes	ug/g		<0.04		0.04	2193292
F1 (C6-C10)	ug/g	<10	<10	<10	10	2193292
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	10	2193292
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	10	2192480
F3 (C16-C34 Hydrocarbons)	ug/g	<10	<10	<10	10	2192480
F4 (C34-C50 Hydrocarbons)	ug/g	<10	<10	<10	10	2192480
Reached Baseline at C50	ug/g	YES	YES	YES		2192480
Surrogate Recovery (%)						
1,4-Difluorobenzene	%	99	100	99		2193292
4-Bromofluorobenzene	%	94	94	94		2193292
D10-Ethylbenzene	%	93	103	92		2193292
D4-1,2-Dichloroethane	%	95	96	94		2193292
o-Terphenyl	%	97	96	93		2192480

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B082882
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2192029	4-Bromofluorobenzene	2010/06/30	109	60 - 140	114	60 - 140	106	%				
2192029	D4-1,2-Dichloroethane	2010/06/30	105	60 - 140	99	60 - 140	108	%				
2192029	D8-Toluene	2010/06/30	104	60 - 140	95	60 - 140	96	%				
2192029	Acetone (2-Propanone)	2010/06/30	89	24 - 171	84	60 - 140	<0.1	ug/g	NC	50		
2192029	Benzene	2010/06/30	78	39 - 137	97	60 - 140	<0.002	ug/g	NC	50		
2192029	Bromodichloromethane	2010/06/30	80	45 - 131	97	60 - 140	<0.002	ug/g	NC	50		
2192029	Bromoform	2010/06/30	69	44 - 131	91	60 - 140	<0.002	ug/g	NC	50		
2192029	Bromomethane	2010/06/30	93	20 - 146	103	60 - 140	<0.003	ug/g	NC	50		
2192029	Carbon Tetrachloride	2010/06/30	97	40 - 139	113	60 - 140	<0.002	ug/g	NC	50		
2192029	Chlorobenzene	2010/06/30	79	45 - 140	101	60 - 140	<0.002	ug/g	NC	50		
2192029	Chloroform	2010/06/30	81	48 - 128	97	60 - 140	<0.002	ug/g	NC	50		
2192029	Dibromochloromethane	2010/06/30	83	52 - 135	101	60 - 140	<0.002	ug/g	NC	50		
2192029	1,2-Dichlorobenzene	2010/06/30	75	39 - 145	103	60 - 140	<0.002	ug/g	NC	50		
2192029	1,3-Dichlorobenzene	2010/06/30	76	38 - 158	103	60 - 140	<0.002	ug/g	NC	50		
2192029	1,4-Dichlorobenzene	2010/06/30	77	35 - 159	108	60 - 140	<0.002	ug/g	NC	50		
2192029	Dichlorodifluoromethane (FREON 12)	2010/06/30	115	60 - 140	119	60 - 140	<0.005	ug/g				
2192029	1,1-Dichloroethane	2010/06/30	78	48 - 131	93	60 - 140	<0.002	ug/g	NC	50		
2192029	1,2-Dichloroethane	2010/06/30	84	43 - 123	97	60 - 140	<0.002	ug/g	NC	50		
2192029	1,1-Dichloroethylene	2010/06/30	85	50 - 134	98	60 - 140	<0.002	ug/g	NC	50		
2192029	cis-1,2-Dichloroethylene	2010/06/30	81	45 - 136	98	60 - 140	<0.002	ug/g	NC	50		
2192029	trans-1,2-Dichloroethylene	2010/06/30	81	45 - 138	100	60 - 140	<0.002	ug/g	NC	50		
2192029	1,2-Dichloropropane	2010/06/30	83	51 - 130	101	60 - 140	<0.002	ug/g	NC	50		
2192029	cis-1,3-Dichloropropene	2010/06/30	75	39 - 143	98	60 - 140	<0.002	ug/g	NC	50		
2192029	trans-1,3-Dichloropropene	2010/06/30	73	33 - 135	91	60 - 140	<0.002	ug/g	NC	50		
2192029	Ethylbenzene	2010/06/30	85	46 - 150	97	60 - 140	<0.002	ug/g	NC	50		
2192029	Ethylene Dibromide	2010/06/30	79	48 - 136	96	60 - 140	<0.002	ug/g	NC	50		
2192029	Hexane	2010/06/30	79	60 - 140	91	60 - 140	<0.005	ug/g				
2192029	MethyleneChloride(Dichloromethane)	2010/06/30	76	47 - 124	95	60 - 140	<0.003	ug/g	NC	50		
2192029	Methyl Isobutyl Ketone	2010/06/30	77	48 - 133	85	60 - 140	<0.03	ug/g	NC	50		
2192029	Methyl Ethyl Ketone (2-Butanone)	2010/06/30	82	39 - 160	84	60 - 140	<0.03	ug/g	NC	50		
2192029	Methyl t-butyl ether (MTBE)	2010/06/30	89	37 - 150	104	60 - 140	<0.002	ug/g	NC	50		
2192029	Styrene	2010/06/30	74	27 - 148	105	60 - 140	<0.002	ug/g	NC	50		
2192029	1,1,1,2-Tetrachloroethane	2010/06/30	85	51 - 140	101	60 - 140	<0.002	ug/g	NC	50		
2192029	1,1,2,2-Tetrachloroethane	2010/06/30	73	46 - 128	92	60 - 140	<0.002	ug/g	NC	50		
2192029	Tetrachloroethylene	2010/06/30	92	45 - 154	107	60 - 140	<0.002	ug/g	NC	50		
2192029	Toluene	2010/06/30	73	30 - 158	93	60 - 140	<0.002	ug/g	NC	50		
2192029	1,1,1-Trichloroethane	2010/06/30	87	44 - 136	100	60 - 140	<0.002	ug/g	NC	50		
2192029	1,1,2-Trichloroethane	2010/06/30	77	56 - 135	89	60 - 140	<0.002	ug/g	NC	50		
2192029	Trichloroethylene	2010/06/30	82	39 - 146	104	60 - 140	<0.002	ug/g	2.3	50		
2192029	Vinyl Chloride	2010/06/30	84	34 - 136	98	60 - 140	<0.002	ug/g	NC	50		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2192029	p+m-Xylene	2010/06/30	75	29 - 161	100	60 - 140	<0.002	ug/g	NC	50		
2192029	o-Xylene	2010/06/30	83	45 - 150	95	60 - 140	<0.002	ug/g	NC	50		
2192029	Trichlorofluoromethane (FREON 11)	2010/06/30	100	45 - 140	111	60 - 140	<0.002	ug/g				
2192029	Xylene (Total)	2010/06/30					<0.002	ug/g	NC	50		
2192480	o-Terphenyl	2010/06/29	92	30 - 130	99	30 - 130	104	%				
2192480	F2 (C10-C16 Hydrocarbons)	2010/06/30	95	60 - 130	99	60 - 130	<10	ug/g	NC	50		
2192480	F3 (C16-C34 Hydrocarbons)	2010/06/30	95	60 - 130	99	60 - 130	<10	ug/g	NC	50		
2192480	F4 (C34-C50 Hydrocarbons)	2010/06/30	95	60 - 130	99	60 - 130	<10	ug/g	NC	50		
2193292	1,4-Difluorobenzene	2010/06/29	99	60 - 140	96	60 - 140	97	%				
2193292	4-Bromofluorobenzene	2010/06/29	94	60 - 140	95	60 - 140	94	%				
2193292	D10-Ethylbenzene	2010/06/29	104	30 - 130	93	30 - 130	94	%				
2193292	D4-1,2-Dichloroethane	2010/06/29	96	60 - 140	103	60 - 140	101	%				
2193292	Benzene	2010/06/29	99	60 - 140	92	60 - 140	<0.02	ug/g	NC	50		
2193292	Toluene	2010/06/29	106	60 - 140	95	60 - 140	<0.02	ug/g	NC	50		
2193292	Ethylbenzene	2010/06/29	106	60 - 140	93	60 - 140	<0.02	ug/g	NC	50		
2193292	o-Xylene	2010/06/29	106	60 - 140	94	60 - 140	<0.02	ug/g	NC	50		
2193292	p+m-Xylene	2010/06/29	102	60 - 140	89	60 - 140	<0.04	ug/g	NC	50		
2193292	F1 (C6-C10)	2010/06/29	98	60 - 140	94	60 - 140	<10	ug/g	NC	50		
2193292	Total Xylenes	2010/06/29					<0.04	ug/g	NC	50		
2193292	F1 (C6-C10) - BTEX	2010/06/29					<10	ug/g	NC	50		
2194021	Moisture	2010/06/30							0.9	50		
2195175	Acid Extractable Antimony (Sb)	2010/07/02	88	75 - 125			<0.2	ug/g			99	75 - 125
2195175	Acid Extractable Arsenic (As)	2010/07/02	95	75 - 125			<1	ug/g	11.3	35	103	75 - 125
2195175	Acid Extractable Barium (Ba)	2010/07/02	NC(1)	75 - 125			<0.5	ug/g	11.5	35	103	75 - 125
2195175	Acid Extractable Beryllium (Be)	2010/07/02	88	75 - 125			<0.2	ug/g			98	75 - 125
2195175	Acid Extractable Boron (B)	2010/07/02	83	75 - 125			<5	ug/g			95	75 - 125
2195175	Acid Extractable Cadmium (Cd)	2010/07/02	94	75 - 125			<0.1	ug/g			101	75 - 125
2195175	Acid Extractable Chromium (Cr)	2010/07/02	95	75 - 125			<1	ug/g	8.5	35	102	75 - 125
2195175	Acid Extractable Cobalt (Co)	2010/07/02	93	75 - 125			<0.1	ug/g			102	75 - 125
2195175	Acid Extractable Copper (Cu)	2010/07/02	95	75 - 125			<0.5	ug/g	12.9	35	107	75 - 125
2195175	Acid Extractable Lead (Pb)	2010/07/02	96	75 - 125			<1	ug/g	10	35	105	75 - 125
2195175	Acid Extractable Molybdenum (Mo)	2010/07/02	97	75 - 125			<0.5	ug/g			104	75 - 125
2195175	Acid Extractable Nickel (Ni)	2010/07/02	97	75 - 125			<0.5	ug/g			104	75 - 125
2195175	Acid Extractable Selenium (Se)	2010/07/02	97	75 - 125			<0.5	ug/g			106	75 - 125
2195175	Acid Extractable Silver (Ag)	2010/07/02	93	75 - 125			<0.2	ug/g			101	75 - 125
2195175	Acid Extractable Thallium (Tl)	2010/07/02	93	75 - 125			<0.05	ug/g			101	75 - 125
2195175	Acid Extractable Uranium (U)	2010/07/02	101	75 - 125			<0.05	ug/g			107	75 - 125
2195175	Acid Extractable Vanadium (V)	2010/07/02	98	75 - 125			<5	ug/g			106	75 - 125
2195175	Acid Extractable Zinc (Zn)	2010/07/02	NC(1)	75 - 125			<5	ug/g	10.8	35	109	75 - 125
2195262	Acid Extractable Antimony (Sb)	2010/07/02	88	75 - 125			<0.2	ug/g			95	75 - 125

Maxxam Job #: B082882
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2195262	Acid Extractable Arsenic (As)	2010/07/02	98	75 - 125			<1	ug/g	4.2	35	100	75 - 125
2195262	Acid Extractable Barium (Ba)	2010/07/02	NC(1)	75 - 125			<0.5	ug/g	0.6	35	102	75 - 125
2195262	Acid Extractable Beryllium (Be)	2010/07/02	94	75 - 125			<0.2	ug/g			94	75 - 125
2195262	Acid Extractable Boron (B)	2010/07/02	93	75 - 125			<5	ug/g			93	75 - 125
2195262	Acid Extractable Cadmium (Cd)	2010/07/02	94	75 - 125			<0.1	ug/g			96	75 - 125
2195262	Acid Extractable Chromium (Cr)	2010/07/02	98	75 - 125			<1	ug/g	10	35	97	75 - 125
2195262	Acid Extractable Cobalt (Co)	2010/07/02	95	75 - 125			<0.1	ug/g			98	75 - 125
2195262	Acid Extractable Copper (Cu)	2010/07/02	99	75 - 125			<0.5	ug/g	5.6	35	102	75 - 125
2195262	Acid Extractable Lead (Pb)	2010/07/02	98	75 - 125			<1	ug/g	13.1	35	104	75 - 125
2195262	Acid Extractable Molybdenum (Mo)	2010/07/02	98	75 - 125			<0.5	ug/g			99	75 - 125
2195262	Acid Extractable Nickel (Ni)	2010/07/02	NC	75 - 125			<0.5	ug/g			99	75 - 125
2195262	Acid Extractable Selenium (Se)	2010/07/02	97	75 - 125			<0.5	ug/g			100	75 - 125
2195262	Acid Extractable Silver (Ag)	2010/07/02	94	75 - 125			<0.2	ug/g			97	75 - 125
2195262	Acid Extractable Thallium (Tl)	2010/07/02	94	75 - 125			<0.05	ug/g			100	75 - 125
2195262	Acid Extractable Uranium (U)	2010/07/02	102	75 - 125			<0.05	ug/g			108	75 - 125
2195262	Acid Extractable Vanadium (V)	2010/07/02	NC	75 - 125			<5	ug/g			102	75 - 125
2195262	Acid Extractable Zinc (Zn)	2010/07/02	NC(1)	75 - 125			<5	ug/g	9.5	35	103	75 - 125
2195381	Acid Extractable Antimony (Sb)	2010/07/02	91	75 - 125			<0.2	ug/g			95	75 - 125
2195381	Acid Extractable Arsenic (As)	2010/07/02	106	75 - 125			<1	ug/g	8.8	35	102	75 - 125
2195381	Acid Extractable Barium (Ba)	2010/07/02	NC	75 - 125			<0.5	ug/g	18.4	35	96	75 - 125
2195381	Acid Extractable Beryllium (Be)	2010/07/02	95	75 - 125			<0.2	ug/g			96	75 - 125
2195381	Acid Extractable Boron (B)	2010/07/02	87	75 - 125			<5	ug/g			91	75 - 125
2195381	Acid Extractable Cadmium (Cd)	2010/07/02	97	75 - 125			<0.1	ug/g			96	75 - 125
2195381	Acid Extractable Chromium (Cr)	2010/07/02	102	75 - 125			<1	ug/g	11.4	35	98	75 - 125
2195381	Acid Extractable Cobalt (Co)	2010/07/02	101	75 - 125			<0.1	ug/g			99	75 - 125
2195381	Acid Extractable Copper (Cu)	2010/07/02	108	75 - 125			<0.5	ug/g	10.0	35	103	75 - 125
2195381	Acid Extractable Lead (Pb)	2010/07/02	NC	75 - 125			<1	ug/g	12.0	35	98	75 - 125
2195381	Acid Extractable Molybdenum (Mo)	2010/07/02	101	75 - 125			<0.5	ug/g			98	75 - 125
2195381	Acid Extractable Nickel (Ni)	2010/07/02	109	75 - 125			<0.5	ug/g			101	75 - 125
2195381	Acid Extractable Selenium (Se)	2010/07/02	98	75 - 125			<0.5	ug/g			100	75 - 125
2195381	Acid Extractable Silver (Ag)	2010/07/02	98	75 - 125			<0.2	ug/g			97	75 - 125
2195381	Acid Extractable Thallium (Tl)	2010/07/02	95	75 - 125			<0.05	ug/g			95	75 - 125
2195381	Acid Extractable Uranium (U)	2010/07/02	104	75 - 125			<0.05	ug/g			98	75 - 125
2195381	Acid Extractable Vanadium (V)	2010/07/02	111	75 - 125			<5	ug/g			104	75 - 125
2195381	Acid Extractable Zinc (Zn)	2010/07/02	NC	75 - 125			<5	ug/g	8.6	35	102	75 - 125

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2195756	Sieve - #200 (<0.075mm)	2010/07/02							3.7	20	66	N/A
2195756	Sieve - #200 (>0.075mm)	2010/07/02							6.9	20	34	N/A

N/A = Not Applicable

RPD = Relative Percent Difference

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.

QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

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.

(1) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B082882

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

Cristina Carriere

CRISTINA CARRIERE, Scientific Services

MAMDOUH SALIB, Analyst, Hydrocarbons

Suzana Popović

SUZANA POPOVIC, Supervisor, Hydrocarbons

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.

Maxxam Analytics Inc. 6740 Campobello Road, Mississauga, ON L5N 2 Phone: 905-817-5700 Fax: 905-817-5778 T

25-Jun-10 08:18
RENATA SPENA
B082882
HSO ENV-887

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION	REPOR	PROJECT INFORMATION	MAXXAM JOB NUMBER
Company Name: PINCHIN ENVIRONMEN	Company Name:	Quotation #:	
Contact Name: LINDSAY BELL	Contact Name:	P.O. #:	
Address: 2470 MILLTOWER C MISSISSAUGA, ON	Address:	Project #: 59167.003	**CHAIN OF CUSTODY #** 00579368
Phone: Fax:	Phone: Fax:	Project Name:	
Email: lbell@pinchin.com	Email: mcormack@pinchin.c	Location:	
		Sampled By: L. Bell	

REGULATORY CRITERIA

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form.

2011

☐ MISA Reg. 153: ☐ Table 1 ☐ Table 2 ☑ Table 3

Sewer Use: ☐ Sanitary ☐ Storm Region

☐ Other specify

☐ PWQO

☐ Reg. 558

Report Criteria on C of A? ☐

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

ANALYSIS REQUESTED (Please be specific)

TURNAROUND TIME (TAT) REQUIRED

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS.

Regular (Standard) TAT: ☑ 5 to 7 Working Days

Rush TAT: Rush Confirmation #: (call lab for #)

☐ 1 day ☐ 2 days ☐ 3 days

DATE Required:

TIME Required:

Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

	Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc)	Regulated Drinking Water? (Y / N)	Metals Field Filtered? (Y / N)	VOCS	PHCS (F1-F4)	ICPMS METALS	PH	GRAIN SIZE-Run						# of Cont.	COMMENTS / TAT COMMENTS
1	BH01 S3	24/06/10		SOIL					X								1	
2	BH01 S11						X	X									2	
3	BH03 S4								X								1	
4	BH03 S7							X									1	
5	BH03 S8						X										1	
6	BH04 S4								X								1	
7	BH04 S12						X	X									2	
8	PH-01									X							1	
9	PH-02									X							1	
10	GRAIN SIZE										X						1	
11																		
12																		

RELINQUISHED BY (Signature/Print)	RECEIVED BY (Signature/Print)	Date	Time	Laboratory Use Only	
LINDSAY BELL		25/06/10	8:00	Temperature (°C) on Receipt	Condition of Sample on Receipt
	Alka Patel	10/06/25	8:18	4/4/4°C	☐ OK ☐ S/F

Page 12 of 12

***MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS

Your Project #: 57167.003
Your C.O.C. #: 00579369

Attention: Lindsay Bell
Pinchin Environmental Ltd
2470 Milltower Crt
Mississauga, ON
L5N 7W5

Report Date: 2010/07/05

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B082944
Received: 2010/06/25, 08:18

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Semivolatile Organic Compounds (TCLP)	1	2010/06/30	2010/07/01	CAM SOP-00301	EPA 8270 modified
Cyanide (WAD) in Leachates	1	N/A	2010/06/30	CAM SOP-00457	SM 4500 CN-I
Fluoride by ISE in Leachates	1	2010/06/30	2010/06/30	CAM SOP-00456	SM 4500FC
Mercury (TCLP Leachable) (mg/L)	1	N/A	2010/06/30	CAM SOP-00453	EPA 7470
Total Metals in TCLP Leachate by ICPMS	1	2010/06/30	2010/07/02	CAM SOP-00447	EPA 6020
Nitrate(NO3) + Nitrite(NO2) in Leachate	1	N/A	2010/06/30	CAM SOP-00440	SM 4500 NO3I/NO2B
Polychlorinated Biphenyl in Leachate	1	2010/06/30	2010/07/01	CAM SOP-00309	SW846 8082
TCLP - % Solids	1	2010/06/29	2010/06/30	CAM SOP-00401	EPA 1311 modified
TCLP - EXTRACTION FLUID	1	N/A	2010/06/30	CAM SOP-00401	EPA 1311 modified
TCLP-INITIAL AND FINAL PH	1	N/A	2010/06/30	CAM SOP-00401	EPA 1311 modified
TCLP Zero Headspace Extraction	1	2010/07/02	2010/07/02	CAM SOP-00430	EPA 1311 modified
VOCs in ZHE Leachates	1	2010/07/04	2010/07/05	CAM SOP 00226	EPA 8260 modified

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

Encryption Key

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

RENATA SPENA, Project Manager
Email: Renata.Spena@maxxamanalytics.com
Phone# (905) 817-5700 Ext:5818

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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

RESULTS OF ANALYSES OF SOIL

Maxxam ID		GH5207		
Sampling Date		2010/06/24		
	Units	**TCLP-01**	**RDL**	**QC Batch**
Charge/Prep Analysis				
Amount Extracted (Wet Weight) (g)	N/A	25	N/A	2195542
Inorganics				
Final pH	pH	6.15		2194139
Leachable Fluoride (F-)	mg/L	0.2	0.1	2194429
Leachable Free Cyanide	mg/L	<0.002	0.002	2194392
Initial pH	pH	9.38		2194139
TCLP - % Solids	%	100	0.2	2194134
TCLP Extraction Fluid	N/A	FLUID1		2194138
Leachable Nitrite (N)	mg/L	<0.01	0.01	2194988
Leachable Nitrate (N)	mg/L	<0.1	0.1	2194988
Leachable Nitrate + Nitrite	mg/L	<0.1	0.1	2194988
Metals				
Leachable Mercury (Hg)	mg/L	<0.001	0.001	2193977

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		GH5207		
Sampling Date		2010/06/24		
	Units	**TCLP-01**	**RDL**	**QC Batch**
Metals				
Leachable Arsenic (As)	mg/L	<0.2	0.2	2194360
Leachable Barium (Ba)	mg/L	0.8	0.2	2194360
Leachable Boron (B)	mg/L	<0.1	0.1	2194360
Leachable Cadmium (Cd)	mg/L	<0.05	0.05	2194360
Leachable Chromium (Cr)	mg/L	<0.1	0.1	2194360
Leachable Lead (Pb)	mg/L	<0.1	0.1	2194360
Leachable Selenium (Se)	mg/L	<0.1	0.1	2194360
Leachable Silver (Ag)	mg/L	<0.01	0.01	2194360
Leachable Uranium (U)	mg/L	<0.01	0.01	2194360

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B082944
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		GH5207		
Sampling Date		2010/06/24		
	Units	**TCLP-01**	**RDL**	**QC Batch**
Semivolatile Organics				
Leachable Benzo(a)pyrene	ug/L	<0.1	0.1	2194343
Surrogate Recovery (%)				
Leachable 2,4,6-Tribromophenol	%	77		2194343
Leachable 2-Fluorobiphenyl	%	68		2194343
Leachable 2-Fluorophenol	%	57		2194343
Leachable D14-Terphenyl (FS)	%	78		2194343
Leachable D5-Nitrobenzene	%	77		2194343
Leachable D5-Phenol	%	18		2194343

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GH5207		
Sampling Date		2010/06/24		
	Units	TCLP-01	RDL	QC Batch
Volatile Organics				
Leachable Benzene	mg/L	<0.02	0.02	2196497
Leachable Carbon Tetrachloride	mg/L	<0.02	0.02	2196497
Leachable Chlorobenzene	mg/L	<0.02	0.02	2196497
Leachable Chloroform	mg/L	<0.02	0.02	2196497
Leachable 1,2-Dichlorobenzene	mg/L	<0.05	0.05	2196497
Leachable 1,4-Dichlorobenzene	mg/L	<0.05	0.05	2196497
Leachable 1,2-Dichloroethane	mg/L	<0.05	0.05	2196497
Leachable 1,1-Dichloroethylene	mg/L	<0.02	0.02	2196497
Leachable Methylene Chloride(Dichloromethane)	mg/L	<0.2	0.2	2196497
Leachable Methyl Ethyl Ketone (2-Butanone)	mg/L	<0.5	0.5	2196497
Leachable Tetrachloroethylene	mg/L	<0.02	0.02	2196497
Leachable Trichloroethylene	mg/L	<0.02	0.02	2196497
Leachable Vinyl Chloride	mg/L	<0.02	0.02	2196497
Surrogate Recovery (%)				
Leachable 4-Bromofluorobenzene	%	91		2196497
Leachable D4-1,2-Dichloroethane	%	115		2196497
Leachable D8-Toluene	%	98		2196497

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B082944
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		GH5207		
Sampling Date		2010/06/24		
	Units	**TCLP-01**	**RDL**	**QC Batch**
PCBs				
Leachable Aroclor 1016	ug/L	<3	3	2194426
Leachable Aroclor 1221	ug/L	<3	3	2194426
Leachable Aroclor 1242	ug/L	<3	3	2194426
Leachable Aroclor 1248	ug/L	<3	3	2194426
Leachable Aroclor 1254	ug/L	<3	3	2194426
Leachable Aroclor 1260	ug/L	<3	3	2194426
Leachable Total PCB	ug/L	<3	3	2194426
Surrogate Recovery (%)				
Leachable 2,4,5,6-Tetrachloro-m-xylene	%	76		2194426
Leachable Decachlorobiphenyl	%	112		2194426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B082944
Report Date: 2010/07/05

Pinchin Environmental Ltd
Client Project #: 57167.003

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	Value	Units
2193977	Leachable Mercury (Hg)	2010/06/30	96	75 - 125	92	80 - 120	<0.001	mg/L	NC	25	<0.001	mg/L
2194343	Leachable 2,4,6-Tribromophenol	2010/07/01	87	10 - 130	86	10 - 130	81	%				
2194343	Leachable 2-Fluorobiphenyl	2010/07/01	76	30 - 130	75	30 - 130	75	%				
2194343	Leachable 2-Fluorophenol	2010/07/01	56	10 - 130	56	10 - 130	58	%				
2194343	Leachable D14-Terphenyl (FS)	2010/07/01	87	30 - 130	86	30 - 130	84	%				
2194343	Leachable D5-Nitrobenzene	2010/07/01	80	30 - 130	75	30 - 130	81	%				
2194343	Leachable D5-Phenol	2010/07/01	24	10 - 130	21	10 - 130	15	%				
2194343	Leachable Benzo(a)pyrene	2010/07/01	92	30 - 130	93	30 - 130	<0.1	ug/L				
2194360	Leachable Arsenic (As)	2010/07/02	98	75 - 125	101	86 - 119	<0.2	mg/L	NC	25	<0.2	mg/L
2194360	Leachable Barium (Ba)	2010/07/02	NC	75 - 125	103	83 - 115	<0.2	mg/L	NC	25	<0.2	mg/L
2194360	Leachable Boron (B)	2010/07/02	99	75 - 125	99	78 - 133	<0.1	mg/L	NC	25	<0.1	mg/L
2194360	Leachable Cadmium (Cd)	2010/07/02	99	75 - 125	102	85 - 116	<0.05	mg/L	NC	25	<0.05	mg/L
2194360	Leachable Chromium (Cr)	2010/07/02	99	75 - 125	106	76 - 120	<0.1	mg/L	NC	25	<0.1	mg/L
2194360	Leachable Lead (Pb)	2010/07/02	97	75 - 125	103	80 - 123	<0.1	mg/L	NC	25	<0.1	mg/L
2194360	Leachable Selenium (Se)	2010/07/02	98	75 - 125	102	82 - 118	<0.1	mg/L	NC	25	<0.1	mg/L
2194360	Leachable Silver (Ag)	2010/07/02	92	75 - 125	98	75 - 125	<0.01	mg/L	NC	25	<0.01	mg/L
2194360	Leachable Uranium (U)	2010/07/02	100	75 - 125	103	82 - 124	<0.01	mg/L	NC	25	<0.01	mg/L
2194392	Leachable Free Cyanide	2010/06/30	97	80 - 120	101	80 - 120	<0.002	mg/L	NC	20	<0.002	mg/L
2194426	Leachable 2,4,5,6-Tetrachloro-m-xylene	2010/07/01	93	40 - 130	88	40 - 130	99	%				
2194426	Leachable Decachlorobiphenyl	2010/07/01	109	40 - 130	101	40 - 130	114	%				
2194426	Leachable Aroclor 1260	2010/07/01	92	30 - 130	85	30 - 130	<3	ug/L				
2194426	Leachable Total PCB	2010/07/01	92	40 - 130	85	40 - 130	<3	ug/L	NC	40		
2194426	Leachable Aroclor 1016	2010/07/01					<3	ug/L				
2194426	Leachable Aroclor 1221	2010/07/01					<3	ug/L				
2194426	Leachable Aroclor 1242	2010/07/01					<3	ug/L				
2194426	Leachable Aroclor 1248	2010/07/01					<3	ug/L				
2194426	Leachable Aroclor 1254	2010/07/01					<3	ug/L				
2194429	Leachable Fluoride (F-)	2010/06/30	87	80 - 120	97	85 - 115	<0.1	mg/L	NC	25	<0.1	mg/L
2194988	Leachable Nitrite (N)	2010/06/30	113	80 - 120	108	85 - 115	<0.01	mg/L	NC	25	<0.01	mg/L
2194988	Leachable Nitrate (N)	2010/06/30	65(1)	80 - 120	110	85 - 115	<0.1	mg/L	NC	25	<0.1	mg/L
2194988	Leachable Nitrate + Nitrite	2010/06/30					<0.1	mg/L	NC	25	<0.1	mg/L
2196497	Leachable 4-Bromofluorobenzene	2010/07/04	98	70 - 130	103	70 - 130	96	%				
2196497	Leachable D4-1,2-Dichloroethane	2010/07/04	110	70 - 130	97	70 - 130	108	%				
2196497	Leachable D8-Toluene	2010/07/04	104	70 - 130	99	70 - 130	98	%				
2196497	Leachable Benzene	2010/07/05	102	70 - 130	94	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable Carbon Tetrachloride	2010/07/05	112	70 - 130	100	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable Chlorobenzene	2010/07/05	100	70 - 130	96	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable Chloroform	2010/07/05	106	70 - 130	91	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable 1,2-Dichlorobenzene	2010/07/05	99	70 - 130	96	70 - 130	<0.05	mg/L	NC	40		
2196497	Leachable 1,4-Dichlorobenzene	2010/07/05	100	70 - 130	104	70 - 130	<0.05	mg/L	NC	40		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	Value	Units
2196497	Leachable 1,2-Dichloroethane	2010/07/05	106	70 - 130	96	70 - 130	<0.05	mg/L	NC	40		
2196497	Leachable 1,1-Dichloroethylene	2010/07/05	108	70 - 130	91	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable Methylene Chloride(Dichloromethane)	2010/07/05	115	70 - 130	94	70 - 130	<0.2	mg/L	NC	40		
2196497	Leachable Methyl Ethyl Ketone (2-Butanone)	2010/07/05	102	60 - 140	95	60 - 140	<0.5	mg/L	NC	40		
2196497	Leachable Tetrachloroethylene	2010/07/05	103	70 - 130	91	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable Trichloroethylene	2010/07/05	101	70 - 130	92	70 - 130	<0.02	mg/L	NC	40		
2196497	Leachable Vinyl Chloride	2010/07/05	110	70 - 130	91	70 - 130	<0.02	mg/L	NC	40		

N/A = Not Applicable

RPD = Relative Percent Difference

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.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Validation Signature Page

Maxxam Job #: B082944

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

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

Cristina Carriere

CRISTINA CARRIERE, Scientific Services

Ming Wang

MICHAEL WANG, Senior Analyst

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Maxxam Analytics Inc. 6740 Campobello Road, Mississauga, ON L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5778 Toll

25-Jun-10 08:18
RENATA SPENA
B082944
FW ENV-698

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION

Company Name: PINCHIN ENVIRONMENTAL
Contact Name: LINDSAY BELL
Address: 2470 MILLTOWER CT
MISSISSAUGA, ON
Phone: Fax:
Email: lbell@pinchin.com

REPORT

Company Name:
Contact Name:
Address:
Phone: Fax:
Email: mccormack@pinchin.com

PROJECT INFORMATION

Quotation #:
P.O. #:
Project #: 57167.003
Project Name:
Location:
Sampled By: L. Bell

MAXXAM JOB NUMBER

CHAIN OF CUSTODY #

00579369

REGULATORY CRITERIA

Note: *For regulated drinking water samples - please use the Drinking Water Chain of Custody Form.*

☐ MISA Reg. 153 Sewer Use ☐ Other
☐ Table 1 ☐ Sanitary
☐ PWQO ☐ Table 2 ☐ Storm specify
☐ Table 3 Region
☑ Reg. 558
Report Criteria on C of A? ☐

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

ANALYSIS REQUESTED (Please be specific)

TURNAROUND TIME (TAT) REQUIRED

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS.

Regular (Standard) TAT:
☑ 5 to 7 Working Days
Rush TAT: Rush Confirmation #: (call Lab for #)
☐ 1 day ☐ 2 days ☐ 3 days
DATE Required:
TIME Required:

Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

	Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc.)	Regulated Drinking Water? (Y / N)	Metals Field Filtered? (Y / N)	Reg 558 VOCs	Reg 558 PCBs	Reg 558 Inorganic	Reg 558 Benzo(a)pyr									# of Cont.	COMMENTS / TAT COMMENTS
1	TCLP-01	24/06/10		SOIL			X	X	X	X									4	
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

RELINQUISHED BY (Signature/Print)	RECEIVED BY (Signature/Print)	Date	Time
Lindsay		25/06/10	8:00
Bell	ALKA PATEL	10/06/25	8:18

Laboratory Use Only

Temperature (°C) on Receipt: 4/4/4 °C

Condition of Sample on Receipt: ☐ OK ☐ SIF

MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

WQOC-ONT-02/05

White: Maxxam Yellow: Mail Pink: Client

Maxxam Analytics *Driven by Service and Science*

Your Project #: 57167.003
Your C.O.C. #: 00579372

Attention: Lindsay Bell
Pinchin Environmental Ltd
2470 Milltower Crt
Mississauga, ON
L5N 7W5

Report Date: 2010/07/08

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B085990
Received: 2010/06/30, 15:11

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydro. CCME F1 & BTEX in Soil	1	2010/07/02	2010/07/07	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	1	2010/07/06	2010/07/07	CAM SOP-00316	CCME CWS
Acid Extr. Metals (aqua regia) by ICPMS	1	2010/07/05	2010/07/05	CAM SOP-00447	EPA 6020
MOISTURE	1	N/A	2010/07/03	CAM SOP-00445	McKeague 2nd ed 1978
MOISTURE	1	N/A	2010/07/05	CAM SOP-00445	McKeague 2nd ed 1978
Volatile Organic Compounds in Soil	1	2010/07/03	2010/07/06	CAM SOP-00226	EPA 8260 modified

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

Encryption Key

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

RENATA SPENA, Project Manager
Email: Renata.Spena@maxxamanalytics.com
Phone# (905) 817-5700 Ext:5818

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Total cover pages: 1

RESULTS OF ANALYSES OF SOIL

Maxxam ID		GJ1382		GJ1383		
Sampling Date		2010/06/29		2010/06/29		
	Units	**BH02 S13**	**QC Batch**	**BH02 S14**	**RDL**	**QC Batch**
Inorganics						
Moisture	%	15	2197219	14	1	2196401

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		GJ1381		
Sampling Date		2010/06/29		
	Units	**BH02 S5**	**RDL**	**QC Batch**
Metals				
Acid Extractable Antimony (Sb)	ug/g	<0.2	0.2	2196786
Acid Extractable Arsenic (As)	ug/g	2	1	2196786
Acid Extractable Barium (Ba)	ug/g	85	0.5	2196786
Acid Extractable Beryllium (Be)	ug/g	0.5	0.2	2196786
Acid Extractable Cadmium (Cd)	ug/g	<0.1	0.1	2196786
Acid Extractable Chromium (Cr)	ug/g	19	1	2196786
Acid Extractable Cobalt (Co)	ug/g	9.4	0.1	2196786
Acid Extractable Copper (Cu)	ug/g	19	0.5	2196786
Acid Extractable Lead (Pb)	ug/g	9	1	2196786
Acid Extractable Molybdenum (Mo)	ug/g	<0.5	0.5	2196786
Acid Extractable Nickel (Ni)	ug/g	21	0.5	2196786
Acid Extractable Selenium (Se)	ug/g	<0.5	0.5	2196786
Acid Extractable Silver (Ag)	ug/g	<0.2	0.2	2196786
Acid Extractable Thallium (Tl)	ug/g	0.12	0.05	2196786
Acid Extractable Vanadium (V)	ug/g	26	5	2196786
Acid Extractable Zinc (Zn)	ug/g	48	5	2196786

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B085990
Report Date: 2010/07/08

Pinchin Environmental Ltd
Client Project #: 57167.003

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GJ1383	GJ1383		
Sampling Date		2010/06/29	2010/06/29		
	Units	BH02 S14	BH02 S14 Lab-Dup	RDL	QC Batch
Volatile Organics					
Acetone (2-Propanone)	ug/g	<0.1	<0.1	0.1	2196681
Benzene	ug/g	<0.002	<0.002	0.002	2196681
Bromodichloromethane	ug/g	<0.002	<0.002	0.002	2196681
Bromoform	ug/g	<0.002	<0.002	0.002	2196681
Bromomethane	ug/g	<0.003	<0.003	0.003	2196681
Carbon Tetrachloride	ug/g	<0.002	<0.002	0.002	2196681
Chlorobenzene	ug/g	<0.002	<0.002	0.002	2196681
Chloroform	ug/g	<0.002	<0.002	0.002	2196681
Dibromochloromethane	ug/g	<0.002	<0.002	0.002	2196681
1,2-Dichlorobenzene	ug/g	<0.002	<0.002	0.002	2196681
1,3-Dichlorobenzene	ug/g	<0.002	<0.002	0.002	2196681
1,4-Dichlorobenzene	ug/g	<0.002	<0.002	0.002	2196681
1,1-Dichloroethane	ug/g	<0.002	<0.002	0.002	2196681
1,2-Dichloroethane	ug/g	<0.002	<0.002	0.002	2196681
1,1-Dichloroethylene	ug/g	<0.002	<0.002	0.002	2196681
cis-1,2-Dichloroethylene	ug/g	<0.002	<0.002	0.002	2196681
trans-1,2-Dichloroethylene	ug/g	<0.002	<0.002	0.002	2196681
1,2-Dichloropropane	ug/g	<0.002	<0.002	0.002	2196681
cis-1,3-Dichloropropene	ug/g	<0.002	<0.002	0.002	2196681
trans-1,3-Dichloropropene	ug/g	<0.002	<0.002	0.002	2196681
Ethylbenzene	ug/g	<0.002	<0.002	0.002	2196681
Ethylene Dibromide	ug/g	<0.002	<0.002	0.002	2196681
Methylene Chloride(Dichloromethane)	ug/g	<0.003	<0.003	0.003	2196681
Methyl Isobutyl Ketone	ug/g	<0.03	<0.03	0.03	2196681
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.03	<0.03	0.03	2196681
Methyl t-butyl ether (MTBE)	ug/g	<0.002	<0.002	0.002	2196681
Styrene	ug/g	<0.002	<0.002	0.002	2196681
1,1,1,2-Tetrachloroethane	ug/g	<0.002	<0.002	0.002	2196681
1,1,2,2-Tetrachloroethane	ug/g	<0.002	<0.002	0.002	2196681
Tetrachloroethylene	ug/g	<0.002	<0.002	0.002	2196681
Toluene	ug/g	0.007	0.008	0.002	2196681
1,1,1-Trichloroethane	ug/g	<0.002	<0.002	0.002	2196681
1,1,2-Trichloroethane	ug/g	<0.002	<0.002	0.002	2196681
Trichloroethylene	ug/g	<0.002	<0.002	0.002	2196681
Vinyl Chloride	ug/g	<0.002	<0.002	0.002	2196681

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GJ1383	GJ1383		
Sampling Date		2010/06/29	2010/06/29		
	Units	**BH02 S14**	**BH02 S14 Lab-Dup**	**RDL**	**QC Batch**
p+m-Xylene	ug/g	0.007	0.007	0.002	2196681
o-Xylene	ug/g	<0.002	0.002	0.002	2196681
Xylene (Total)	ug/g	0.007	0.009	0.002	2196681
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	81	78		2196681
D4-1,2-Dichloroethane	%	100	100		2196681
D8-Toluene	%	121	125		2196681

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B085990
Report Date: 2010/07/08

Pinchin Environmental Ltd
Client Project #: 57167.003

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		GJ1382	GJ1382		
Sampling Date		2010/06/29	2010/06/29		
	Units	**BH02 S13**	**BH02 S13 Lab-Dup**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons					
Benzene	ug/g	<0.02	<0.02	0.02	2198220
Toluene	ug/g	<0.02	<0.02	0.02	2198220
Ethylbenzene	ug/g	<0.02	<0.02	0.02	2198220
o-Xylene	ug/g	<0.02	<0.02	0.02	2198220
p+m-Xylene	ug/g	<0.04	<0.04	0.04	2198220
Total Xylenes	ug/g	<0.04	<0.04	0.04	2198220
F1 (C6-C10)	ug/g	<10	<10	10	2198220
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	2198220
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	2197682
F3 (C16-C34 Hydrocarbons)	ug/g	20	41	10	2197682
F4 (C34-C50 Hydrocarbons)	ug/g	11	18	10	2197682
Reached Baseline at C50	ug/g	YES	YES		2197682
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	95	100		2198220
4-Bromofluorobenzene	%	109	107		2198220
D10-Ethylbenzene	%	86	94		2198220
D4-1,2-Dichloroethane	%	101	96		2198220
o-Terphenyl	%	93	97		2197682

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2196401	Moisture	2010/07/03							14.3	50		
2196681	4-Bromofluorobenzene	2010/07/06	82	60 - 140	99	60 - 140	100	%				
2196681	D4-1,2-Dichloroethane	2010/07/06	97	60 - 140	102	60 - 140	101	%				
2196681	D8-Toluene	2010/07/06	120	60 - 140	100	60 - 140	100	%				
2196681	Acetone (2-Propanone)	2010/07/06	114	24 - 171	95	60 - 140	<0.1	ug/g	NC	50		
2196681	Benzene	2010/07/06	111	39 - 137	99	60 - 140	<0.002	ug/g	NC	50		
2196681	Bromodichloromethane	2010/07/06	97	45 - 131	96	60 - 140	<0.002	ug/g	NC	50		
2196681	Bromoform	2010/07/06	100	44 - 131	102	60 - 140	<0.002	ug/g	NC	50		
2196681	Bromomethane	2010/07/06	107	20 - 146	94	60 - 140	<0.003	ug/g	NC	50		
2196681	Carbon Tetrachloride	2010/07/06	110	40 - 139	105	60 - 140	<0.002	ug/g	NC	50		
2196681	Chlorobenzene	2010/07/06	114	45 - 140	97	60 - 140	<0.002	ug/g	NC	50		
2196681	Chloroform	2010/07/06	101	48 - 128	96	60 - 140	<0.002	ug/g	NC	50		
2196681	Dibromochloromethane	2010/07/06	113	52 - 135	98	60 - 140	<0.002	ug/g	NC	50		
2196681	1,2-Dichlorobenzene	2010/07/06	134	39 - 145	99	60 - 140	<0.002	ug/g	NC	50		
2196681	1,3-Dichlorobenzene	2010/07/06	147	38 - 158	98	60 - 140	<0.002	ug/g	NC	50		
2196681	1,4-Dichlorobenzene	2010/07/06	145	35 - 159	98	60 - 140	<0.002	ug/g	NC	50		
2196681	1,1-Dichloroethane	2010/07/06	106	48 - 131	100	60 - 140	<0.002	ug/g	NC	50		
2196681	1,2-Dichloroethane	2010/07/06	98	43 - 123	98	60 - 140	<0.002	ug/g	NC	50		
2196681	1,1-Dichloroethylene	2010/07/06	110	50 - 134	101	60 - 140	<0.002	ug/g	NC	50		
2196681	cis-1,2-Dichloroethylene	2010/07/06	99	45 - 136	96	60 - 140	<0.002	ug/g	NC	50		
2196681	trans-1,2-Dichloroethylene	2010/07/06	104	45 - 138	97	60 - 140	<0.002	ug/g	NC	50		
2196681	1,2-Dichloropropane	2010/07/06	99	51 - 130	97	60 - 140	<0.002	ug/g	NC	50		
2196681	cis-1,3-Dichloropropene	2010/07/06	95	39 - 143	100	60 - 140	<0.002	ug/g	NC	50		
2196681	trans-1,3-Dichloropropene	2010/07/06	108	33 - 135	96	60 - 140	<0.002	ug/g	NC	50		
2196681	Ethylbenzene	2010/07/06	124	46 - 150	97	60 - 140	<0.002	ug/g	NC	50		
2196681	Ethylene Dibromide	2010/07/06	104	48 - 136	96	60 - 140	<0.002	ug/g	NC	50		
2196681	MethyleneChloride(Dichloromethane)	2010/07/06	107	47 - 124	101	60 - 140	<0.003	ug/g	NC	50		
2196681	Methyl Isobutyl Ketone	2010/07/06	98	48 - 133	102	60 - 140	<0.03	ug/g	NC	50		
2196681	Methyl Ethyl Ketone (2-Butanone)	2010/07/06	105	39 - 160	100	60 - 140	<0.03	ug/g	NC	50		
2196681	Methyl t-butyl ether (MTBE)	2010/07/06	107	37 - 150	103	60 - 140	<0.002	ug/g	NC	50		
2196681	Styrene	2010/07/06	111	27 - 148	98	60 - 140	<0.002	ug/g	NC	50		
2196681	1,1,1,2-Tetrachloroethane	2010/07/06	121	51 - 140	96	60 - 140	<0.002	ug/g	NC	50		
2196681	1,1,2,2-Tetrachloroethane	2010/07/06	98	46 - 128	93	60 - 140	<0.002	ug/g	NC	50		
2196681	Tetrachloroethylene	2010/07/06	125	45 - 154	98	60 - 140	<0.002	ug/g	NC	50		
2196681	Toluene	2010/07/06	116	30 - 158	96	60 - 140	<0.002	ug/g	NC	50		
2196681	1,1,1-Trichloroethane	2010/07/06	104	44 - 136	97	60 - 140	<0.002	ug/g	NC	50		
2196681	1,1,2-Trichloroethane	2010/07/06	111	56 - 135	92	60 - 140	<0.002	ug/g	NC	50		
2196681	Trichloroethylene	2010/07/06	99	39 - 146	97	60 - 140	<0.002	ug/g	NC	50		
2196681	Vinyl Chloride	2010/07/06	115	34 - 136	105	60 - 140	<0.002	ug/g	NC	50		
2196681	p+m-Xylene	2010/07/06	114	29 - 161	97	60 - 140	<0.002	ug/g	NC	50		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2196681	o-Xylene	2010/07/06	124	45 - 150	94	60 - 140	<0.002	ug/g	NC	50		
2196681	Xylene (Total)	2010/07/06					<0.002	ug/g	NC	50		
2196786	Acid Extractable Antimony (Sb)	2010/07/05	95	75 - 125			<0.2	ug/g	NC	35	96	75 - 125
2196786	Acid Extractable Arsenic (As)	2010/07/05	96	75 - 125			<1	ug/g	NC	35	98	75 - 125
2196786	Acid Extractable Barium (Ba)	2010/07/05	92	75 - 125			<0.5	ug/g	3.7	35	99	75 - 125
2196786	Acid Extractable Beryllium (Be)	2010/07/05	94	75 - 125			<0.2	ug/g	NC	35	104	75 - 125
2196786	Acid Extractable Cadmium (Cd)	2010/07/05	96	75 - 125			<0.1	ug/g	NC	35	95	75 - 125
2196786	Acid Extractable Chromium (Cr)	2010/07/05	94	75 - 125			<1	ug/g	NC	35	98	75 - 125
2196786	Acid Extractable Cobalt (Co)	2010/07/05	93	75 - 125			<0.1	ug/g	4.9	35	99	75 - 125
2196786	Acid Extractable Copper (Cu)	2010/07/05	91	75 - 125			<0.5	ug/g	3.5	35	97	75 - 125
2196786	Acid Extractable Lead (Pb)	2010/07/05	96	75 - 125			<1	ug/g	NC	35	106	75 - 125
2196786	Acid Extractable Molybdenum (Mo)	2010/07/05	100	75 - 125			<0.5	ug/g	NC	35	99	75 - 125
2196786	Acid Extractable Nickel (Ni)	2010/07/05	95	75 - 125			<0.5	ug/g	NC	35	99	75 - 125
2196786	Acid Extractable Selenium (Se)	2010/07/05	97	75 - 125			<0.5	ug/g	NC	35	101	75 - 125
2196786	Acid Extractable Silver (Ag)	2010/07/05	95	75 - 125			<0.2	ug/g	NC	35	95	75 - 125
2196786	Acid Extractable Thallium (Tl)	2010/07/05	94	75 - 125			<0.05	ug/g	NC	35	102	75 - 125
2196786	Acid Extractable Vanadium (V)	2010/07/05	97	75 - 125			<5	ug/g	NC	35	106	75 - 125
2196786	Acid Extractable Zinc (Zn)	2010/07/05	103	75 - 125			<5	ug/g	NC	35	111	75 - 125
2197219	Moisture	2010/07/05							5.9	50		
2197682	o-Terphenyl	2010/07/06	93	30 - 130	85	30 - 130	93	%				
2197682	F2 (C10-C16 Hydrocarbons)	2010/07/07	82	60 - 130	68	60 - 130	<10	ug/g	NC	50		
2197682	F3 (C16-C34 Hydrocarbons)	2010/07/07	82	60 - 130	68	60 - 130	<10	ug/g	NC	50		
2197682	F4 (C34-C50 Hydrocarbons)	2010/07/07	82	60 - 130	68	60 - 130	<10	ug/g	NC	50		
2198220	1,4-Difluorobenzene	2010/07/07	99	60 - 140	96	60 - 140	94	%				
2198220	4-Bromofluorobenzene	2010/07/07	108	60 - 140	109	60 - 140	109	%				
2198220	D10-Ethylbenzene	2010/07/07	91	30 - 130	86	30 - 130	83	%				
2198220	D4-1,2-Dichloroethane	2010/07/07	96	60 - 140	105	60 - 140	107	%				
2198220	Benzene	2010/07/07	77	60 - 140	75	60 - 140	<0.02	ug/g	NC	50		
2198220	Toluene	2010/07/07	86	60 - 140	85	60 - 140	<0.02	ug/g	NC	50		
2198220	Ethylbenzene	2010/07/07	91	60 - 140	88	60 - 140	<0.02	ug/g	NC	50		
2198220	o-Xylene	2010/07/07	97	60 - 140	96	60 - 140	<0.02	ug/g	NC	50		
2198220	p+m-Xylene	2010/07/07	88	60 - 140	86	60 - 140	<0.04	ug/g	NC	50		
2198220	F1 (C6-C10)	2010/07/07	92	60 - 140	80	60 - 140	<10	ug/g	NC	50		

Maxxam Job #: B085990
Report Date: 2010/07/08

Pinchin Environmental Ltd
Client Project #: 57167.003

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2198220	Total Xylenes	2010/07/07					<0.04	ug/g	NC	50		
2198220	F1 (C6-C10) - BTEX	2010/07/07					<10	ug/g	NC	50		

N/A = Not Applicable
RPD = Relative Percent Difference
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.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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 (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 #: B085990

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

Cristina Carriere

CRISTINA CARRIERE, Scientific Services

MAMDOUH SALIB, Analyst, Hydrocarbons

Suzana Popovic

SUZANA POPOVIC, Supervisor, Hydrocarbons

Maxxam Analytics Inc. 6740 Campobello Road, Mississauga, ON L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5778 Toll Fre

30-Jun-10 15:11
RENATA SPENA
B085990
FW ENV-083

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION

Company Name: PINCHIN ENVIRONMENTAL
Contact Name: LINDSAY BELL
Address: 2470 MILLTOWER
MISSISSAUGA ON
Phone: Fax:
Email: lbell@pinchin.com

REPORT INF

Company Name:
Contact Name:
Address:
Phone: Fax:
Email: [illegible]@pinchin.com

PROJECT INFORMATION

otation #:
#:
Project #: 57167.003
Project Name:
Location:
Sampled By: L. Bell

MAXXAM JOB NUMBER

CHAIN OF CUSTODY #: 00579372

REGULATORY CRITERIA

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form.

☐ MISA
☐ PWQO
☐ Reg. 558

Reg. 153
☐ Table 1
☐ Table 2
☑ Table 3

Sewer Use
☐ Sanitary
☐ Storm
Region:

☐ Other
specify

Report Criteria on C of A? ☐

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

ANALYSIS REQUESTED (Please be specific)

	Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc)	Regulated Drinking Water? (Y / N)	Metals Field Filtered? (Y / N)	VOCS	PHCS (F1-F4)	ICPMS Metals	# of Cont.	COMMENTS / TAT COMMENTS
1	BH02 SS	29/06/10		SOIL			X	X	X	3	
2	BH02 S13	"		↓				X		1	
3	BH02 S14	↓		↓			X			1	
4											
5											
6											
7											
8											
9											
10											
11											
12											

TURNAROUND TIME (TAT) REQUIRED

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS.

Regular (Standard) TAT:
☑ 5 to 7 Working Days

Rush TAT: Rush Confirmation #: (call Lab for #)
☐ 1 day ☐ 2 days ☐ 3 days

DATE Required:
TIME Required:

Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

RELINQUISHED BY (Signature/Print)	RECEIVED BY (Signature/Print)	Date	Time	Temperature (°C) on Receipt	Condition of Sample on Receipt
L. Lindsay Bell		30/06/10	4:30 pm		
	FANG WANG	10/06/30	15:11	1/1/1	☐ OK ☐ S/F

Laboratory Use Only

MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

NYCOC-ONT-05/06

White: Maxxam Yellow: Mail Pink: Client

Your Project #: 57167.003
Your C.O.C. #: 00590482

Attention: Lindsay Bell
Pinchin Environmental Ltd
2470 Milltower Crt
Mississauga, ON
L5N 7W5

Report Date: 2010/07/09

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B087034
Received: 2010/07/05, 13:06

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydro. CCME F1 & BTEX in Water	3	N/A	2010/07/08	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	3	2010/07/06	2010/07/07	CAM SOP-00316	CCME Hydrocarbons
Dissolved Metals by ICPMS	3	N/A	2010/07/09	CAM SOP-00447	EPA 6020
Volatile Organic Compounds in Water	3	N/A	2010/07/08	CAM SOP-00226	EPA 8260 modified

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

Encryption Key

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

RENATA SPENA, Project Manager
Email: Renata.Spena@maxxamanalytics.com
Phone# (905) 817-5700 Ext:5818

==
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

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		GJ7107	GJ7108		GJ7109		
Sampling Date		2010/07/05	2010/07/05		2010/07/05		
	Units	**MW01**	**MW02**	**RDL**	**MW03**	**RDL**	**QC Batch**
Metals							
Dissolved Antimony (Sb)	ug/L	<0.5	<0.5	0.5	<0.5	0.5	2201603
Dissolved Arsenic (As)	ug/L	1	1	1	<1	1	2201603
Dissolved Barium (Ba)	ug/L	700	480	5	69	5	2201603
Dissolved Beryllium (Be)	ug/L	<0.5	<0.5	0.5	<0.5	0.5	2201603
Dissolved Boron (B)	ug/L	15	13	10	14	10	2201603
Dissolved Cadmium (Cd)	ug/L	<0.1	<0.1	0.1	<0.1	0.1	2201603
Dissolved Chromium (Cr)	ug/L	<5	<5	5	<5	5	2201603
Dissolved Cobalt (Co)	ug/L	3.7	3.6	0.5	1.9	0.5	2201603
Dissolved Copper (Cu)	ug/L	2	1	1	2	1	2201603
Dissolved Lead (Pb)	ug/L	<0.5	<0.5	0.5	<0.5	0.5	2201603
Dissolved Molybdenum (Mo)	ug/L	<1	<1	1	9	1	2201603
Dissolved Nickel (Ni)	ug/L	8(1)	9(1)	5	6	1	2201603
Dissolved Selenium (Se)	ug/L	<2	<2	2	<2	2	2201603
Dissolved Silver (Ag)	ug/L	<0.1	<0.1	0.1	<0.1	0.1	2201603
Dissolved Sodium (Na)	ug/L	380000	410000	100	26000	100	2201603
Dissolved Thallium (Tl)	ug/L	<0.05	<0.05	0.05	<0.05	0.05	2201603
Dissolved Vanadium (V)	ug/L	1	2	1	2	1	2201603
Dissolved Zinc (Zn)	ug/L	6	13	5	<5	5	2201603

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B087034
Report Date: 2010/07/09

Pinchin Environmental Ltd
Client Project #: 57167.003

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		GJ7107	GJ7107	GJ7108	GJ7109		
Sampling Date		2010/07/05	2010/07/05	2010/07/05	2010/07/05		
	Units	MW01	MW01 Lab-Dup	MW02	MW03	RDL	QC Batch
Volatile Organics							
Acetone (2-Propanone)	ug/L	19	12	<10	<10	10	2197907
Benzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Bromodichloromethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Bromoform	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
Bromomethane	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2197907
Carbon Tetrachloride	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Chlorobenzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Chloroform	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Dibromochloromethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
1,2-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
1,3-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
1,4-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
Dichlorodifluoromethane (FREON 12)	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2197907
1,1-Dichloroethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
1,2-Dichloroethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
1,1-Dichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
cis-1,2-Dichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
trans-1,2-Dichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
1,2-Dichloropropane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
cis-1,3-Dichloropropene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
trans-1,3-Dichloropropene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
Ethylbenzene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Ethylene Dibromide	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
Hexane	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2197907
Methylene Chloride(Dichloromethane)	ug/L	<0.5	<0.5	<0.5	<0.5	0.5	2197907
Methyl Isobutyl Ketone	ug/L	<5	<5	<5	<5	5	2197907
Methyl Ethyl Ketone (2-Butanone)	ug/L	<5	<5	<5	<5	5	2197907
Methyl t-butyl ether (MTBE)	ug/L	0.3	0.2	0.3	<0.2	0.2	2197907
Styrene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
1,1,1,2-Tetrachloroethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
1,1,2,2-Tetrachloroethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
Tetrachloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Toluene	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
1,1,1-Trichloroethane	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
1,1,2-Trichloroethane	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		GJ7107	GJ7107	GJ7108	GJ7109		
Sampling Date		2010/07/05	2010/07/05	2010/07/05	2010/07/05		
	Units	**MW01**	**MW01 Lab-Dup**	**MW02**	**MW03**	**RDL**	**QC Batch**
Trichloroethylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Vinyl Chloride	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
p+m-Xylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
o-Xylene	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Xylene (Total)	ug/L	<0.1	<0.1	<0.1	<0.1	0.1	2197907
Trichlorofluoromethane (FREON 11)	ug/L	<0.2	<0.2	<0.2	<0.2	0.2	2197907
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	95	95	95	95		2197907
D4-1,2-Dichloroethane	%	105	107	106	110		2197907
D8-Toluene	%	96	96	97	98		2197907

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		GJ7107	GJ7108	GJ7109		
Sampling Date		2010/07/05	2010/07/05	2010/07/05		
	Units	**MW01**	**MW02**	**MW03**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons						
F1 (C6-C10)	ug/L	<100	<100	<100	100	2199191
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	100	2199191
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	100	2198845
F3 (C16-C34 Hydrocarbons)	ug/L	<100	<100	<100	100	2198845
F4 (C34-C50 Hydrocarbons)	ug/L	<100	<100	<100	100	2198845
Reached Baseline at C50	ug/L	YES	YES	YES		2198845
Surrogate Recovery (%)						
1,4-Difluorobenzene	%	92	100	93		2199191
4-Bromofluorobenzene	%	85	97	83		2199191
D10-Ethylbenzene	%	77	96	89		2199191
D4-1,2-Dichloroethane	%	114	121	115		2199191
o-Terphenyl	%	99	97	98		2198845

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B087034
Report Date: 2010/07/09

Pinchin Environmental Ltd
Client Project #: 57167.003

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2197907	4-Bromofluorobenzene	2010/07/08	100	70 - 130	101	70 - 130	91	%		
2197907	D4-1,2-Dichloroethane	2010/07/08	99	70 - 130	100	70 - 130	100	%		
2197907	D8-Toluene	2010/07/08	102	70 - 130	100	70 - 130	98	%		
2197907	Acetone (2-Propanone)	2010/07/08	107	60 - 140	96	60 - 140	<10	ug/L	NC	40
2197907	Benzene	2010/07/08	92	70 - 130	97	70 - 130	<0.1	ug/L	NC	40
2197907	Bromodichloromethane	2010/07/08	90	70 - 130	97	70 - 130	<0.1	ug/L	NC	40
2197907	Bromoform	2010/07/08	98	70 - 130	103	70 - 130	<0.2	ug/L	NC	40
2197907	Bromomethane	2010/07/08	94	60 - 140	92	60 - 140	<0.5	ug/L	NC	40
2197907	Carbon Tetrachloride	2010/07/08	90	70 - 130	96	70 - 130	<0.1	ug/L	NC	40
2197907	Chlorobenzene	2010/07/08	90	70 - 130	92	70 - 130	<0.1	ug/L	NC	40
2197907	Chloroform	2010/07/08	89	70 - 130	95	70 - 130	<0.1	ug/L	NC	40
2197907	Dibromochloromethane	2010/07/08	96	70 - 130	100	70 - 130	<0.2	ug/L	NC	40
2197907	1,2-Dichlorobenzene	2010/07/08	91	70 - 130	93	70 - 130	<0.2	ug/L	NC	40
2197907	1,3-Dichlorobenzene	2010/07/08	91	70 - 130	93	70 - 130	<0.2	ug/L	NC	40
2197907	1,4-Dichlorobenzene	2010/07/08	97	70 - 130	98	70 - 130	<0.2	ug/L	NC	40
2197907	Dichlorodifluoromethane (FREON 12)	2010/07/08	79	60 - 140	87	60 - 140	<0.5	ug/L	NC	40
2197907	1,1-Dichloroethane	2010/07/08	90	70 - 130	95	70 - 130	<0.1	ug/L	NC	40
2197907	1,2-Dichloroethane	2010/07/08	88	70 - 130	97	70 - 130	<0.2	ug/L	NC	40
2197907	1,1-Dichloroethylene	2010/07/08	92	70 - 130	98	70 - 130	<0.1	ug/L	NC	40
2197907	cis-1,2-Dichloroethylene	2010/07/08	96	70 - 130	100	70 - 130	<0.1	ug/L	NC	40
2197907	trans-1,2-Dichloroethylene	2010/07/08	92	70 - 130	98	70 - 130	<0.1	ug/L	NC	40
2197907	1,2-Dichloropropane	2010/07/08	93	70 - 130	99	70 - 130	<0.1	ug/L	NC	40
2197907	cis-1,3-Dichloropropene	2010/07/08	84	70 - 130	88	70 - 130	<0.2	ug/L	NC	40
2197907	trans-1,3-Dichloropropene	2010/07/08	102	70 - 130	104	70 - 130	<0.2	ug/L	NC	40
2197907	Ethylbenzene	2010/07/08	98	70 - 130	101	70 - 130	<0.1	ug/L	NC	40
2197907	Ethylene Dibromide	2010/07/08	96	70 - 130	100	70 - 130	<0.2	ug/L	NC	40
2197907	Hexane	2010/07/08	76	70 - 130	91	70 - 130	<0.5	ug/L	NC	40
2197907	MethyleneChloride(Dichloromethane)	2010/07/08	87	70 - 130	95	70 - 130	<0.5	ug/L	NC	40
2197907	Methyl Isobutyl Ketone	2010/07/08	97	70 - 130	105	70 - 130	<5	ug/L	NC	40
2197907	Methyl Ethyl Ketone (2-Butanone)	2010/07/08	104	60 - 140	102	60 - 140	<5	ug/L	NC	40
2197907	Methyl t-butyl ether (MTBE)	2010/07/08	101	70 - 130	108	70 - 130	<0.2	ug/L	NC	40
2197907	Styrene	2010/07/08	87	70 - 130	90	70 - 130	<0.2	ug/L	NC	40
2197907	1,1,1,2-Tetrachloroethane	2010/07/08	94	70 - 130	97	70 - 130	<0.1	ug/L	NC	40
2197907	1,1,2,2-Tetrachloroethane	2010/07/08	91	70 - 130	94	70 - 130	<0.2	ug/L	NC	40
2197907	Tetrachloroethylene	2010/07/08	87	70 - 130	88	70 - 130	<0.1	ug/L	NC	40
2197907	Toluene	2010/07/08	93	70 - 130	94	70 - 130	<0.2	ug/L	NC	40
2197907	1,1,1-Trichloroethane	2010/07/08	91	70 - 130	96	70 - 130	<0.1	ug/L	NC	40
2197907	1,1,2-Trichloroethane	2010/07/08	91	70 - 130	95	70 - 130	<0.2	ug/L	NC	40
2197907	Trichloroethylene	2010/07/08	89	70 - 130	95	70 - 130	<0.1	ug/L	NC	40
2197907	Vinyl Chloride	2010/07/08	87	70 - 130	91	70 - 130	<0.2	ug/L	NC	40

Maxxam Job #: B087034
Report Date: 2010/07/09

Pinchin Environmental Ltd
Client Project #: 57167.003

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2197907	p+m-Xylene	2010/07/08	103	70 - 130	103	70 - 130	<0.1	ug/L	NC	40
2197907	o-Xylene	2010/07/08	104	70 - 130	106	70 - 130	<0.1	ug/L	NC	40
2197907	Trichlorofluoromethane (FREON 11)	2010/07/08	86	70 - 130	94	70 - 130	<0.2	ug/L	NC	40
2197907	Xylene (Total)	2010/07/08					<0.1	ug/L	NC	40
2198845	o-Terphenyl	2010/07/06	95	30 - 130	102	30 - 130	100	%		
2198845	F2 (C10-C16 Hydrocarbons)	2010/07/07	94	60 - 130	104	60 - 130	<100	ug/L	NC	50
2198845	F3 (C16-C34 Hydrocarbons)	2010/07/07	94	60 - 130	104	60 - 130	<100	ug/L	NC	50
2198845	F4 (C34-C50 Hydrocarbons)	2010/07/07	94	60 - 130	104	60 - 130	<100	ug/L	NC	50
2199191	1,4-Difluorobenzene	2010/07/07	NC	70 - 130	113	70 - 130	116	%		
2199191	4-Bromofluorobenzene	2010/07/07	NC	70 - 130	110	70 - 130	114	%		
2199191	D10-Ethylbenzene	2010/07/07	NC	70 - 130	100	70 - 130	98	%		
2199191	D4-1,2-Dichloroethane	2010/07/07	NC	70 - 130	116	70 - 130	99	%		
2199191	F1 (C6-C10)	2010/07/08	NC	70 - 130	90	70 - 130	<100	ug/L	NC	40
2199191	F1 (C6-C10) - BTEX	2010/07/08					<100	ug/L	NC	40
2201603	Dissolved Antimony (Sb)	2010/07/09	106	80 - 120	102	90 - 110	<0.5	ug/L		
2201603	Dissolved Arsenic (As)	2010/07/09	104	80 - 120	106	90 - 110	<1	ug/L		
2201603	Dissolved Barium (Ba)	2010/07/09	100	80 - 120	101	90 - 110	<5	ug/L		
2201603	Dissolved Beryllium (Be)	2010/07/09	103	80 - 120	105	90 - 110	<0.5	ug/L		
2201603	Dissolved Boron (B)	2010/07/09	101	80 - 120	99	90 - 110	<10	ug/L		
2201603	Dissolved Cadmium (Cd)	2010/07/09	101	80 - 120	101	90 - 110	<0.1	ug/L		
2201603	Dissolved Chromium (Cr)	2010/07/09	99	80 - 120	99	90 - 110	<5	ug/L		
2201603	Dissolved Cobalt (Co)	2010/07/09	99	80 - 120	103	90 - 110	<0.5	ug/L		
2201603	Dissolved Copper (Cu)	2010/07/09	98	80 - 120	101	90 - 110	<1	ug/L		
2201603	Dissolved Lead (Pb)	2010/07/09	101	80 - 120	104	90 - 110	<0.5	ug/L	NC	25
2201603	Dissolved Molybdenum (Mo)	2010/07/09	109	80 - 120	102	90 - 110	<1	ug/L		
2201603	Dissolved Nickel (Ni)	2010/07/09	97	80 - 120	101	90 - 110	<1	ug/L		
2201603	Dissolved Selenium (Se)	2010/07/09	101	80 - 120	104	90 - 110	<2	ug/L		
2201603	Dissolved Silver (Ag)	2010/07/09	95	80 - 120	100	90 - 110	<0.1	ug/L		
2201603	Dissolved Sodium (Na)	2010/07/09	NC	80 - 120	98	90 - 110	<100	ug/L		
2201603	Dissolved Thallium (Tl)	2010/07/09	98	80 - 120	102	90 - 110	<0.05	ug/L		
2201603	Dissolved Vanadium (V)	2010/07/09	100	80 - 120	100	90 - 110	<1	ug/L		
2201603	Dissolved Zinc (Zn)	2010/07/09	96	80 - 120	100	90 - 110	<5	ug/L		

N/A = Not Applicable

RPD = Relative Percent Difference

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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 #: B087034

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

Cristina Carriere

CRISTINA CARRIERE, Scientific Services

Suzana Popovic

SUZANA POPOVIC, Supervisor, Hydrocarbons

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.

Maxxam Analytics Inc 6740 Campobello Road, Mississauga, ON L
Phone: 905-817-5700 Fax: 905-817-5778

5-Jul-10 13:06
RENATA SPENA
B087034
JJL ENV-645

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION

Company Name: Pinchin Environmental
Contact Name: Lindsay Bell
Address: 2470 Milltower Ct
Mississauga, ON
Phone: Fax:
Email: lbell@pinchin.com

R

Company:
Contact N
Address:
Phone: Fax:
Email: mcormier@pinchin

PROJECT INFORMATION

Quotation #:
P.O. #:
Project #: 57167.003
Project Name:
Location:
Sampled By: L.Bell

MAXXAM JOB NUMBER

CHAIN OF CUSTODY #

00590482

REGULATORY CRITERIA

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form.

☐ MISA
☐ PWQO
☐ Reg. 558
Reg. 153
☐ Table 1
☐ Table 2
☑ Table 3
Sewer Use
☐ Sanitary
☐ Storm
Region:
☐ Other
Specify
Report Criteria on C of A? ☐

Reg. 153
☐ 2004 ☑ 2011

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

ANALYSIS REQUESTED (Please be specific)

TURNAROUND TIME (TAT) REQUIRED

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS.

Regular (Standard) TAT:
☑ 5 to 7 Working Days
Rush TAT: Rush Confirmation #: (call lab for #)
☐ 1 day ☐ 2 days ☐ 3 days
DATE Required:
TIME Required:

Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

	Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc.)	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	VOCS	PHCS (F1-F4)	ICPMS METALS	# of Cont.	COMMENTS / TAT COMMENTS
1	MW01	5/7/10		WATER		Y	X	X	X	9	Small air bubbles may
2	MW02	↓		↓		Y	X	X	X	↓	be present due to
3	MW03	↓		↓		Y	X	X	X	↓	degassing.
4											
5											Sediment may be 2/or
6											in some vials.
7											Please run as is.
8											
9											Samples submitted
10											same day
11											
12											

RELINQUISHED BY (Signature/Print)	RECEIVED BY (Signature/Print)	Date	Time	Laboratory Use Only: Temperature (°C) on Receipt	Condition of Sample on Receipt
Lindsay Bell	Mike Sheppard	5/7/10 10/07/05	1:00pm 13:06	7'6'9'c	☐ OK ☐ S/F

***MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.**

ENVCOC-ONT-0506 White: Maxxam Yellow: Mail Pink: Client

Appendix 1F

Environmental Risk Database Search – ERIS

DATABASE
REPORTS

Canada's Primary Environmental Risk Information Service

Project Site:	**OPA 620 Steeles Corridor** **Steeles Corridor, Jane to Keele** **Vaughan, ON**
Client:	**Erica Tsang** **SRM Associates** **110 Scotia Court, Unit 41** **Whitby, ON L1N8Y7**
ERIS Project No:	**20100525021**
Report Type:	**Custom Report - .25km Search Radius**
Prepared By:	**Matt Thompson** mthompson@eris.ca
Date:	**June 03, 2010**

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ECOLOG
ERIS

Table of Contents

Order Number: 20100525021
Site Name: OPA 620 Steeles Corridor
Site Address: Steeles Corridor, Jane to Keele Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Report Summary

Order Number: 20100525021
Site Name: OPA 620 Steeles Corridor
Site Address: Steeles Corridor, Jane to Keele Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Number of Mappable Records Surrounding the Site

Database		Selected	On-site	Within 0.25	0.25km to 0.25km	Total
AAGR	Abandoned Aggregate Inventory	N	0	0	0	0
AGR	Aggregate Inventory	N	0	0	0	0
AMIS	Abandoned Mine Information System	N	0	0	0	0
ANDR	Anderson's Waste Disposal Sites	N	0	0	0	0
AUWR	Automobile Wrecking & Supplies	N	0	0	0	0
BORE	Borehole	N	0	17	0	17
CA	Certificates of Approval	N	0	3	0	3
CFOT	Commercial Fuel Oil Tanks	N	0	1	0	1
CHEM	Chemical Register	N	0	0	0	0
COAL	Coal Gasification Plants	N	0	0	0	0
CONV	Compliance and Convictions	N	0	0	0	0
DRL	Drill Hole Database	N	0	0	0	0
EBR	Environmental Registry	N	0	1	0	1
EEM	Environmental Effects Monitoring	N	0	0	0	0
EHS	ERIS Historical Searches	N	0	9	0	9
EIIS	Environmental Issues Information System	N	0	0	0	0
FCON	Federal Convictions	N	0	0	0	0
FCS	Contaminated Sites on Federal Land	N	0	0	0	0
FOFT	Fisheries & Oceans Fuel Storage Tanks	N	0	0	0	0
FST	Fuel Storage Tank	N	0	3	0	3
GEN	Ontario Regulation 347 Waste Generators Summary	N	0	20	0	20
IAFT	Indian & Northern Affairs Fuel Tanks	N	0	0	0	0
MINE	Canadian Mine Locations	N	0	0	0	0
MNR	Mineral Occurrences	N	0	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	N	0	0	0	0
NCPL	Non-Compliance Reports	N	0	0	0	0
NDFT	National Defence & Canadian Forces Fuel Storage Tanks	N	0	0	0	0
NDSP	National Defence & Canadian Forces Spills	N	0	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	N	0	0	0	0
NEES	National Environmental Emergencies System (NEES)	N	0	0	0	0
NPCB	National PCB Inventory	N	0	0	0	0
NPRI	National Pollutant Release Inventory	N	0	0	0	0
OGW	Oil and Gas Wells	N	0	0	0	0
OOGW	Ontario Oil and Gas Wells	N	0	0	0	0
OPCB	Inventory of PCB Storage Sites	N	0	0	0	0
PAP	Canadian Pulp and Paper	N	0	1	0	1
PCFT	Parks Canada Fuel Storage Tanks	N	0	0	0	0
PES	Pesticide Register	N	0	2	0	2
PRT	Private and Retail Fuel Storage Tanks	N	0	4	0	4
REC	Ontario Regulation 347 Waste Receivers Summary	N	0	0	0	0
RSC	Record of Site Condition	N	0	0	0	0
RST	Retail Fuel Storage Tanks	N	0	0	0	0

Report Summary

Order Number: 20100525021
Site Name: OPA 620 Steeles Corridor
Site Address: Steeles Corridor, Jane to Keele Vaughan, ON
Report Type: Custom Report, 0.25 km Search Radius

Database		Selected	On-site	Within 0.25	0.25km to 0.25km	Total
SCT	Scott's Manufacturing Directory	N	0	28	0	28
SPL	Ontario Spills	N	0	14	0	14
SRDS	Wastewater Discharger Registration Database	N	0	0	0	0
TANK	Anderson's Storage Tanks	N	0	0	0	0
TCFT	Transport Canada Fuel Storage Tanks	N	0	0	0	0
WDS	Waste Disposal Sites - MOE CA Inventory	N	0	0	0	0
WDSH	Waste Disposal Sites - MOE 1991 Historical Approval Inventory	N	0	0	0	0
WWIS	Water Well Information System	Y	0	8	0	8
		TOTAL	0	111	0	111

The databases chosen by the client as per the submitted order form are denoted in the 'Selected' column in the above table. Counts have been provided outside the primary buffer area for cursory examination only. These records have not been examined or verified, therefore, they are subject to change.

SITE DIAGRAM

ECOLOG ERIS
Pinpointing Your Environmental Risks
12 Concorde Pl, Suite 800 North York, ON M3C 4J2
416-510-5204

Project Property: OPA 620 Steeles Corridor
Steeles Corridor, Jane to Keele
Vaughan, ON

ERIS Project #: 20100525021

Date: JUN-03-2010

LEGEND

- Project Property
- ▲ Database Location

Points of Interest

- Chimney
- ○ Silo

Pipe & Transmission Lines

- Pipeline
- Transmission Line
- Transmission Tower
- Transformer Station

Rail

- Railway - Main
- Railway - Sidetrack
- Railway - Abandoned
- Bridge
- Tunnel

Transportation - Other

- Embankment
- Trail
- Runway

Hydrographic Features

- Permanent Waterway
- Intermittent Waterway
- Open Reservoir
- Dyke/Levee
- Dam
- Breakwall
- Wetland

Landuse Classifications

- Open Area
- Residential
- Commercial
- Resource and Industrial
- Government and Institutional
- Parks and Recreational
- Waterbody

Recreation

- Golf Course/Driving Range
- Park/Sports Field
- Other Recreation Area
- Sports/Race Track
- Cemetery
- Campground

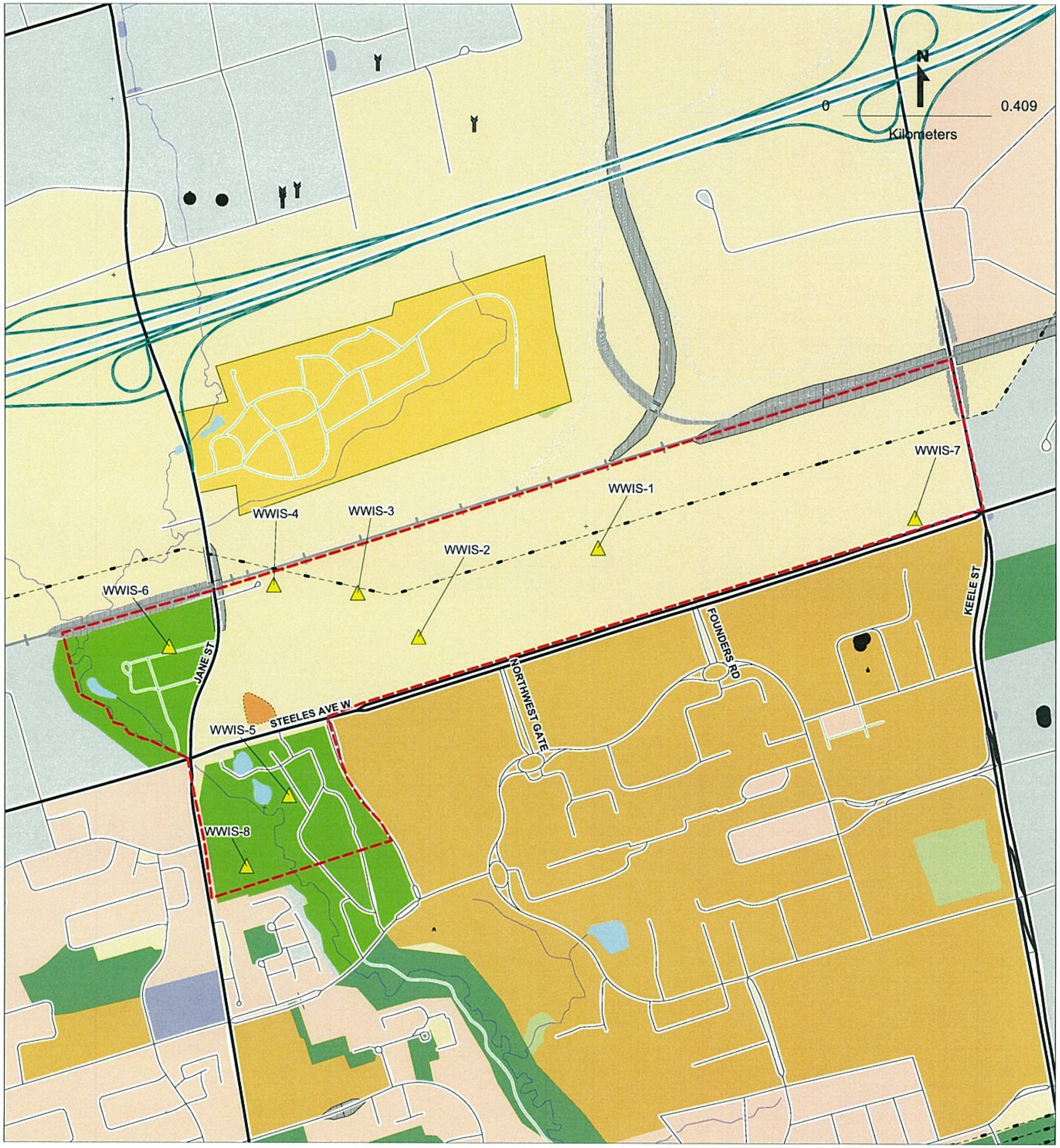
Vegetation

- Wooded Area
- Orchard
- Vineyard

Industrial Resources

- Conveyor
- Crane: Moveable
- Crane: Stationary
- ● Tank
- Rock Cut
- Auto Wrecker
- Lumber Yard
- Pit

This diagram is to be used solely for relative street location purposes. It may not accurately portray street or site positions.



Detail Report

Order Number:	20100525021
Site Name:	OPA 620 Steeles Corridor
Site Address:	Steeles Corridor, Jane to Keele Vaughan ON
Report Type:	Custom Report, 0.25 km Search Radius

If information is required for sites located beyond the selected address, please contact your ERIS representative.

Water Well Information System

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-1		lot 1 con 4 VAUGHAN TOWN (VAUGHAN TWP)	6926402	001	04	CON	YORK	VAUGHAN TOWN (VAUGHAN TWP)

Easting Nad83: 620082.1
Northing Nad83: 4848593
Zone: 17
Utm Reliability: unknown UTM
Construction Date: 4/26/2001
Primary Water Use: Domestic
Secondary Water Use:
Well Depth (ft): 295
Pump Rate (gpm): 18
Static Water Level (ft): 126
Flow Rate (gpm):
Clear/Cloudy: CLEAR
Specific Capacity:
Final Well Status: Water Supply
Construction Method: Cable Tool
Flowing (y/n): N
Elevation (ft):
Elevation Reliability: Unknown elevation
Depth to Bedrock (ft):
Overburden/Bedrock: Overburden
Water Type: FRESH
Casing Material: STEEL

Thickness (ft)	Original Depth (ft)	Material Colour	Material
16	16	BROWN	CLAY, SAND
100	116	BLUE	CLAY
11	127	BLUE	SILT, SAND
37	164	BLUE	CLAY
26	190	BLUE	SILT
50	240	BLUE	CLAY
55	295	BLUE	SILT, SAND

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-2		TORONTO CITY	7107991				YORK	TORONTO CITY

Easting Nad83: 619590
Northing Nad83: 4848336
Zone: 17
Utm Reliability: margin of error : 10 - 30 m
Construction Date: 6/17/2008
Primary Water Use:
Secondary Water Use:
Well Depth (ft):
Pump Rate (gpm):
Static Water Level (ft):
Flow Rate (gpm):
Clear/Cloudy:
Specific Capacity:
Final Well Status: Abandoned-Other
Construction Method: Boring
Flowing (y/n):
Elevation (ft):
Elevation Reliability:
Depth to Bedrock (ft):
Overburden/Bedrock:
Water Type:
Casing Material:

Thickness (ft)	Original Depth (ft)	Material Colour	Material

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-3		VAUGHAN TOWN (VAUGHAN TWP)	7136211				YORK	VAUGHAN TOWN (VAUGHAN TWP)

Easting Nad83: 619419
Northing Nad83: 4848455
Zone: 17
Utm Reliability: margin of error : 10 - 30 m
Construction Date: 8/10/2009
Primary Water Use:
Secondary Water Use:
Well Depth (ft):
Pump Rate (gpm):
Static Water Level (ft):
Flow Rate (gpm):
Clear/Cloudy:
Specific Capacity:
Final Well Status:
Construction Method:
Flowing (y/n):
Elevation (ft):
Elevation Reliability:
Depth to Bedrock (ft):
Overburden/Bedrock:
Water Type:
Casing Material:

Thickness (ft)	Original Depth (ft)	Material Colour	Material

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-4		Toronto	7125546				YORK	TORONTO CITY

Easting Nad83: 619186
Northing Nad83: 4848473
Zone: 17
Utm Reliability: margin of error : 10 - 30 m
Construction Date: 6/2/2009
Primary Water Use: Monitoring
Secondary Water Use:
Well Depth (ft): 65.6168
Pump Rate (gpm):
Static Water Level (ft):
Flow Rate (gpm):
Clear/Cloudy:
Specific Capacity:
Final Well Status: Observation Wells
Construction Method: Boring
Flowing (y/n):
Elevation (ft):
Elevation Reliability:
Depth to Bedrock (ft):
Overburden/Bedrock:
Water Type:
Casing Material: PLASTIC

Thickness (ft)	Original Depth (ft)	Material Colour	Material
1.968504	1.968504	BROWN	GRAVEL, TOPSOIL, PACKED
63.648296	65.6168	GREY	SILT, CLAY

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-5		lot 25 con 4 NORTH YORK BOROUGH	6905157	025	04	YS W	YORK	NORTH YORK BOROUGH

Easting Nad83: 619239.7
Northing Nad83: 4847892
Zone: 17
Utm Reliability: margin of error : 100 m - 300 m
Construction Date: 6/14/1960
Primary Water Use: Public
Secondary Water Use:
Well Depth (ft): 67
Pump Rate (gpm): 10
Static Water Level (ft): 42
Flow Rate (gpm):
Clear/Cloudy: CLEAR
Specific Capacity:
Final Well Status: Water Supply
Construction Method: Cable Tool
Flowing (y/n): N
Elevation (ft): 600
Elevation Reliability: Read from topographic map, contour interval - 25 f
Depth to Bedrock (ft):
Overburden/Bedrock: Overburden
Water Type: FRESH
Casing Material: STEEL

Thickness (ft)	Original Depth (ft)	Material Colour	Material
20	20	BROWN	CLAY
10	30		CLAY, SILT
30	60		CLAY
7	67		GRAVEL

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-6		lot 1 con 5 VAUGHAN TOWN (VAUGHAN TWP)	6906619	001	05	CON	YORK	VAUGHAN TOWN (VAUGHAN TWP)

Easting Nad83: 618899.7
Northing Nad83: 4848297
Zone: 17
Utm Reliability: margin of error : 100 m - 300 m
Construction Date: 1/14/1967
Primary Water Use: Domestic
Secondary Water Use:
Well Depth (ft): 51
Pump Rate (gpm): 2
Static Water Level (ft): 30
Flow Rate (gpm):
Clear/Cloudy: CLEAR
Specific Capacity:
Final Well Status: Water Supply
Construction Method: Boring
Flowing (y/n): N
Elevation (ft): 620
Elevation Reliability: Read from topographic map, contour interval - 10 f
Depth to Bedrock (ft):
Overburden/Bedrock: Overburden
Water Type: FRESH
Casing Material: CONCRETE

Thickness (ft)	Original Depth (ft)	Material Colour	Material
18	18		TOPSOIL, MEDIUM SAND
12	30	GREY	CLAY
2	32		GRAVEL
19	51	GREY	CLAY

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-7		TORONTO CITY	7116429				YORK	TORONTO CITY

Easting Nad83: 620956
Northing Nad83: 4848692
Zone: 17
Utm Reliability: margin of error : 10 - 30 m
Construction Date: 9/3/2008
Primary Water Use: Monitoring
Secondary Water Use:
Well Depth (ft): 25.262468
Pump Rate (gpm):
Static Water Level (ft):
Flow Rate (gpm):
Clear/Cloudy:
Specific Capacity:
Final Well Status: Observation Wells
Construction Method: Boring
Flowing (y/n):
Elevation (ft):
Elevation Reliability:
Depth to Bedrock (ft):
Overburden/Bedrock:
Water Type:
Casing Material: PLASTIC

Thickness (ft)	Original Depth (ft)	Material Colour	Material
0.984252	0.984252	BROWN	TOPSOIL
12.139108	13.12336	BROWN	CLAY
12.139108	25.262468	GREY	CLAY, SILT

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
WWIS-8		lot 15 con 6 VAUGHAN TOWN (VAUGHAN TWP)	6912047	015	06	CON	YORK	VAUGHAN TOWN (VAUGHAN TWP)

Easting Nad83: 619125.7
Northing Nad83: 4847694
Zone: 17
Utm Reliability: margin of error : 30 m - 100 m
Construction Date: 5/23/1974
Primary Water Use: Domestic
Secondary Water Use:
Well Depth (ft): 64
Pump Rate (gpm): 7
Static Water Level (ft): 25
Flow Rate (gpm):
Clear/Cloudy: CLEAR
Specific Capacity:
Final Well Status: Water Supply
Construction Method: Boring
Flowing (y/n): N
Elevation (ft): 671
Elevation Reliability: Read from topographic map, contour interval - 10 f
Depth to Bedrock (ft):
Overburden/Bedrock: Overburden
Water Type: FRESH
Casing Material: CONCRETE

Thickness (ft)	Original Depth (ft)	Material Colour	Material
12	12	BROWN	TOPSOIL, SAND
40	52	GREY	CLAY
2	54	GREY	COARSE SAND
10	64	GREY	CLAY

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
n/a		lot 1 VAUGHAN TOWN (VAUGHAN TWP)	6929400	001			YORK	VAUGHAN TOWN (VAUGHAN TWP)

Easting Nad83:
Northing Nad83:
Zone:
Utm Reliability:
Construction Date: 5/31/2005
Primary Water Use: Domestic
Secondary Water Use:
Well Depth (ft): 155
Pump Rate (gpm): 5
Static Water Level (ft): 70
Flow Rate (gpm):
Clear/Cloudy: CLEAR
Specific Capacity:
Final Well Status: Water Supply
Construction Method: Cable Tool
Flowing (y/n):
Elevation (ft):
Elevation Reliability:
Depth to Bedrock (ft):
Overburden/Bedrock: Overburden
Water Type:
Casing Material: STEEL

Thickness (ft)	Original Depth (ft)	Material Colour	Material
1	1	BLACK	TOPSOIL
18	19	BROWN	CLAY
48	67	BLUE	CLAY
2	69	GREY	TILL
56	125	BLUE	CLAY, DENSE
27	152	BLUE	CLAY, SOFT
3	155	BROWN	SAND, GRAVEL

Water Well Information System

Map Key	Company	Address	Well Id	Lot	Concession	Concession Name	County	Municipality
n/a		lot 1 TORONTO CITY M6N 3A5	7040409	001			YORK	TORONTO CITY

Easting Nad83:
Northing Nad83:
Zone:
Utm Reliability:
Construction Date: 12/18/2006
Primary Water Use:
Secondary Water Use:
Well Depth (ft): 22.96588
Pump Rate (gpm):
Static Water Level (ft):
Flow Rate (gpm):
Clear/Cloudy:
Specific Capacity:
Final Well Status: Observation Wells
Construction Method: Rotary (Convent.)
Flowing (y/n):
Elevation (ft):
Elevation Reliability:
Depth to Bedrock (ft):
Overburden/Bedrock: Overburden
Water Type: FRESH
Casing Material: PLASTIC

Thickness (ft)	Original Depth (ft)	Material Colour	Material
2.296588	2.296588	BROWN	GRAVEL, FILL, DENSE
5.905512	8.2021	BROWN	SILT, DENSE
3.28084	11.48294	BROWN	SILT, CLAY, DENSE
4.92126	16.4042	BROWN	SAND, SILT, LOOSE
3.28084	19.68504	BROWN	CLAY, SILT, DENSE
3.28084	22.96588	BROWN	SAND, SILT, LOOSE

Appendix: Ontario Database Descriptions

EcoLog Environmental Risk Information Services Ltd can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to EcoLog ERIS at the time of update. Note: Databases denoted with "*" indicates that the database will no longer be updated. See the individual database descriptions for more information.

Provincial Government Source Databases:

Abandoned Aggregate Inventory Up to Sept 2002 **AAGR**

The MAAP Program maintains a database of all abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.

Aggregate Inventory Up to Jan 2010 **AGR**

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. Please note that the database is only referenced by lot\concession and city/town location. The database provides information regarding the registered owner/operator, location, status, licence type, and maximum tonnage.

Abandoned Mines Information System 1800-2005 **AMIS**

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Borehole 1875-Jul 2009 **BORE**

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc.
For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Certificates of Approval 1985-Sept 2002* (for current CofA info please check the EBR Database) **CA**

This database contains the following types of approvals: Certificates of Approval (Air) issued under Section 9 of the Ontario EPA; Certificates of Approval (Industrial Wastewater) issued under Section 53 of the Ontario Water Resources Act ("OWRA"); and Certificates of Approval (Municipal/Provincial Sewage and Waterworks) issued under Sections 52 and 53 of the OWRA. For more current Certificate of Approval information please see the EBR database, which will include information such as 'Approval for discharge into the natural environment other than water (i.e. Air) (EPA s.9)', and Approval for sewage works (OWRA s.53(1)).

TSSA Commercial Fuel Oil Tanks 1948-Jan 2010 **CFOT**

Since May 2002, Ontario developed a new act where it became mandatory for fuel oil tanks to be registered with Technical Standards & Safety Authority (TSSA). This data would include all commercial underground fuel oil tanks in Ontario with fields such as location, registration number, tank material, age of tank and tank size.

Coal Gasification Plants 1987, 1988* **COAL**

This inventory of all known and historical coal gasification plants was collected by the Ministry of Environment. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, landuse, soil condition, site operators/occupants, site description, and potential environmental impacts. This information is effective to 1988, but the program has since been discontinued.

Compliance and Convictions 1989-Apr 2010 **CONV**

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Drill Holes 1886-2005 **DRL**

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Environmental Registry 1994-Apr 2010 **EBR**

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, licence, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes things like; Approval for discharge into the natural environment other than water (i.e. Air), Permit to Take Water (PTTW), Certificate of Property Use (CPU), Approval for a waste disposal site, Order for preventative measures.(EPA s. 18), Order for conformity with Act for waste disposal sites.(EPA s. 44), Order for remedial work.(EPA s. 17) and many more.

TSSA Fuel Storage Tanks Current to Jan 2010 **FST**

The Technical Standards & Safety Authority (TSSA), under the *Technical Standards & Safety Act* of 2000 maintains a database of registered private and retail fuel storage tanks in Ontario with fields such as location, tank status, license date, tank type, tank capacity, fuel type, installation year and facility type.

Ontario Regulation 347 Waste Generators Summary 1986-Jan 2010 **GEN**

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Mineral Occurrences 1846-Oct 2009 **MNR**

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the planimetric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Non-Compliance Reports 1992(water only), 1994-2008 NCPL

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

Ontario Oil and Gas Wells 1800-Feb 2010 OOGW

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. The OGSR Library has over 20,000+ wells in their database. Information available for all wells in the ERIS database include well owner/operator, location, permit issue date, well cap date, licence no., status, depth and the primary target (rock unit) of the well being drilled. All geology/stratigraphy table information, plus all water table information is also provide for each well record.

Ontario Inventory of PCB Storage Sites 1987-Oct 2004 OPCB

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Pesticide Register 1988-Jan 2010 PES

The Ontario Ministry of Environment maintains a database of all manufacturers and vendors of registered pesticides.

Private and Retail Fuel Storage Tanks 1989-1996* PRT

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Ontario Regulation 347 Waste Receivers Summary 1986-2008 REC

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Record of Site Condition 1997-Sept 2001, Oct 2004-Apr 2010 RSC

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use, such as residential, proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up. Information available includes Registration Number, Filing Owner, Property Address, Filing Date and Municipality.

Ontario Spills 1988-Jan 2010 **SPL**

This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Wastewater Discharger Registration Database 1990-2008 **SRDS**

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Waste Disposal Sites - MOE CA Inventory 1970-Sept 2002 **WDS**

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. For more current information for Waste Disposal Sites please see the EBR database, which will include information such as 'Approval for a waste disposal site (EPA s.27)' and 'Approval for use of a former waste disposal site (EPA s.46)'.

Waste Disposal Sites - MOE 1991 Historical Approval Inventory Up to Oct 1990* **WDSH**

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Water Well Information System 1955-Jan 2010 **WWIS**

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. It includes such information as coordinates, construction date, well depth, primary and secondary use, pump rate, static water level, well status, etc. Also included are detailed stratigraphy information, approximate depth to bedrock and the approximate depth to the water table.

Federal Government Source Databases: Diagram Identifier:

Environmental Effects Monitoring 1992-2007* **EEM**

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Environmental Issues Inventory System 1992-2001* **EIIS**

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Federal Convictions **1988-Jun 2007** **FCON**

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Contaminated Sites on Federal Land **June 2000-Jan 2010** **FCS**

The Treasury Board of Canada Secretariat maintains an inventory of all known contaminated sites held by various Federal departments and agencies. This inventory does not include properties owned by Crown corporations, but does contain non-federal sites for which the Government of Canada has accepted some or all financial responsibility. All sites have been classified through a system developed by the Canadian Council of Ministers of the Environment. The database provides information on company name, location, site ID #, property use, classification, current status, contaminant type and plan of action for site remediation.

Fisheries & Oceans Fuel Tanks **1964-Sept 2003** **FOFT**

Fisheries & Oceans Canada maintains an inventory of all aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Indian & Northern Affairs Fuel Tanks **1950-Aug 2003** **IAFT**

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of all aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

National Analysis of Trends in Emergencies System (NATES) **1974-1994*** **NATE**

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

National Defence & Canadian Forces Fuel Tanks **Up to May 2001*** **NDFT**

The Department of National Defence and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

National Defence & Canadian Forces Spills **Mar 1999-Jul 2009** **NDSP**

The Department of National Defence and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

National Defence & Canadian Forces Waste Disposal Sites **2001-April 2007** **NDWD**

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

National Environmental Emergencies System (NEES) 1974-2003 **NEES**

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for all previous Environment Canada spill datasets. NEES is composed of the historic datasets – or Trends – which dates from approximately 1974 to present. **NEES Trends** is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

National PCB Inventory 1988-2008 **NPCB**

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. All federal out-of-service PCB containing equipment and all PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites.

National Pollutant Release Inventory 1993-2008 **NPRI**

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers of 178 specified substances.

Parks Canada Fuel Storage Tanks 1920-Jan 2005 **PCFT**

Canadian Heritage maintains an inventory of all known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Transport Canada Fuel Storage Tanks 1970-March 2007 **TCFT**

With the provinces of BC, MB, NB, NF, ON, PE, and QC; Transport Canada currently owns and operates 90 fuel storage tanks. This inventory will also include The Pickering Lands, which refers to the 7,530 hectares (18,600 acres) of land in Pickering, Markham and Uxbridge - owned by the Government of Canada since 1972. Properties on this land has been leased by the government since 1975, falls under the Site Management Policy of Transport Canada, but administered by Public Works and Government Services Canada. Our inventory provides information on the site name, location, tank age, capacity and fuel type.

Private Source Databases:

Anderson's Waste Disposal Sites 1860s-Present **ANDR**

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the *Ontario MOE Waste Disposal Site Inventory*, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. *Please note that the data is not warranted to be complete, exhaustive or authoritive. The information was collected for research purposes only.*

Automobile Wrecking & Supplies 2001-Feb 2009 AUWR

This database provides an inventory of all known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Chemical Register 1992, 1999-Feb 2009 CHEM

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

ERIS Historical Searches 1999-Apr 2010 EHS

EcoLog ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Canadian Mine Locations 1998-2009 MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Oil and Gas Wells Oct 2001-Mar 2010 OGW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickles' database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Canadian Pulp and Paper 1999, 2002, 2004, 2005, 2009 PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Retail Fuel Storage Tanks 2000-Feb 2009 RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks. Information is provided on company name, location and type of business.

Scott's Manufacturing Directory 1992-Sept 2009 SCT

Scott's Directories is a data bank containing information on over 70,000 manufacturers in Ontario. Even though Scott's listings are voluntary, it is the most comprehensive database of Ontario manufacturers available. Information concerning a company's address, plant size, and main products are included in this database. This database begins with 1992 information and is updated annually.

Anderson's Storage Tanks 1915-1953* TANK

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. *Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.*

Appendix 1G

Cost Estimates – Water Projects

PROJECT: 09321
CITY OF VAUGHAN

ORDER OF MAGNITUDE COSTING FOR DISCUSSIONS PURPOSES
WATERMAIN OPTION B
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

Revised 23-Oct-11

	WATERMAIN OPTION B			ORDER OF MAGNITUDE COSTING	
ITEM	DESCRIPTION	EST. QTY.	UNIT	UNIT RATE	ESTIMATED AMOUNT
A	**400 WATERMAIN ALONG NORTH EAST-WEST ROAD**				
a.1	Trunk 400 watermain from Keele to Jane Street including all appurtenances	2160	lm	$ 675	$ 1,458,000
a.2	Valve and Chambers including drain and air release valves	9	ea	$ 40,000	$ 360,000
a.3	Hydrants sets	15	ea	$ 6,500	$ 97,500
a.4	Connections at Keele and Jane Street to existing watermain including all appurtenances	2	ea.	$ 50,000	$ 100,000
a.5	Traffic control, road cuts and restoration at Keele and Jane streets during watermain installation.	2	ea.	$ 50,000	$ 100,000
	SUB-TOTAL				**$ 2,115,500**
	CONTINGENCIES (30% OF TOTAL)				**$ 634,650**
	TOTAL CONSTRUCTION COST WITH CONTINGENCIES				**$ 2,750,150**

ADDITIONAL ASSUMPTIONS FOR OPTION B

1 It is assumed that the watermain will be installed as part of the road construction for the new East-West road.
2 Valve and Chamber spacing was based on one valve and chamber for every 250m of watermain.
3 Hydrant spacing was based on one hydrant for every 150m of watermain length.

Approximate Cost per Hectare based on 41.5 Hectares **$66,268.67**

Appendix 1H

Cost Estimates – Wastewater Collection System

INTENTIONALLY LEFT OUT
TO BE INCLUDED IN FINAL VERSION

Appendix 1I

Cost Estimates – Stormwater Management System

ORDER OF MAGNITUDE COSTING FOR DISCUSSIONS PURPOSES
OPTION A
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

Revised 23-Oct-11

	OPTION A			ORDER OF MAGNITUDE COSTING	
ITEM	DESCRIPTION	EST. QTY.	UNIT	UNIT RATE	ESTIMATED AMOUNT
A	**HYDRO ONE LANDS SWMF**				
a.1	Excavation & off-site disposal	40000	m3	$ 15	$ 600,000
a.2	Control structure and appurtenances including liner	1	LS	$ 200,000	$ 200,000
a.3	Landscaping incl. topsoil/sodding	26000	m²	$ 14	$ 364,000
a.4	Access roads, bollards, signage, etc.	1	LS	$ 50,000	$ 50,000
B	**HYDRO ONE SWMF ASSOCIATED INFRASTRUCTURE**				
b.1	Trunk sewer to SWMF (1650mm-dia. pipe)	188	m	$ 1,500	$ 282,000
b.2	Trunk sewer to SWMF (1800mm-dia. pipe)	100	m	$ 1,700	$ 170,000
b.3	Trunk sewer to SWMF (1200mm-dia. pipe)	470	m	$ 1,000	$ 470,000
b.4	SWMF inlet pipe (1950mm-dia. pipe)	60	m	$ 2,000	$ 120,000
b.5	SWMF outlet pipe (1200mm-dia. pipe)	500	m	$ 1,200	$ 600,000
b.6	New trunk sewer to SWMF (1650mm-dia. pipe) (including removal of existing sewer)	200	m	$ 2,000	$ 400,000
b.7	MH	18	EA	$ 15,000	$ 270,000
b.8	Break-in for flow diversion	1	LS	$ 10,000	$ 10,000
b.9	Break-in for connection to trunk sewer	1	LS	$ 5,000	$ 5,000
b.10	Oil Grit Separator Unit (14000)	1	EA	$ 140,000	$ 140,000
C	**UNDERGROUND STORAGE (N/A)**				
D	**BCPV NORTH SWMF**				
d.1	Excavation & off-site disposal	15000	m3	$ 15	$ 225,000
d.2	Control structure	1	LS	$ 40,000	$ 40,000
d.3	Landscaping incl. topsoil/sodding	8000	m²	$ 14	$ 112,000
d.4	Access roads, bollards, signage, etc.	1	LS	$ 50,000	$ 50,000
E	**BCPV NORTH ASSOCIATED INFRASTRUCTURE**				
e.1	Trunk sewer outlet from Jane St. to SWMF (1800mm-dia.) (including removal of existing 1500mm dia.)	450	m	$ 2,300	$ 1,035,000
e.2	Trunk sewer along Jane St. (1200mm-dia.) including restoration	310	m	$ 2,000	$ 620,000
e.3	Sewer for North Access Road (600mm dia) including restoration	120	m	$ 800	$ 96,000
e.4	MH	8	EA	$ 15,000	$ 120,000
e.5	Jane St. crossing	1	LS	$ 100,000	$ 100,000
e.6	Roof diversion infrastructure	1	LS	$ 75,000	$ 75,000
F	**WORKS ASSOCIATED WITH ENLARGING EXISTING CITY SWM FACILITY**				
f.1	Relocation of inlet, headwalls, and temporary diversion	1	LS	$ 100,000	$ 100,000
f.2	Remove topsoil, dry and replace and dispose excess off-site	3000	m3	$ 15	$ 45,000
f.3	Excavate SWM Facility and dispose off-site	8000	m3	$ 15	$ 120,000
f.4	Remove sanitary sewer and dispose off-site including manholes	300	lm	$ 100	$ 30,000
f.5	New 525mm sanitary sewer including manholes, restoration of Jane Street and easement	540	lm	$ 800	$ 432,000

PROJECT: 09321
CITY OF VAUGHAN

ORDER OF MAGNITUDE COSTING FOR DISCUSSIONS PURPOSES
OPTION A
OPA 620 LANDS STORMWATER MANAGEMENT STRATEGY

Revised 23-Oct-11

	OPTION A			ORDER OF MAGNITUDE COSTING			
ITEM	DESCRIPTION	EST. QTY.	UNIT		UNIT RATE		ESTIMATED AMOUNT
f.6	Remove existing 400mm watermain, dispose off-site and restore	240	lm	$	100	$	24,000
f.7	New 400mm watermain and appurtenances including restoration of Jane Street and easement.	400	lm	$	1,500	$	600,000
f.8	Landscaping incl. topsoil/sodding	10000	m²	$	14	$	140,000
f.9	Access roads, bollards, signage, etc.	1	LS	$	50,000	$	50,000
G	**DEWATERING FOR SEWERS**						
g.1	Dewatering costs associated with installation of all sewers, watermains and appurtenances. (length and costs assumed as no solid information is presently available.	1000	lm	$	150	$	150,000
g.2	Traffic control for works on or adjacent to Steeles Avenue and Jane Street	1	LS	$	120,000	$	120,000
H	**PREMIUM ITEMS RELATED TO TRCA COMMENTS**						
h.1	TRCA/Black Creek mitigations measures	1	LS	$	1,000,000	$	1,000,000
h.2	Existing Building Protection for Dalziel Barn	1	LS	$	50,000	$	50,000
h.3	Black Creek Stream Improvements	1	LS	$	300,000	$	300,000
h.4	TRCA Environmental Studies	1	LS	$	225,000	$	225,000
	SUB-TOTAL					**$**	**9,540,000**
	CONTINGENCIES (30% OF TOTAL)					**$**	**2,862,000**
	TOTAL CONSTRUCTION COST WITH CONTINGENCIES					**$**	**12,402,000**

ADDITIONAL ASSUMPTIONS FOR OPTION A

1 The existing OPA 620 SWM pond will be converted into a quality/quantity facility and utilized with the BCPVN SWM Facility in series. UPS will still release their present allowed flows until the lands are redeveloped.

2 It was assumed that the existing sewer on north side of Steeles will be used. No new sewers except where Subway passes under.

3 No hydraulic modelling of existing SWM pond has been done with increase in quantity volume based on matching Hydro land SWM Facility and not accounting for inefficiencies due to two ponds in series, decrease volume due to higher release from UPS, and storage (permanent and extended required for quality control.

Approximate Cost per Hectare based on 41.5 Hectares **$298,843.37**