FUNCTIONAL SERVICING REPORT
591 LIVERPOOL ROAD
PICKERING HARBOUR COMPANY LIMITED
CITY OF PICKERING

Prepared By:	Sabourin Kimble & Associates Ltd.
Prepared For:	Pickering Harbour Company Limited
Project Number:	17:380:P
Date:	Revised March 10, 2020

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1.0 INTRODUCTION

Sabourin Kimble & Associates Ltd. has been retained by Pickering Harbour Company Limited to complete a Functional Servicing Report for the development of the property at 591 Liverpool Road in the City of Pickering.

This report includes the examination of water supply, storm and sanitary drainage, stormwater management controls, and a preliminary grading design for the proposed development at this site.

A previous report was prepared by Sabourin Kimble & Associates Ltd. in October 2012 for The Pickering Harbour Company Limited. The purpose of that report was to study the existing municipal sanitary sewers within the subject site to determine if any of the sewers could be relocated to provide a larger area for development. The recommendation from that study identified that relocation of the existing sanitary sewer was viable to allow for a larger area available for development. A copy of that report and related correspondence is included in Appendix B.

2.0 SITE DESCRIPTION

The subject site is located at the foot of Liverpool Road. The site is bounded by commercial and residential units and a Region of Durham sanitary pumping station to the north, Frenchman's Bay Marina and Liverpool Road to the west, and a wetland area and Krosno Creek to the east and to the south. There is an existing municipally owned public parking adjacent to the site.

The site itself is approximately 2.5 hectares. Current use of the subject site includes a boat storage area, and private parking with an office building.

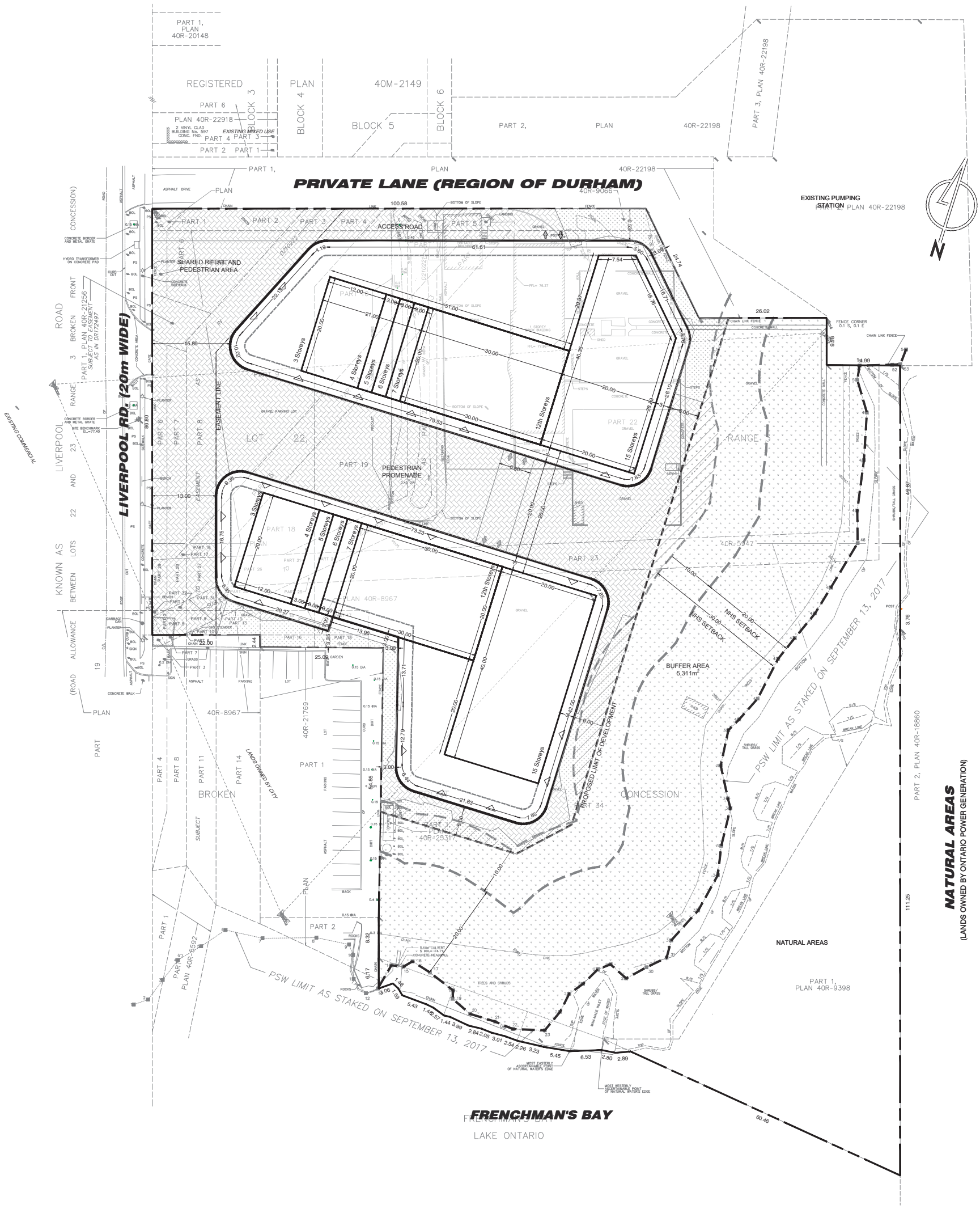
3.0 DEVELOPMENT CONCEPT

The proposed development includes two multi-storey residential buildings with a section of green roof on each of the buildings.

The two buildings will contain commercial space, amenity areas, and 377 residential units. There is also a proposed underground parking structure as a single structure for both buildings. A proposed private road at the north limit of the site will serve as the vehicular access from Liverpool Road. A pedestrian promenade is proposed between the buildings with access from Liverpool Road, and a naturalized buffer is proposed adjacent to Krosno Creek.

The existing municipal parking lot will remain in place.

The Concept Plan prepared by the Biglieri Group is shown in Figure 1.



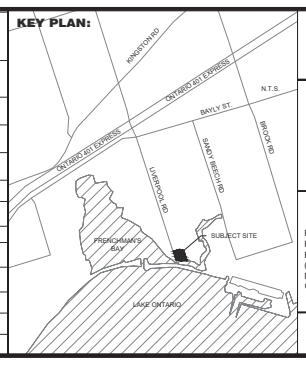
SITE STATISTICS

LAND AREA (NDA)	Ha	Acres
TOTAL	1.11	2.74
Residential Density	340	u/ha
FSI	4.4	
GROSS FLOOR AREA BREAKDOWN		
	m^2	ft^2
Total Permitted GFA	48,840.00	525,713.76
Residential Uses		
Residential GFA	43,233.20	465,362.16
Residential Indoor Amenity GFA	754.80	8,124.67
Total Residential GFA	**43,988.00**	**473,486.83**
Total Units	377	Units
Non-Residential Uses		
Commercial GFA	1,400.00	15,069.60
Assembly Hall GFA	625.00	6,727.50
Parking, Boat Storage, Lobby GFA	2,827.00	30,429.83
Total Non-Residential GFA	4,852.00	52,226.93

PARKING STATISTICS

PROPOSED PARKING RATE	PROPOSED SPACES
RESIDENTIAL @ 1 SPACES / UNIT	377
VISITOR @ 0.15 SPACES / UNIT	57
COMMERCIAL @ 0.1 / UNIT	38
PUBLIC HALL @ 10/100 m^2	63
TOTAL	**535**
PROPOSED PARKING LOCATIONS	
U/G Parking/FL	250
U/G Parking Levels	2
A/G Parking/FL	35
A/G Parking Levels	1
TOTAL	**535**

KEY PLAN:



CONCEPTUAL SITE PLAN

591 LIVERPOOL RD., PICKERING, ONTARIO

LEGAL DESCRIPTION:

PART OF LOT 22
RANGE 3,
BROKEN FRONT CONCESSION
(GEOGRAPHIC TOWNSHIP OF PICKERING)
NOW IN THE CITY OF PICKERING REGIONAL MUNICIPALITY OF DURHAM

NOTE:
DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LEGEND

- VEGETATION / LANDSCAPING
- PEDESTRIAN AND RETAIL AREA
- PEDESTRIAN & VEHICLE HARDSCAPE
- BUILDING ENTRANCE
- PARKADE / GARAGE ACCESS

0 5 10 15 20 25

REVISIONS

No.	Description	Date	Int.
3			
2			
1	REVISED SUBMISSION PER COMMENTS RECEIVED	3/10/2020	JS

PROJECT No.: 15360
DATE: April 10, 2019
SCALE: 1:400
DRAFTED BY: JS CHECKED BY: MP
DRAWING No.: **CSP-01**

THE BIGLIERI GROUP LTD.
Planning | Development | Project Management | Urban Design
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thebiglierigroup.com

4.0 STORM DRAINAGE

4.1 Existing Site Drainage

Currently the site slopes gradually from north to south. There are two existing catchbasins in the boat storage area that collect overland drainage from a portion of the site and outlet south to a headwall that discharges into Krosno Creek. The boat storage area is mostly paved, with very little grassed area. Limited topographic survey information is available for the existing public parking lot located at the southwest corner of the site, but it appears to drain to a single catchbasin near the north driveway. This catchbasin outlets to the storm sewers on Liverpool Road, and into Frenchman's Bay. The remainder of the site sheet drains to the wetland area adjacent to Krosno Creek.

A previous Stormwater Management Report was completed by Sabourin Kimble & Associates Ltd. for The Pickering Harbour Company Limited in 2002. The study area of the report included the east side of Liverpool Road, where the current proposed development is situated. That report included an analysis of floodplain impact for the lands between Krosno Creek and Liverpool Road. Under the direction of the Toronto and Region Conservation Authority, the floodplain hydraulics for Frenchman's Bay and Krosno Creek had been updated by Clarifica Consulting. The floodplain hydraulics indicated that the Regional Floodline elevation east of the Liverpool Road Bridge is 76.26m.

At the time, the floodplain limit from Krosno Creek was shown to inundate as backwater over the Pickering Harbour Lands east of Liverpool Road, and the area had poor conveyance of the Regional Storm flow. It was recommended to flood-proof the area and improve the Regional Storm flow by utilizing a balanced cut and fill of the existing land. A permit was issued by Toronto and Region Conservation Authority to fill a central portion of the site and expand the existing wetland along Krosno Creek in order to realign the floodline toward the outer edge of the property. The earthworks activity maintained the existing floodline at an elevation of 76.26m, which now extends along the east and south limits of the site, adjacent to Krosno Creek.

The existing Regional floodline is illustrated on the Preliminary Grading Plan. It falls outside of the existing fence line on the site. No grading is proposed beyond the fence

line, therefore, the existing floodline will not be disturbed, with the exception of the area of the existing and proposed storm sewer outlets where restoration is required. A freeboard of 0.30m is required above the Regional floodline. As shown on the Preliminary Grading Plan, the development limit of the site will generally be graded at an elevation of 76.92m, well above the required elevation of 76.56m.

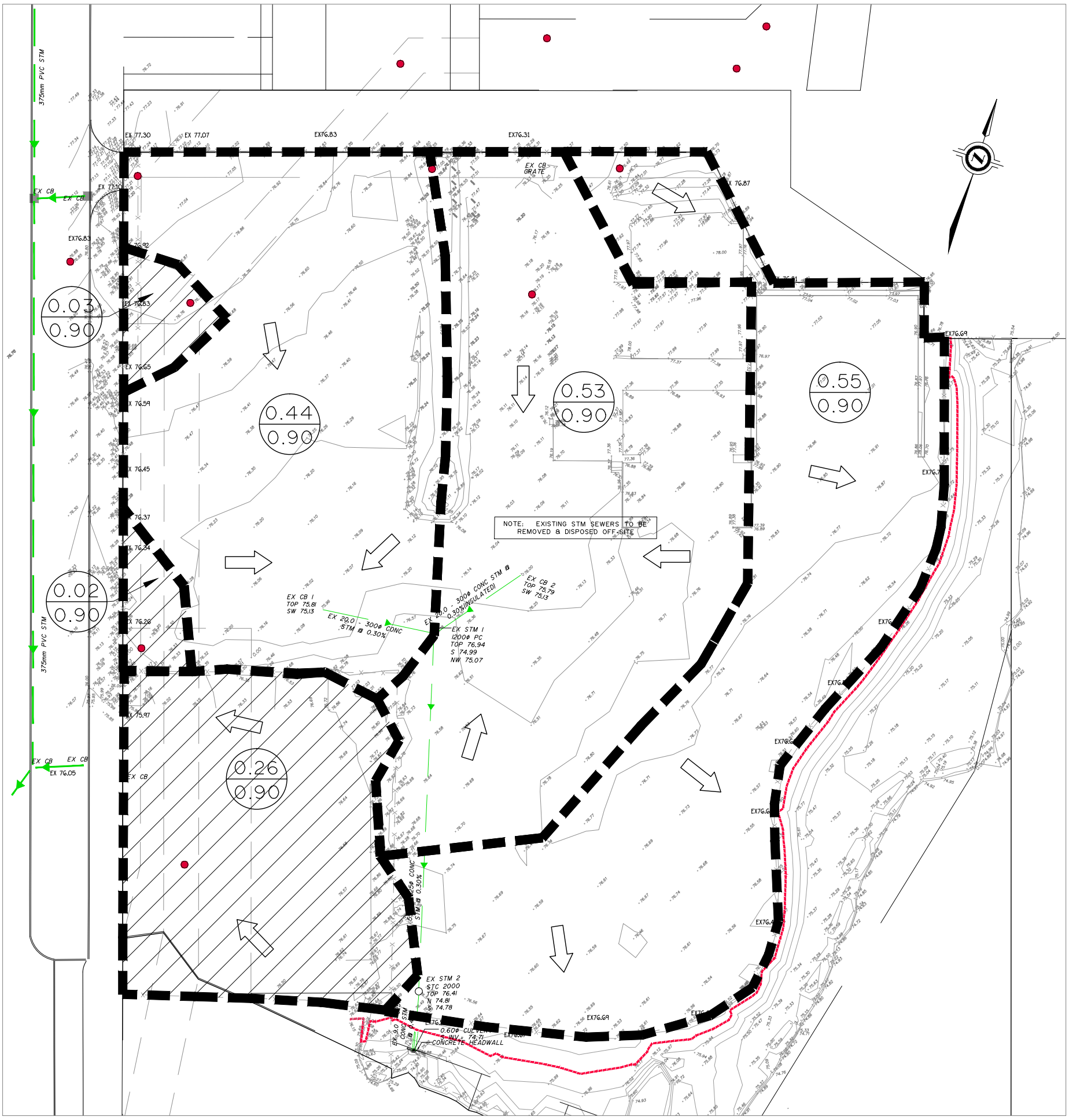
4.1.1 Pre-Development Storm Drainage

Currently, the boat storage area is mostly paved with small patches of grass near the property boundary. As mentioned in the previous section there are two existing catchbasins in the boat storage area capturing drainage. A portion of the boat storage along the southerly and easterly portion of the site sheet drains towards the wetland (See Figure 2 – Pre-Development Drainage Plan). Small portions of the site drain towards Liverpool Road. Drainage from the paved municipal parking lot also appears to be directed to the storm sewers on Liverpool Road.

As shown in Table 1.0 below, the Cumulative Area x Runoff Coefficient (AxR) under pre-development conditions that drains to Krosno Creek is 1.41 and the AxR to the Liverpool Road sewers is 0.22. Therefore, the total pre-development AxR for the subject site is 1.63. Runoff Coefficients are based on the City of Pickering design criteria.

Table 1. Pre-Development Land Use Areas

Land Use	AxR
Existing West Catchbasin **0.44 ha.** (C = 0.90)	0.40
Existing East Catchbasin **0.53 ha**. (C = 0.90)	0.48
Overland to existing wetland **0.55 ha**. (C = 0.90)	0.50
Total to Krosno Creek	**1.38**
Total to Liverpool Road Sewer System **0.31ha.** (C = 0.90)	0.28
Total AR	**1.64**



LEGEND

EXISTING DRAINAGE BOUNDARY

DRAINAGE TO LIVERPOOL ROAD

OVERLAND FLOW

AREA (ha.)
RUN-OFF COEFFICIENT — 0.48 / 0.90

1:750

PRE - DEVELOPMENT DRAINAGE PLAN

SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER	FIGURE NO.
17:380	2

CAD FILE: P:\17\380\Drawing Files\Phase I\Figures\380 Fig 283 Drainage Plan.dwg

4.2 Post Development Storm Drainage

As described in Section 5.1, the City of Pickering has advised that no quantity controls controlling post-development flows to pre-development conditions will be required if the site is discharging directly to Frenchman's Bay. If the site is draining to Krosno Creek, post-development flows must be controlled to pre-development levels for the 2 through 100-year storms.

Under post-development conditions, drainage from the roofs and hardscaped areas (pedestrian promenade and internal road) will be collected in a storm sewer system and discharged south to Krosno Creek via a proposed headwall located outside of the 20m buffer, and a bioswale downstream of the headwall, located within the 20m buffer.

Overland flow from the naturalized buffer area behind the proposed buildings will sheet drain into the wetland. The proposed area draining to the wetland and Krosno Creek is very similar to the existing drainage area (0.56 hectares vs. 0.55 hectares). Under proposed conditions, the area will consist of a small portion of sidewalk on the east side of the proposed buildings, and vegetated buffer area.

A small portion of the site fronting on Liverpool Road will drain overland and be collected by the existing catchbasins on Liverpool Road.

A preliminary storm sewer design is shown on the Preliminary Site Servicing Plan. Table 2 below shows the AxR breakdown of the site under post-development conditions.

Table 2. Post Development Land Use

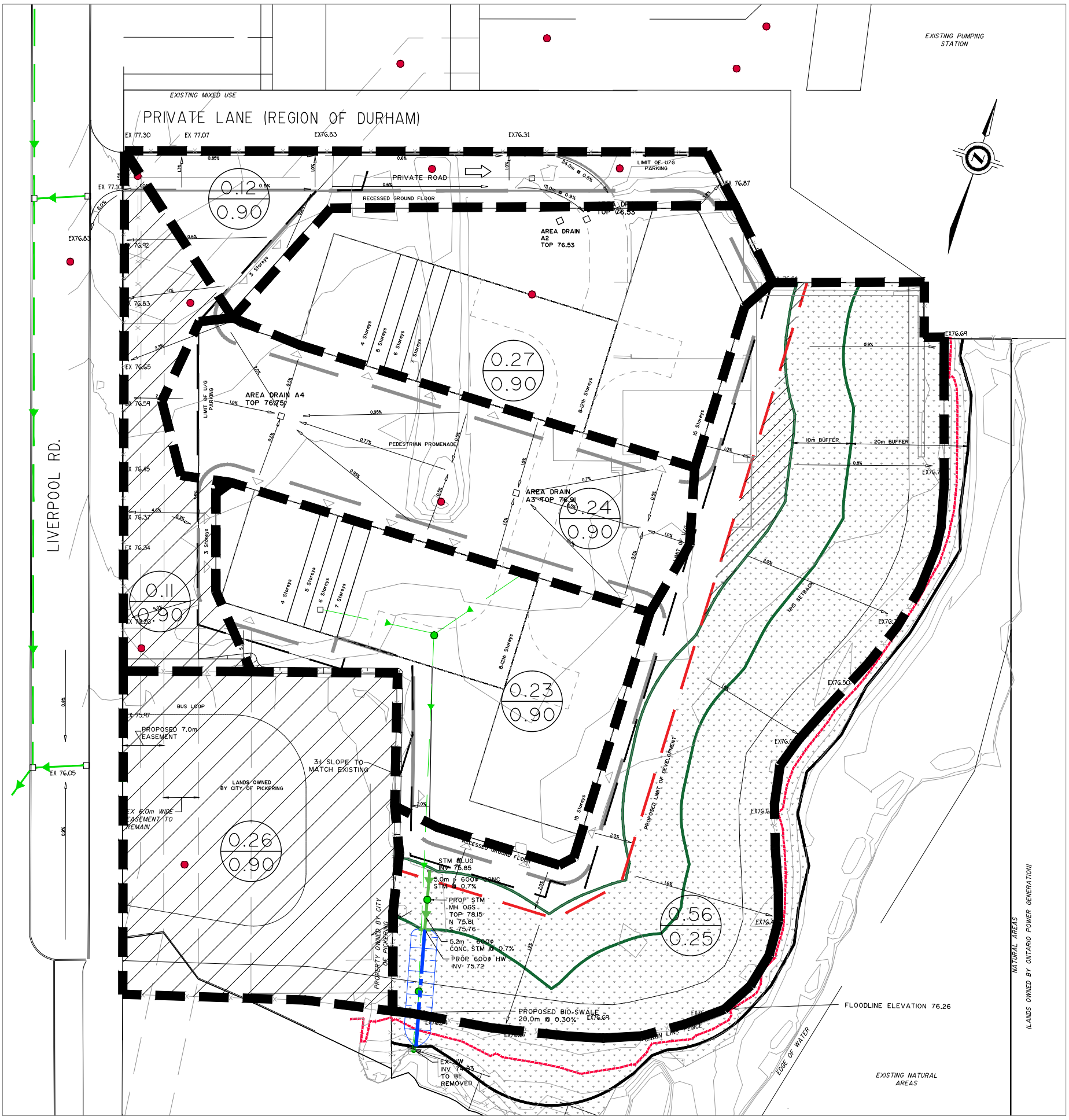
Land Use	AxR
Building Roof **0.50 ha.** (C = 0.90)	0.45
Pedestrian Promenade & Access Road **0.36 ha.** (C = 0.90)	0.32
Overland to existing wetland **0.56 ha.** (C = 0.25)	0.14
Total to Krosno Creek	**0.91**
Total to Liverpool Road sewer system **0.37 ha.** (C = 0.90)	0.33
Total AR	**1.24**

Based on the new land use from the proposed development, the total contributing AxR to Krosno Creek is 0.91. As shown in Table 1, the pre-development AxR to Krosno

Creek is 1.38. Since the post-development contributing drainage is less than the pre-development, the storm drainage can be discharged to Krosno Creek and no on-site quantity controls are required.

As shown in Table 2, the contributing area draining to Liverpool Road has been increased slightly from a pre-development area of 0.31 hectares to a post-development area of 0.37 hectares. Given that the existing storm sewer on Liverpool Road adjacent to the site is the downstream end of the system and outlets directly to Frenchmans Bay adjacent to the site, it is expected that the slight increase in drainage area will not impact the function of the existing sewer.

Stormwater management controls are discussed in Section 5.



LEGEND

PROPOSED DRAINAGE BOUNDARY

DRAINAGE TO LIVERPOOL ROAD

AREA (ha.) 0.18
RUN-OFF COEFFICIENT 0.90

1:750

POST - DEVELOPMENT DRAINAGE PLAN

SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER	FIGURE NO.
17:380	3

CAD FILE: P:\17\380\Drawing Files\Phase I\Figures\380 Fig 283 Drainage Plan.dwg

5.0 STORMWATER MANAGEMENT

5.1 Stormwater Management Criteria

The TRCA has advised of the following stormwater management control criteria for the subject lands:

- Enhanced fisheries protection, as per MOE guidelines, is to be provided for quality control. This is 80% total suspended solids (TSS) removal from stormwater effluent.
- For local erosion control and to meet the requirement for a treatment train approach, the first 5mm of rainfall should be retained on site using low impact development measures.
- If the site is discharging directly to Frenchman's Bay, no quantity controls are required. If the site is draining to Krosno Creek, post-development flows must be controlled to pre-development levels for the 2 through 100-year storms.

5.2 Quality Control and Low Impact Development Measures

Stormwater quality control will be provided by conveying drainage through an Oil and Grit Separator (OGS) system. Although the OGS application may be sufficient, the TRCA has adopted the City of Toronto Guidelines where OGS devices are considered capable of achieving a Total Suspended Solids (TSS) removal efficiency of 50%. Therefore additional low impact development measures will be implemented to provide a treatment train approach. These will include Catchbasin Shield Inserts that will be installed in all catchbasins within the site. As described in the letter provided by CB Shield Inc., it is expected that the CB Shield Inserts will capture a minimum of 60% of the coarsest fraction of the annual sediment load, and the OGS unit will capture 50% of the remaining sediment load for an overall capture rate exceeding 80% (see Appendix A for details). Furthermore, a bioswale is proposed downstream of the headwall outlet. The bioswale will be 20 metres in length, with a 0.50 metre wide flat bottom and 2:1 side slopes to match existing grades.

Given the proximity to the lake, the groundwater table is expected to be fairly high, and therefore infiltration on site may not be feasible. Furthermore, there is little opportunity for LIDs outside of the buffer areas due to the fact that a large portion of the developable site will consist of an underground parking structure, and the remainder will be encumbered by a sanitary sewer easement.

In addition to the bioswale outlet downstream of the outlet headwall, other low impact development measures will include a green roof for a substantial portion of the two buildings. The green roof is proposed on the 12th and 15th storey roofs, which represents over half of the roof area.

The buffer area will be graded fairly flat, with grades ranging from 0.8% to 2.0% to promote uptake by vegetation within the buffer.

During detailed design, calculations for the 5mm on-site retention will be provided for the green roof and the bioswale. An approximate footprint for the bioswale is shown on the drawings.

5.3 Stormwater Quantity Control

As discussed in Section 4.2, based on the proposed land-use, the post-development contributing drainage area to Krosno Creek is less than the pre-development drainage area. Therefore, on-site quantity controls will not be required.

6.0 SANITARY DRAINAGE

6.1 Existing Sanitary Sewers

There are several sanitary sewers located within the subject site. A 900mm diameter trunk sewer is located within the western portion of the site and conveys flows north to the pumping station. This sewer is on a 6.0 metre wide easement. At the northwest corner of the site, a 450mm diameter sewer on Liverpool Road connects to this 900mm sewer.

An existing 750mm diameter emergency overflow sewer extends from the pumping station south, into a 900mm diameter sewer that crosses the site just south of the existing office building. The 900mm diameter sewer continues south, beside the Liverpool Road right-of-way. This overflow sewer is also on a 6.0m wide easement.

6.2 Proposed Sanitary Sewers

In order for the proposed buildings to be constructed, the emergency overflow sewer is to be relocated. A previous study prepared by Sabourin & Kimble Associates in 2012 concluded that a 6.0m wide easement should be provided for the 750mm overflow sewer along the north limits of the property and a 7.0m wide easement for the 900mm overflow sewer along the west limit of the property. The existing 900mm trunk sewer will remain and the 900mm overflow sewer will run parallel within a combined easement width of 13.0 metres. The 2012 study and related correspondence are included in Appendix B.

Sanitary drainage for the proposed buildings will be internal to the structures. A single proposed sanitary stub is provided at existing MH 13-97 to service the entire site.

There are 377 residential units proposed within the two buildings, of which 30% are proposed as 1-bedroom units, 40% as two-bedroom units, 20% as 3-bedroom units, and 10% as 3+-bedroom units. Using Region of Durham design criteria, this represents a total population of 981 people. There is also 1400 square metres of commercial space proposed in the two buildings. Given the site uses, the theoretical sanitary flow, including infiltration, would be 16.28L/s. This flow represents approximately 2.7% of the capacity of the existing 900mm diameter sewer at 0.10% grade downstream of the site.

Existing and proposed sanitary sewers are illustrated on the Preliminary Site Servicing Plan. Sanitary drainage calculations are included in Appendix C.

7.0 WATER SUPPLY

7.1 Existing Water Supply Infrastructure

There is an existing 200mm PVC watermain located on the east side of Liverpool Road adjacent to the subject lands. An existing hydrant is located in the boulevard directly adjacent to Building 1 and another at the south limit of the subject lands.

7.2 Proposed Water System

Fire and domestic watermains will be provided internal to the site plan, and connected to the existing 200mm watermain on Liverpool Road.

The water meter for the domestic line and the backflow preventer for the fire line will be located in a mechanical room internal to the building. Individual water service connections will be provided to each of the dwelling units through an internal system designed by the mechanical consultant.

A fire hydrant will be provided internal to the site, above the parking structure.

8.0 SITE GRADING

The proposed grading for this site has been designed to meet the City of Pickering grading criteria, while matching existing grades at the site boundaries and development limits.

Existing Liverpool Road boulevard elevations will be matched along the west property line. A curb/concrete toe wall is proposed along the north side of the access road so that existing elevations can be matched at the north property limit. Existing elevations will be matched at the existing fence line adjacent to Krosno Creek, which is above the Regional floodline as described in Section 4.1. Proposed grades within the buffer will be relatively flat, ranging from 0.8% to 2.0% to promote uptake of runoff by the vegetation in the buffer.

Internal grading will consist of slopes ranging from 0.5% to 5.0% on hard surfaces. The grading on the site was designed to maintain the same finished floor elevation for both proposed buildings. The proposed grading promotes drainage away from the access driveways for the underground parking, and maintains drainage onsite using catchbasins in localized low-points.

The preliminary grading design is illustrated in the Preliminary Site Grading Plan.

9.0 SEDIMENT AND EROSION CONTROL

Prior to construction of any portion of the Study Area, adequate erosion and sedimentation controls must be implemented. In support of the detailed design for any development proposal, a comprehensive erosion and sedimentation control plan should be prepared in accordance with the Erosion and Sediment Control Guideline for Urban Construction 2006. This plan should detail the works proposed to control erosion on-site and sediment transport from the site to match or exceed current Municipal and Provincial standards. Works such as sediment shields, temporary sediment ponding areas, undisturbed buffers, and catchbasin/storm sewer sediment traps should be implemented.

Sedimentation control practices will be implemented for all construction activities within the Study Area, including during tree removal, topsoil stripping, underground sewer construction, road construction and building construction. Sedimentation control measures are to be installed and operational prior to any construction activity, and are to remain in place until such time as the buildings are constructed and the landscaping complete with established sod.

10.0 CONSTRUCTION MANAGEMENT

During the site plan stage, a detailed construction management plan will be required, including details on specific sediment control measures, construction storage and staging areas, and access and egress from the sites. For the purposes of this report, the following is a general guideline on construction management.

Construction of this site is expected to be executed in one phase. Construction traffic will enter and exit the site via Liverpool Road.

Prior to any work being completed, erosion and sediment control (ESC) measures outlined in Section 9.0 will be implemented. These may consist of sediment fences, interceptor swales, rock check dams, catchbasin silt traps, mud mats, and possibly temporary sediment ponds. The ESC measures must be inspected regularly, and repaired, replaced or cleaned when damaged or no longer effective.

Any existing trees that are to be preserved should be protected with hoarding and any other protective measures described in the Tree Preservation Report.

Once the ESC and tree protection measures are in place, topsoil stripping may begin. Topsoil required for landscaping purposes may be stockpiled on site, and the remainder will be disposed off-site. Topsoil stockpile locations will be detailed at the site plan stage for each phase, but in general, stockpiles should not be located directly adjacent to any natural heritage features. Stockpiles should be surrounded by sediment fence and seeded.

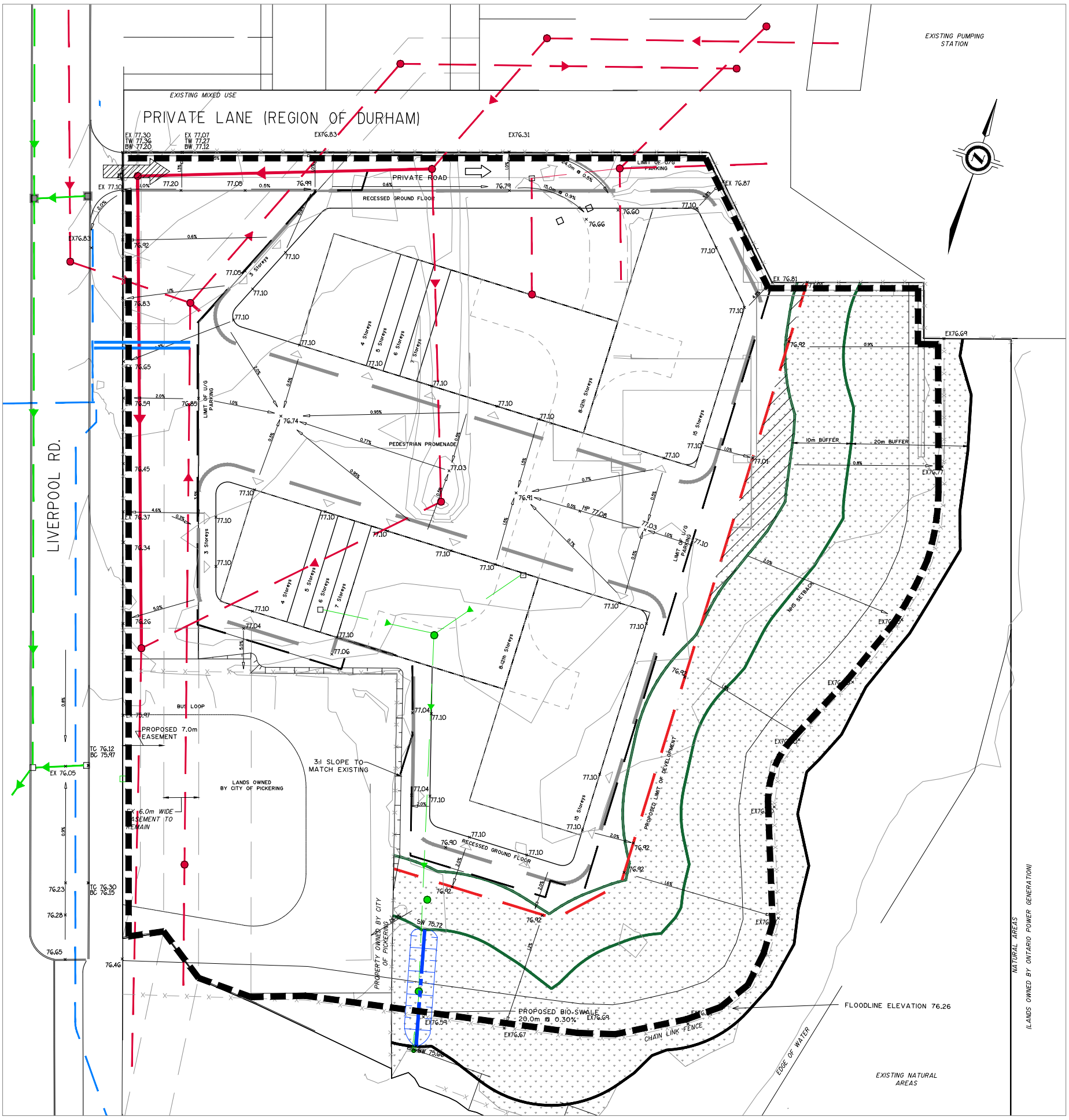
Upon completion of topsoil stripping, the site may be rough graded, however it is expected that little grading will be required given the extent of the underground parking structure. The new sanitary sewer by-pass pipe will then be constructed along the west side of the site, after which the existing pipe in the centre of the site can be decommissioned and removed.

The bioretention swale will be constructed only when construction of all other services, laneways, and buildings are nearing completion to ensure that it does not become full of sediment during construction.

During construction, dust control measures and a road cleaning program are to be implemented. Mud mats are to be constructed at each access location.

The location of construction staging and storage areas, site trailers, parking areas for construction workers, and temporary washroom facilities will be determined at the site plan stage. All construction waste is to be disposed off-site. Working hours are to be in accordance with City by-laws.

Refer to Figure CMP-1 for Construction Management Plan.



LEGEND

SEDIMENT CONTROL

CONSTRUCTION ACCESS (MUDMAT LOCATION)

CATCHBASIN SILTATION TRAP

1:750

NOTES:

1. ACCESS FOR CONSTRUCTION TO BE FROM LIVERPOOL ROAD AT THE NORTH END OF THE SITE.
2. MUDMATS TO BE CONSTRUCTION AT ALL ACCESS LOCATIONS.
3. DUST CONTROL MEASURES AND ROAD CLEANING PROGRAM TO BE IMPLEMENTED PERIODICALLY DURING CONSTRUCTION.
4. TOPSOIL STOCKPILE LOCATIONS, SITE TRAILERS AND CONSTRUCTION STAGING AREAS TO BE DETERMINED AT SITE PLAN STAGE. FENCING AND HOARDING TO BE ERECTED BEFORE CONSTRUCTION.

CONSTRUCTION MANAGEMENT PLAN

SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER	FIGURE NO.
17:380	CMP-1

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11.0 CONCLUSIONS

Based on the analysis carried out as part of this preliminary design investigation, it was concluded that municipal servicing and stormwater management of the subject lands is readily achievable as follows:

- Storm drainage from the site will be collected in a storm sewer system and conveyed south, discharging to Krosno Creek via a proposed headwall and bioswale.
- Overland flow from the naturalized buffer behind the proposed buildings will sheet drain to the existing wetland adjacent to Krosno Creek.
- Stormwater quantity control will not be necessary since the post-development contributing area is less than the pre-development contributing area.
- Stormwater quality control will be provided by conveying drainage through an Oil and Grit Separator (OGS) system. Catchbasin shield inserts will be installed in all site catchbasins.
- Low impact development measures will be implemented to retain 5mm of runoff and to provide a treatment train approach. These measures will include a green roof for at least a portion of the buildings and a bioswale downstream of the outlet headwall.
- Relocation of the existing overflow sanitary sewer will be required for the proposed development.
- Existing watermains are available to service the site.
- The site can be graded in accordance with City of Pickering criteria.
- Adequate sedimentation control measures should be provided during the construction program.

Based on the above conclusions, we recommend that the subject lands be graded and serviced in accordance with the details included in this report.

Yours truly,

SABOURIN KIMBLE & ASSOCIATES LTD.

Krista Boyce, P. Eng.

APPENDIX A

CB SHIELD INC.

39 Uplands Drive
Brantford, Ontario, N3R 6H5
(T) 519-212-9161
info@cbshield.com

March 7, 2020

Sabourin Kimble & Associates Ltd
110 Old Kingston Road
Ajax, Ontario
L1T 2Z9

Reference: Predicted Performance of CB Shield Units
Pickering Site

Mr. A. Geof Nicholson, C.E.T.

We are pleased to provide an estimate of the Total Suspended Solids (TSS) removal performance for CB Shield inserts implemented on the above-referenced project. There are three catch basins, all serving less than 0.1 hectares. Assuming the sediment load is consistent with the City of Toronto Particle Size Distribution the TSS removal will be:

Drainage Area (ha)	% Impervious	Predicted TSS Removal
0.1	95%	**60%**

Long term sediment removal is based on independently conducted laboratory testing completed on a full-scale unit for the Canadian ETV Verification Program. The ETV testing protocol mandated an extremely fine particle size gradation. An adjustment was made to account for the City of Toronto particle size distribution (i.e. overall coarser material than ETV test sediment) which we understand is currently required for sizing OGS devices in the City of Pickering.

Overall, catch basins with CB Shield inserts serving a drainage area of 0.1 hectares that is close to 100% impervious will conservatively capture 60% of the annual TSS load, for a particle size distribution (PSD) consistent with the City of Toronto's Wet Weather Flow Guidelines.

The table on the next page has been developed from utilizing long term rainfall (i.e. approximately 20 years) and simulating resulting runoff rates using continuous hydrologic modelling. Predicted flows are matched to CB Shield's ETV testing results, allowing an overall prediction of long term sediment removal to be determined.

Average Annual Sediment Removal Rates (%) using a CB Shield (based on Toronto Sediment - Particle Size Distribution)						
Area to CB (ha)	Imperviousness[1] (%)					
	20%	35%	50%	65%	80%	100%
0.02	66%	66%	66%	66%	66%	65%
0.05	65%	65%	65%	65%	64%	64%
0.10	65%	64%	64%	63%	62%	61%
0.20	64%	63%	61%	59%	58%	56%
0.30	62%	60%	58%	56%	55%	52%

Notes:
1. Runoff Coefficient 'C' is approximately equal to 0.05 + 0.9*Impervious Fraction.
2. Above chart is based on long term continuous hydrologic analysis of Toronto, Ontario (Bloor St) rainfall data.
3. Assumes 0.6 m sump in CB and that maintenance is performed (i.e. CB cleaning) when required by sediment/pollutant build-up or otherwise.
4. See accompanying chart for suggested maintenance scheduling - AND - get CB Shield Inc. to monitor it for you in field.
5. Sediment/Pollutant removal rates based on adjusting third party certified laboratory testing using ETV sediment (PSD available on request).
6. See additional discussion regarding scour protection from CB Shield during more infrequent runoff events.

For the Pickering site, CB Shield inserts will be installed in upstream catch basins to pre-treat a HydroStorm oil/grit separator. We assume the catch basins with CB Shield inserts will capture 60% of the coarsest fraction of the annual sediment load and the HydroStorm unit will capture 50% of the remaining sediment load for an overall capture rate exceeding 80%.

Particle Size (um)	**%**	
20	20	HydroStorm
30	10	HydroStorm
50	10	HydroStorm
100	20	CB Shield
250	20	CB Shield
1000	20	CB Shield

The Toronto Region Conservation Authority reviewed and verified our independent testing results for our ETV verification. We would be happy to provide references if needed. CB Shield has also been monitored in the field many times. We would be happy to provide any additional data you feel would be helpful.

Thanks for your consideration,

Yours very truly,

Mark Smith
CB Shield Inc.
cc. Stephen Braun, P.Eng., CB Shield Inc.

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

CB Shield® Stormwater Quality Device

Developed by CB Shield Inc.
Oakville, Ontario, Canada

Registration: GPS-ETV_VR2019-10-31

In accordance with

ISO 14034:2016

Environmental Management —
Environmental Technology Verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

October 31, 2019
Vancouver, BC, Canada

GLOBE PERFORMANCE SOLUTIONS

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Hydroworks Sizing Summary

Private Development
Pickering, Ontario

03-08-2020

Recommended Size: HS 4

A HydroStorm HS 4 is recommended to provide 20 % annual TSS removal based on a drainage area of 1.08 (ha) with an imperviousness of 95 % and Toronto Central, Ontario rainfall for the User defined particle size distribution.

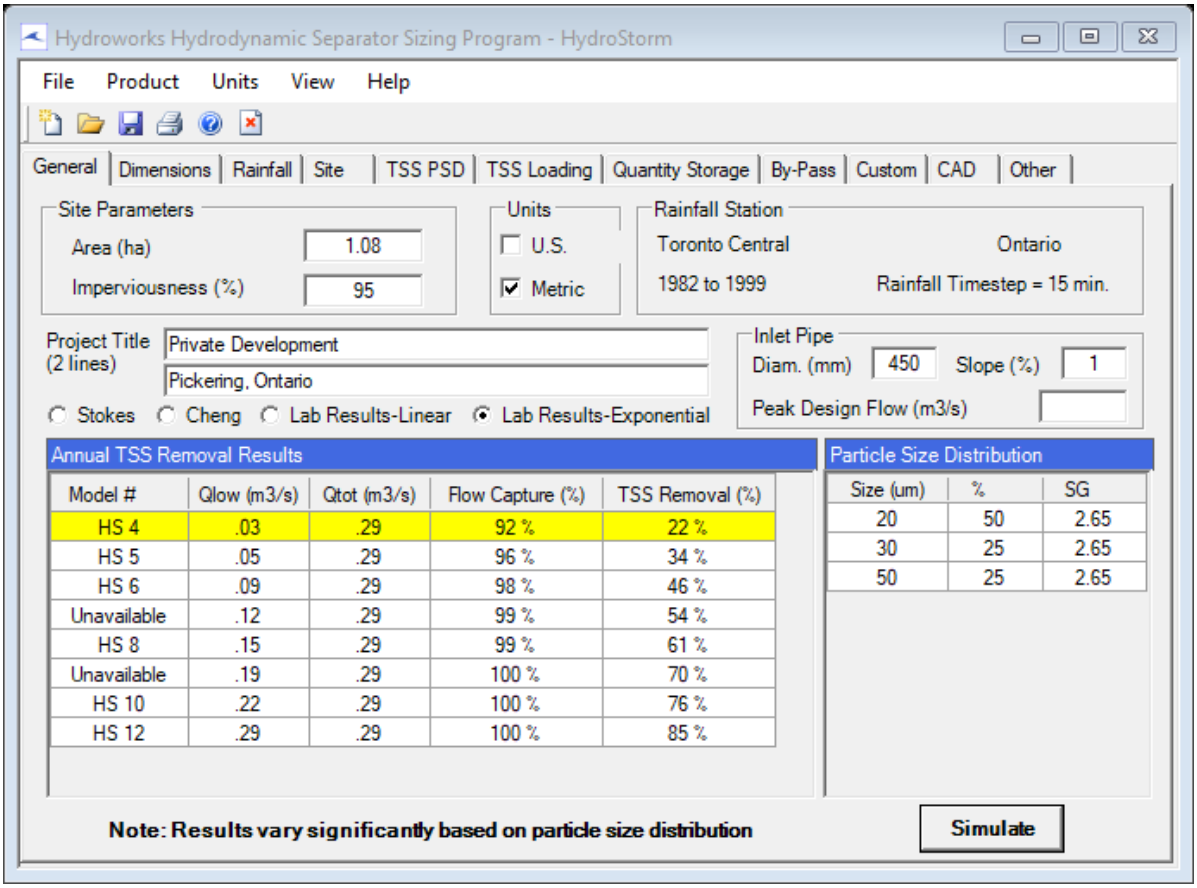
The recommended HydroStorm HS 4 treats 92 % of the annual runoff and provides 22 % annual TSS removal for the Toronto Central rainfall records and User defined particle size distribution.

The HydroStorm has a headloss coefficient (K) of 1.04. Since a peak flow was not specified, headloss was calculated using the full pipe flow of .29 (m3/s) for the given 450 (mm) pipe diameter at 1% slope. The headloss was calculated to be 170 (mm) based on a flow depth of 450 (mm) (full pipe flow).

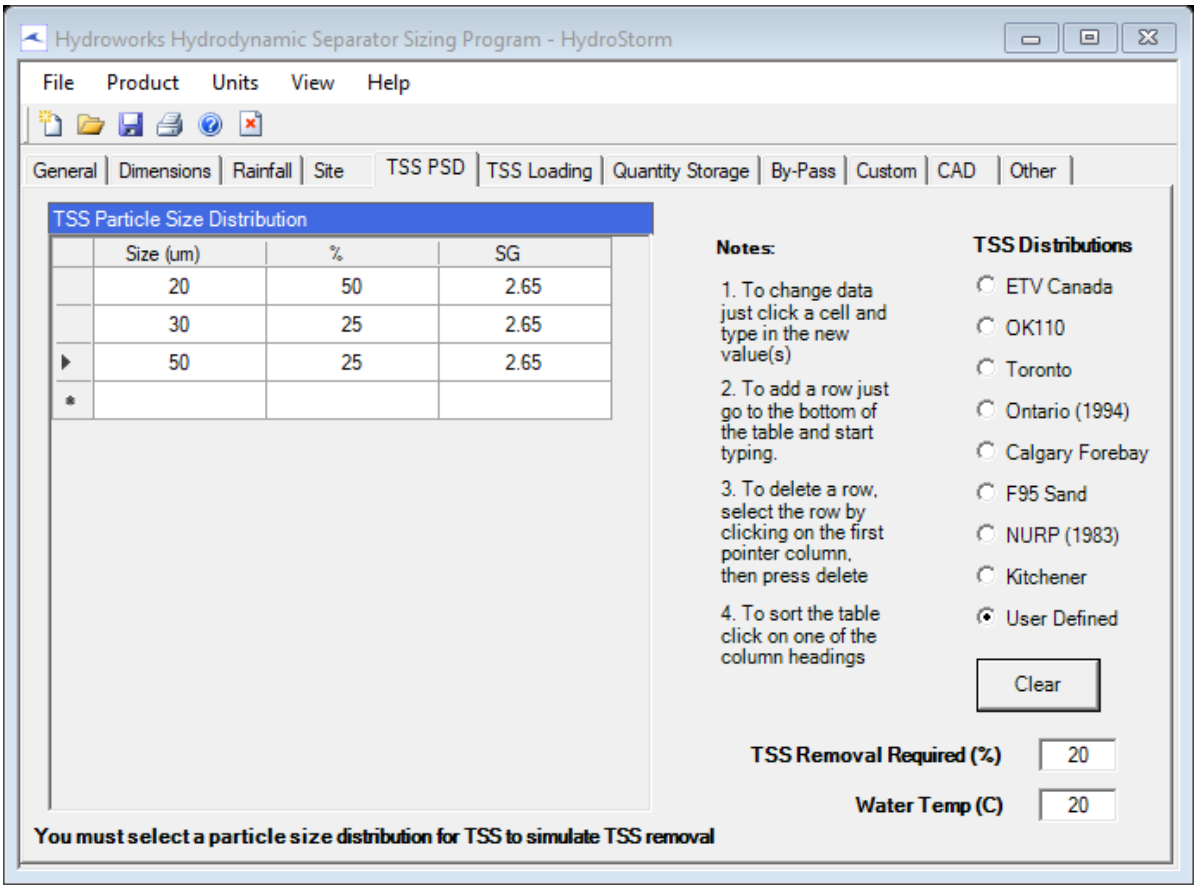
This summary report provides the main parameters that were used for sizing. These parameters are shown on the summary tables and graphs provided in this report.

If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at support@hydroworks.com.

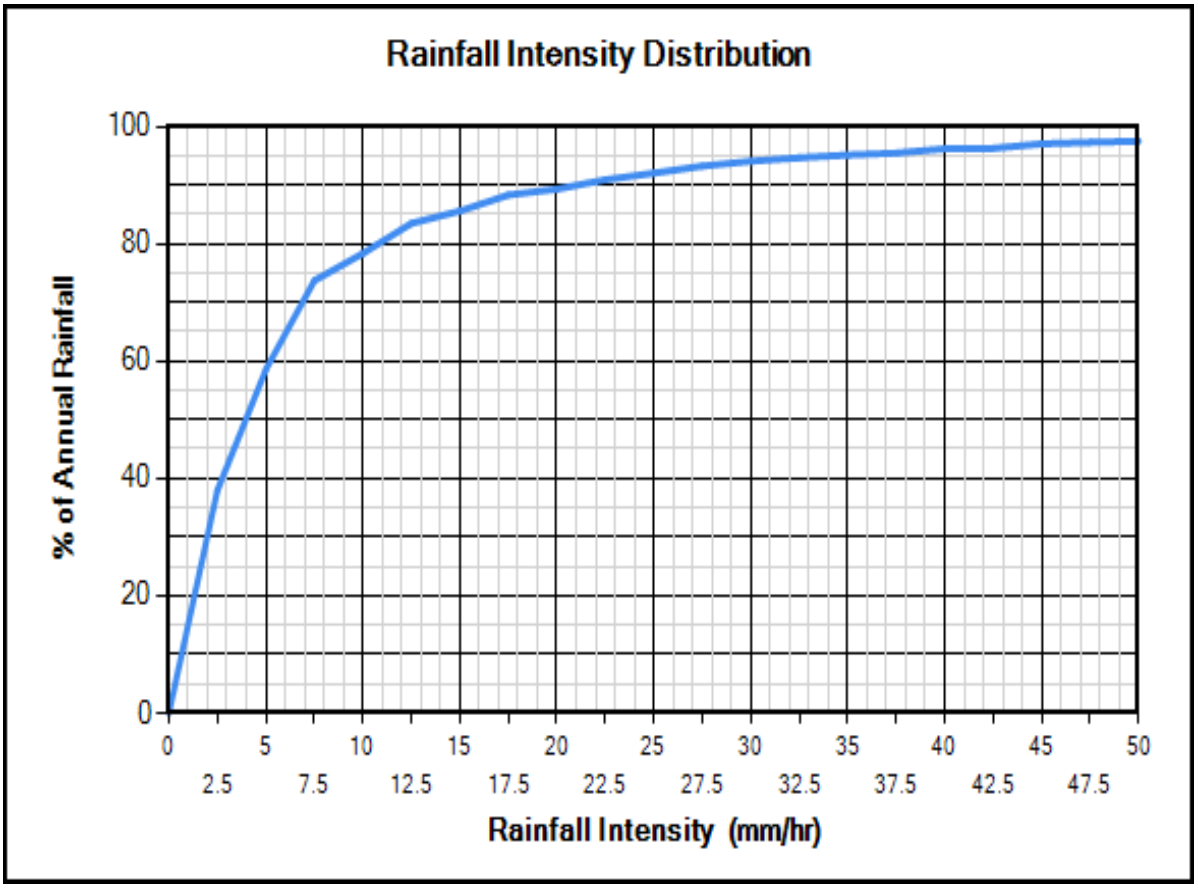
TSS Removal Sizing Summary



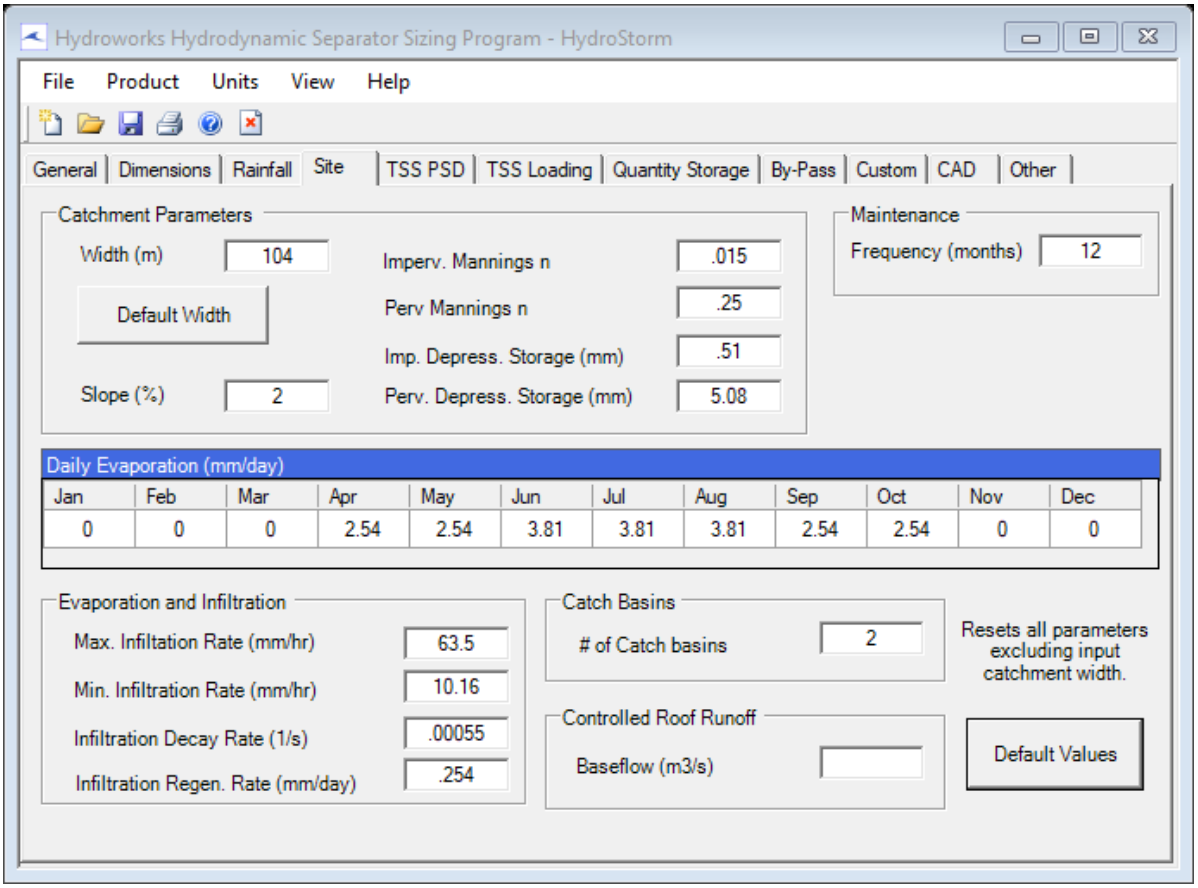
TSS Particle Size Distribution



Rainfall Station - Toronto Central, Ontario(1982 to 1999)



Site Physical Characteristics



Dimensions And Capacities

Hydroworks Hydrodynamic Separator Sizing Program - HydroStorm

File Product Units View Help

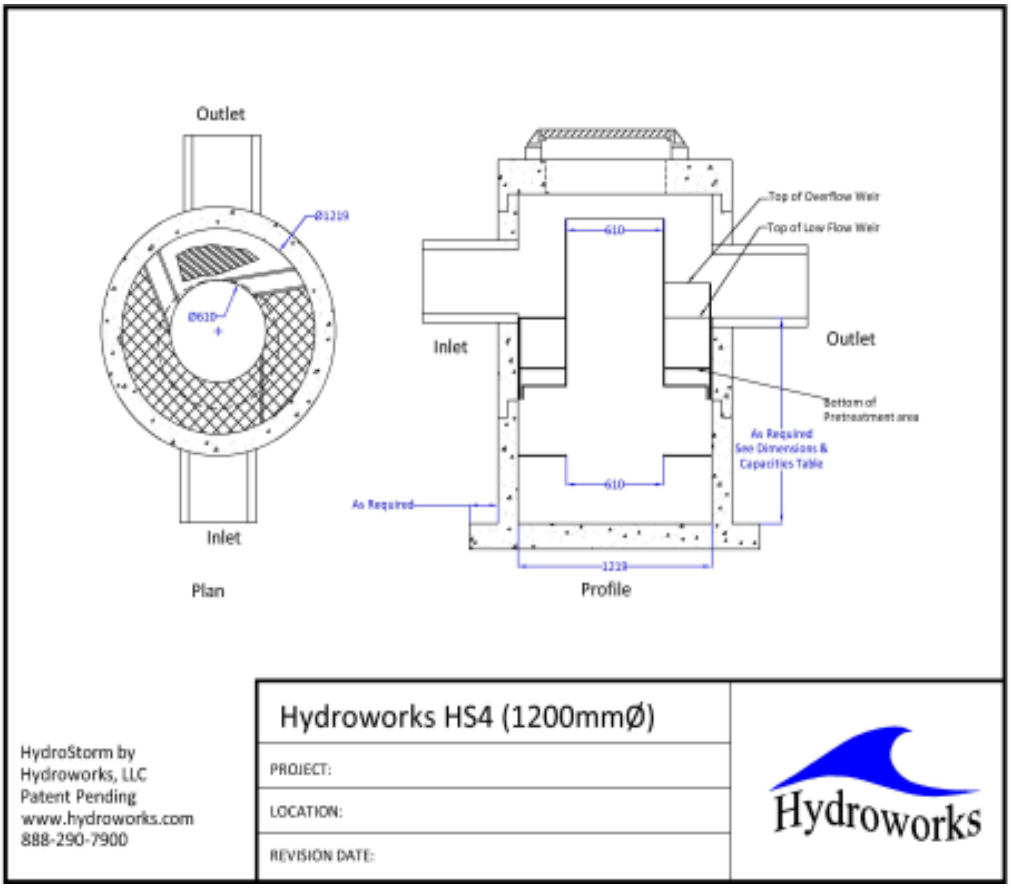
General | Dimensions | Rainfall | Site | TSS PSD | TSS Loading | Quantity Storage | By-Pass | Custom | CAD | Other

Dimensions and Capacities

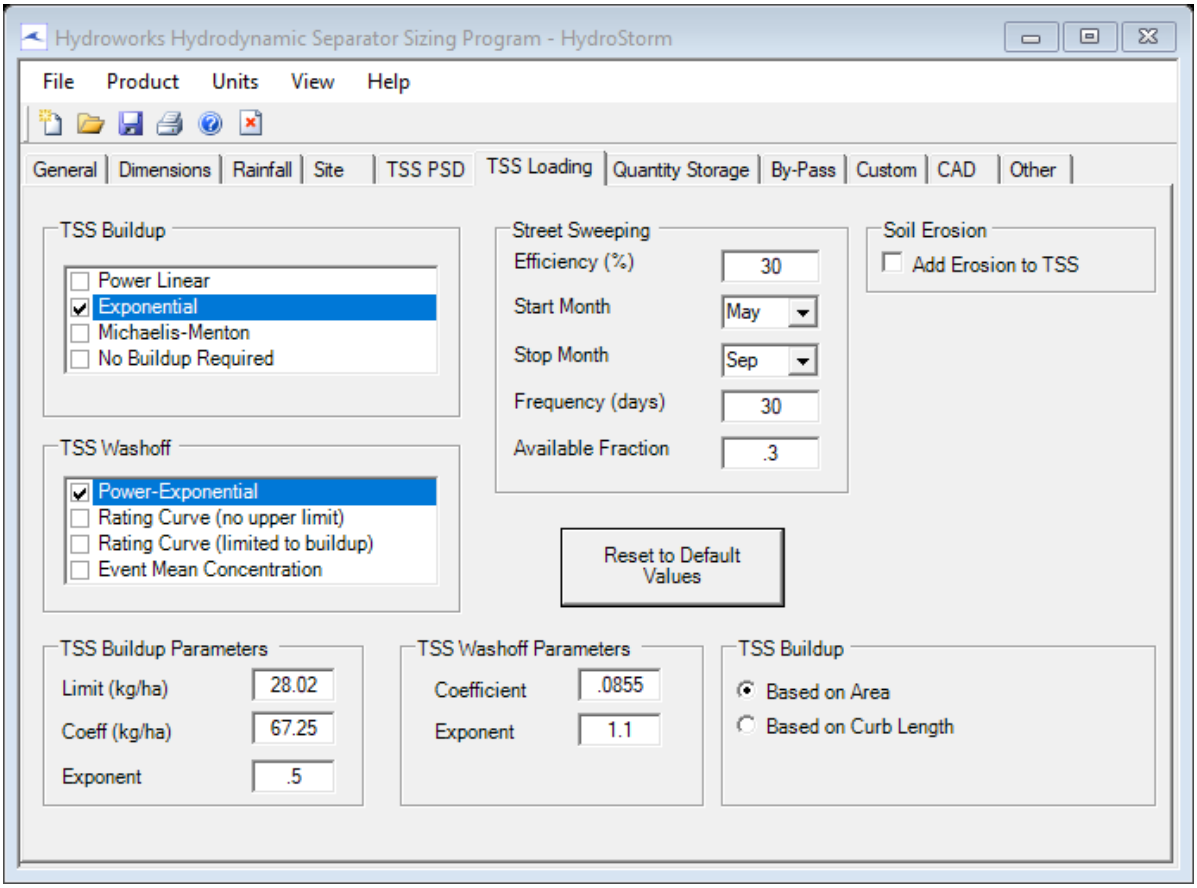
Model	Diam. (m)	Depth (m)	Float. Vol. (L)	Sediment Vol. (m3)	Total Vol. (m3)
HS 4	1.22	1.22	360	0.9	1.4
HS 5	1.52	1.52	625	1.8	2.8
HS 6	1.83	1.83	1022	3.2	4.8
HS 7	2.13	1.98	1552	4.6	7.1
HS 8	2.44	2.13	2328	6.3	10
HS 9	2.74	2.44	3217	9.3	14.4
HS 10	3.05	2.74	4277	13.2	20
HS 12	3.66	3.35	7097	23.8	35.2

Depth = Depth from outlet invert to inside bottom of tank

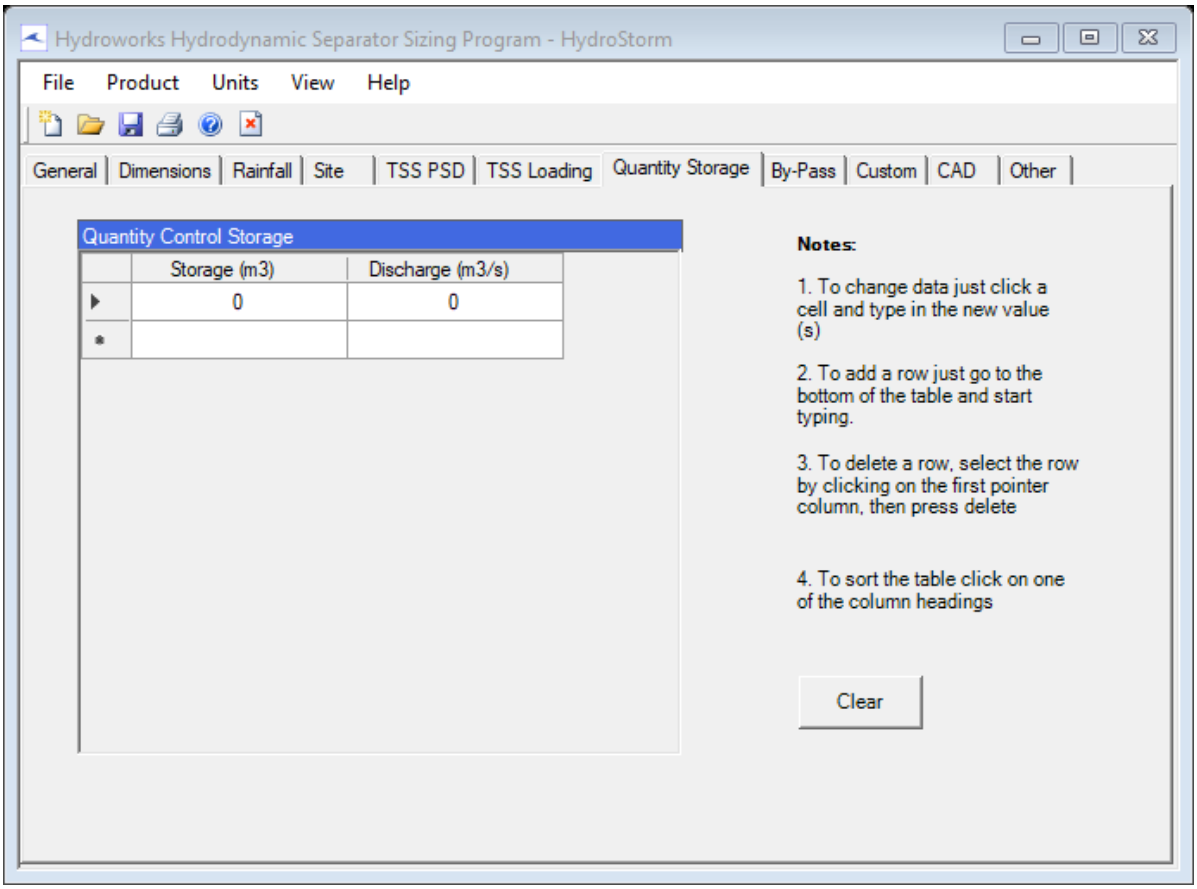
Generic HS 4 CAD Drawing



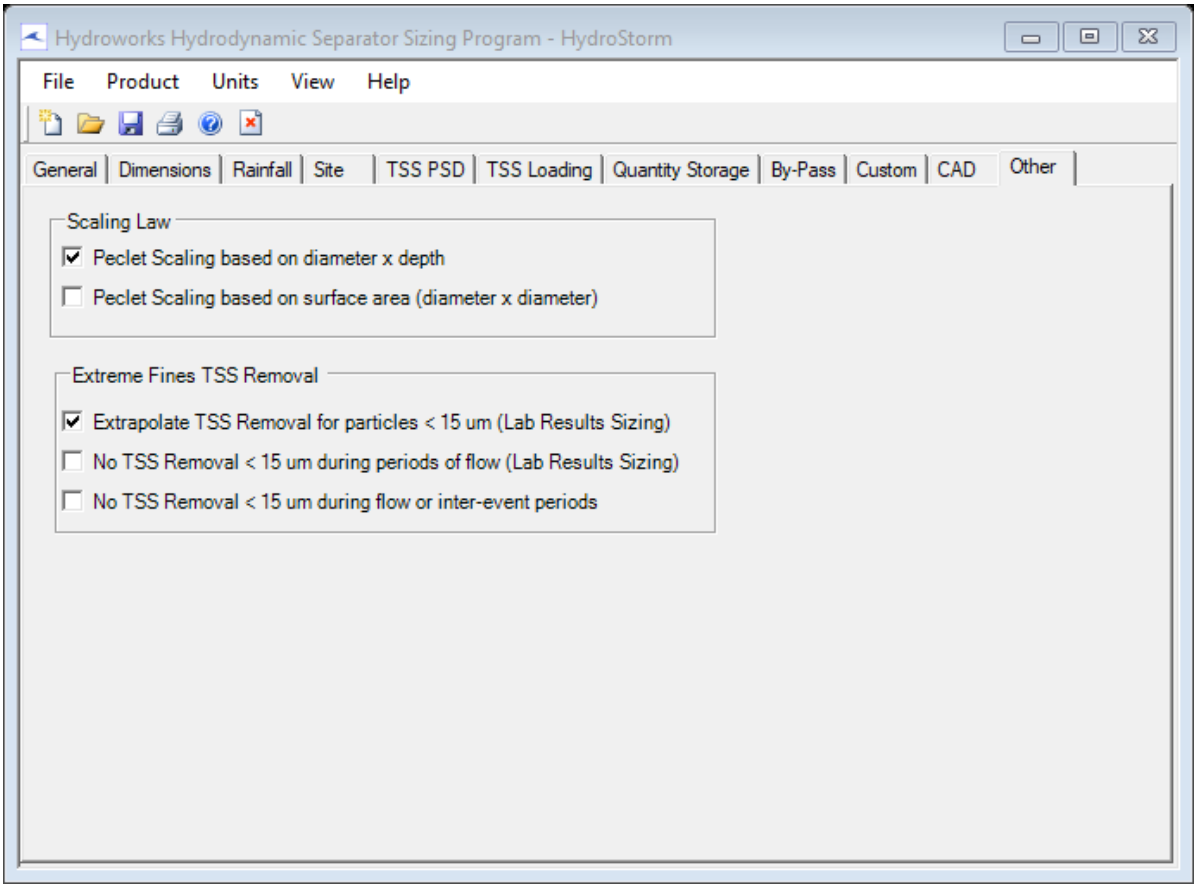
TSS Buildup And Washoff



Upstream Quantity Storage



Other Parameters



Hydroworks Sizing Program - Version 4.9

APPENDIX B

SANITARY SERVICING STUDY
591 LIVERPOOL ROAD
THE PICKERING HARBOUR COMPANY LTD.

Prepared by: Sabourin Kimble & Associates Ltd.

Prepared for: The Pickering Harbour Company Ltd.

Project No.: 91:625:D

Date: October 24, 2012

1.0 Introduction

In May 2012, The Pickering Harbour Company Ltd. commissioned Martindale Planning Services to research the status of various easements on the subject site at 591 Liverpool Road in Pickering. Martindale Planning Services prepared an analysis report on the easements, which is appended to this document. As described in Martindale's report, some of the easements are in favour of the Region of Durham for various sanitary sewers that exist within the site. Sabourin Kimble & Associates Ltd. was retained by The Pickering Harbour Company Ltd. in August 2012 to research the existing municipal sanitary sewers within the subject site to determine if any of the sewers can be relocated to provide a larger area for development of the site.

2.0 Site Description

The subject site is located at the foot of Liverpool Road, bounded by Liverpool Road to the west and Lake Ontario to the south. It was previously the location of a sewage treatment plant, but the plant has been decommissioned; the Liverpool Road Pumping Station is located directly north of the site. The site currently acts as a boat storage area, with an office building.

3.0 Existing and Proposed Sanitary Sewers

There are several sanitary sewers located with the subject site.

A 900mm diameter trunk sewer is located within the western portion of the site and conveys flows northerly to the pumping station. This sewer is on a 6.0 metre wide easement. Within the northwest corner of the site, a 450mm diameter sewer on Liverpool Road connects to this 900mm sewer.

A 750mm diameter emergency overflow sewer extends from the pumping station southerly, bisecting the subject site. This sewer connects to a 900mm diameter sewer that crosses the

site just south of the existing office building, which in turn drains into a 900mm diameter sewer located just east of the Liverpool Road right-of-way. The overflow sewer is also on a 6.0 metre wide easement.

If the emergency overflow sewer were relocated closer to the north and west limits of the subject site, a larger area would be available for development. This could be achieved as shown on Figure 1 enclosed. The proposed sewer would connect to existing sanitary manhole 3A at the north end of the site, and to existing manhole 2 adjacent to Liverpool Road. Because connection would be made at manholes, it would be possible to construct the proposed sewer and decommission the existing sewer without disruption to the availability of the emergency overflow pipe, and without disruption to the pumping station.

According to the design drawings, the existing 750mm overflow pipe within the site is very flat (less than 0.1%). In relocating the pipe, the slope of the pipe could be improved for positive drainage.

4.0 Easements

In a letter dated May 10, 2012, the Region of Durham requested that an additional 3.0 metre wide easement be provided for the 900mm diameter trunk sewer at the west portion of the site. If the emergency overflow sewer is relocated, a 7.0 metre wide easement could be provided between the existing easement and the Liverpool Road right-of-way. This would result in a total easement width of 13.0 metres for the two sewers. A 6.0 metre wide easement should be provided for the relocated sewer at the north limit of the property. The existing 6.0 metre wide easement for the existing overflow sewer could be released when the sewer is decommissioned.

5.0 Recommendations

It is recommended that the 750mm diameter and 900mm diameter emergency overflow sewers that bisect the site be relocated to the north and west limits of the site. A 6.0 metre wide easement should be provided for the relocated sewer at the north limit of the property. A 7.0 metre wide easement should be provided for the relocated sewer along the west limit of the property, between the existing trunk sewer easement and the Liverpool Road right-of-way, providing for 13.0 metres of total easement for two sewers. The existing overflow sewers could then be decommissioned and the existing easement released.

Yours truly,
SABOURIN KIMBLE & ASSOCIATES LTD.

Krista Boyce, P. Eng.

APPENDIX C

SANITARY SEWER DESIGN

				TOTAL AREA	RESIDENTIAL															COMMERCIAL			TOTAL FLOWS	PIPE DESIGN					
					Residential Area		Known Lot Fabric									Cummulative Flows													
Street	Upstream Manhole	Downstream Manhole	Sec Area (ha)	Cumm Area (ha)	Sec Area (ha)	Cumm Area (ha)	Type A Unit Count	Density Per Unit (Type A)	Type B Unit Count	Density Per Unit (Type B)	Type C Unit Count	Density Per Unit (Type C)	Type D Unit Count	Density Per Unit (Type D)	Section Pop.	Cumm. Pop. (P/1000)	Peak Factor	Res. Flow (l/s)	Infiltration Flow (l/s)	Section Area (ha)	Cumm. Area (ha)	Commer. Flow (l/s)	Cumm. Design Flow (l/s)	Pipe	Pipe Size (mm)	Grade (%)	Capacity (l/s)	Velocity (m/s)	Length (m)
	1 A	2 A	1.10	1.10	1.10	1.10	113	1.5	151	2.5	75	3.5	38	4.5	981	0.981	3.8	15.71	0.29	0.14	0.140	0.29	16.28	METRIC	900	0.10	597.22	0.91	

	Liverpool Site-City of Pickering	NOTES P.F. = 1 + 14 / (4 + (pop) ^ 0.5) Q residential = 364 l/p/d Q infiltration = 22,500 l/ha/d Q institution = 112,000 l/ha/d Q commercial = 180,000 l/ha/d	Designed By:
			Checked By:
	March 2020		

SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

EX SAN MH 3
(MOE PROJ. No. I-0106-82
DWG No. 824-G3)
E 75.06
SW 75.06

EX SAN MH 3
(MOE PROJ. No. I-0106-84 DWG No. 2A)
E 68.76
SW 68.81

EX 750ø CONC SAN (EMERGENCY OVERFLOW) TO REMAIN

EX 900ø CONC SAN @ 0.10% TO REMAIN

EXISTING PUMPING STATION

EX SAN MH 2
(MOE PROJ. No. I-0106-84 DWG No. 2A)
E 68.71
SW 68.66

375mm PVC STM

EXISTING MIXED USE

WV

PRIVATE LANE (REGION OF DURHAM)

EX SAN MH 3A
(MOE PROJ. No. I-0106-82
DWG No. 824-G3)
E 75.06
SW 75.06

PREVIOUSLY ABANDONED 750ø CONC SAN

PREVIOUSLY ABANDONED 350ø AC SAN

PROP 50.5 - 750ø CONC
EMERGENCY OVERFLOW SAN @ 0.60%

PRIVATE ROAD

EX CB GRATE

LIMIT OF U/G PARKING

EX SAN MH (DECOMMISSIONED)

PREVIOUSLY ABANDONED 350ø AC SAN

EX CB

EX CB

PROP SAN MH A
E 74.75
S 74.69

RECESSED GROUND FLOOR

AREA DRAIN A1
TOP 76.53

EX 900ø CONC TRUNK SAN @ 0.168% TO REMAIN

AREA DRAIN
A2
TOP 76.53

EX SAN MH I3-97
TOP 76.50
W 71.81
W DROP 69.70
S 68.96
NE 68.90
SE 69.95

3 Storeys

CORE INTO EX MH I3-97 AT INV 69.95 AND ADJUST BENCHING AS PER OPSD 701.021

EX SAN MH I3-108
TOP 76.87
E 72.02
SW 71.88

EX 450ø CONC SAN @ 0.37%

1.5m - 200ø PVC SAN @ 2.00%

SAN PLUG INV 70.00

EX SAN MH
(DECOMMISSIONED)

4 Storeys

5 Storeys

6 Storeys

7 Storeys

8-12th Storeys

15 Storeys

DOM. WM

FIRE WM

WM PLUG (DOM)
WM PLUG (FIRE)

WV

WV

WVHYD

EX 900ø CONC TRUNK SAN @ 0.154% TO REMAIN

LIMIT OF U/G PARKING

EX 750ø CONC EMERGENCY OVERFLOW SAN @ 0.07% TO BE DECOMMISSIONED

AREA DRAIN A4
TOP 76.75

PEDESTRIAN PROMENADE

10m BUFFER

20m BUFFER

LIVERPOOL RD.

EX SAN MH 4
(MOE PROJ. NO. I-0106-82
DWG. NO. 224-G3)
N 75.02

AREA DRAIN
A3 TOP 76.91

NOTE: EXISTING STM SEWERS TO BE REMOVED & DISPOSED OFF-SITE

PROP 81.0m - 900ø CONC EMERGENCY OVERFLOW SAN @ 0.6%

EX 900ø CONC TRUNK SAN @ 0.154% TO REMAIN

3 Storeys

EX 900ø CONC EMERGENCY OVERFLOW SAN @ 1.19% TO BE DECOMMISSIONED

4 Storeys

EX CB
TOP 75.81
SW 75.13

5 Storeys

6 Storeys

7 Storeys

EX 20.0 - 300ø CONC STM @ 0.30%

EX 20.0 - 300ø CONC STM @ 0.30%(INSULATED)

EX CB 2
TOP 75.79
SW 75.13

EX STM I
1200ø PC
TOP 76.94
S 74.99
NW 75.07

8-12th Storeys

NHS SETBACK

EX SAN MH 2
NE 74.19
S 74.16

BUS LOOP

PROPOSED 7.0m EASEMENT

EX CB

EX CB

EX CB

3:1 SLOPE TO MATCH EXISTING

LANDS OWNED BY CITY OF PICKERING

EX 6.0m WIDE EASEMENT TO REMAIN

EX SAN MH
(FROM DWG FROM SRM ENGINEERING)
S 69.71
N 69.11

15 Storeys

PROPOSED LIMIT OF DEVELOPMENT

RECESSED GROUND FLOOR

STM PLUG
INV 75.85

5.0m - 600ø CONC STM @ 0.7%

PROP STM MH OGS
TOP 78.15
N 75.81
S 75.76

EX 59.5 - 525ø CONC STM @ 0.30%

5.2m - 600ø CONC. STM @ 0.7%

PROP 600ø HW
INV 75.72

PROPERTY OWNED BY CITY OF PICKERING

EX STM 2
STC 2000
TOP 76.41
N 74.81
S 74.78

525ø CONC STM @ 0.40%

PROPOSED BIO-SWALE - 20.0m @ 0.30%

FLOODLINE ELEVATION 76.26

0.60ø CULVERT
S INV= 74.71
CONCRETE HEADWALL

CHAIN LINK FENCE

EDGE OF WATER

EX 900ø CONC SAN @ 0.88%

EX SAN MH I2
NE 74.19
S 74.16

EX CB

EX CB

EX CB

HYD

WV

WV

EXISTING NATURAL AREAS

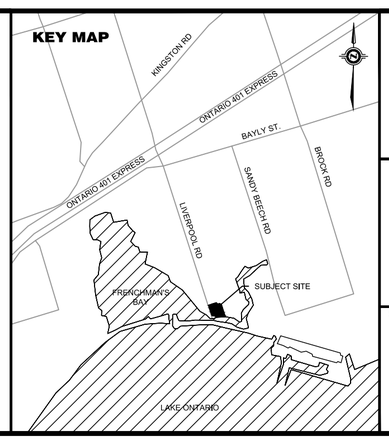
EX SW
INV 74.83
TO BE REMOVED

NATURAL AREAS
(LANDS OWNED BY ONTARIO POWER GENERATION)

KROSNO CREEK

LEGEND

KEY MAP



591 LIVERPOOL RD., PICKERING, ONTARIO

PART 1 - PLAN SHOWING TOPOGRAPHY OF PART OF LOT 22 RANGE 3,
BROKEN FRONT CONCESSION
(GEOGRAPHIC TOWNSHIP OF PICKERING)
NOW IN THE CITY OF PICKERING REGIONAL MUNICIPALITY OF DURHAM

PRELIMINARY SITE SERVICING PLAN

SERVICE AND GRADING DESIGNED BY:

SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

REVISIONS

No.	Description	Date	Int.
8			
7			
6			
5			
4			
3			
2			
1			

PROJECT No.: 17:380

DATE: March 9, 2020

DESIGNED BY: GT

SCALE: 1:300

BUILDING YOUR IDEAS - INTO BIG PLANS
THE BIGLIERI GROUP LTD.
Planning | Development | Project Management
20 Leslie Street, Suite 121, Toronto, Ontario M4M 3L4
Office: (416) 693-9155 Fax: (416) 693-9133
tbg@thebiglierigroup.com

DRAWING No.: **SS-1**

EXISTING PUMPING STATION

EXISTING MIXED USE

PRIVATE LANE (REGION OF DURHAM)

EX 77.30 TW 77.36 BW 77.20 | EX 77.07 TW 77.27 BW 77.12 | EX76.83 TW77.07 BW76.92 | EX76.31 TW76.87 BW76.72

PRIVATE ROAD

RECESSED GROUND FLOOR

LIMIT OF U/G PARKING

24.0m @ 0.8%

15.0m @ 0.9%

EX 77.10 | 77.20 | 77.05 | 76.99 | 76.79 | EX 76.87

A1 76.60 | A2 76.66

EX76.83 | EX 76.92 | EX 76.83 | EX 76.65 | EX 76.59 | 76.85 | EX 76.45 | EX 76.37 | EX 76.34 | EX 76.26 | EX 75.97

LIVERPOOL RD.

3 Storeys | 4 Storeys | 5 Storeys | 6 Storeys | 7 Storeys | 8-12th Storeys | 15 Storeys

A3 76.91 | A4 76.74 | HP 77.08 | 77.03 | 77.04

PEDESTRIAN PROMENADE

BUS LOOP

PROPOSED 7.0m EASEMENT

EX 6.0m WIDE EASEMENT TO REMAIN

LANDS OWNED BY CITY OF PICKERING

3:1 SLOPE TO MATCH EXISTING

TC 76.12 BC 75.97 | TC 76.30 BC 76.15 | 76.23 | 76.28 | 76.65 | 76.46 | EX 76.05

PROPERTY OWNED BY CITY OF PICKERING

SW 75.72 | SW 75.66

PROPOSED BIO-SWALE – 20.0m @ 0.30%

EX76.59 | EX76.67 | EX76.69 | EX76.61

CHAIN LINK FENCE

EDGE OF WATER

PROPOSED LIMIT OF DEVELOPMENT

EX 76.81 | 77.01 | EX76.69 | 76.92 | 10m BUFFER | 20m BUFFER | EX76.77 | EX76.35 | NHS SETBACK | EX76.50 | EX76.60 | EX76.47

FLOODLINE ELEVATION 76.26

EXISTING NATURAL AREAS

NATURAL AREAS

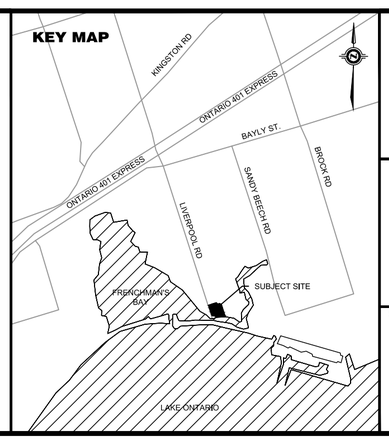
ILANDS OWNED BY ONTARIO POWER GENERATION

KROSNO CREEK

LEGEND

EX 76.26	EXISTING GRADE
76.92	PROPOSED GRADE
SW 75.66	PROPOSED SWALE GRADE
	PROPOSED BIO SWALE & SLOPING

KEY MAP



591 LIVERPOOL RD., PICKERING, ONTARIO

PART 1 - PLAN SHOWING TOPOGRAPHY OF PART OF LOT 22 RANGE 3, BROKEN FRONT CONCESSION (GEOGRAPHIC TOWNSHIP OF PICKERING) NOW IN THE CITY OF PICKERING REGIONAL MUNICIPALITY OF DURHAM

PRELIMINARY SITE GRADING PLAN

SERVICE AND GRADING DESIGNED BY:

SABOURIN KIMBLE & ASSOCIATES LTD. CONSULTING ENGINEERS

REVISIONS

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