

**FUNCTIONAL SERVICING REPORT
2055 BROCK ROAD
BROCK ROAD DUFFINS FOREST INC.
CITY OF PICKERING
REGIONAL MUNICIPALITY OF DURHAM**



This document is intended for preliminary review in support of Official Plan Amendment, Zoning By-Law Amendment and Draft Plan of Subdivision Application for Brock Road Duffins Forest Inc. only and shall not be relied upon for construction or bidding purposes.

Prepared By: Sabourin Kimble & Associates Ltd.

Prepared For: Brock Road Duffins Forest Inc.

Project Number: 19:411

Date: March 2020, Revised December 2021, Revised September 2022

**FUNCTIONAL SERVICING AND SWM REPORT
2055 BROCK ROAD
CITY OF PICKERING**

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	STUDY AREA	2
3.0	STORM DRAINAGE.....	4
3.1	Existing Site Drainage	4
3.2	Post Development Conditions	4
3.3	Service Connections.....	4
4.0	STORMWATER MANAGEMENT.....	7
4.1	General.....	7
4.2	Regional Floodline	7
4.3	Water Balance	9
5.0	SANITARY DRAINAGE.....	9
5.1	Existing Conditions	9
5.2	Proposed Sanitary Servicing	10
5.2.1	Design Flow.....	10
5.3	Service Connections.....	11
6.0	WATER SUPPLY	12
6.1	Existing Water Supply Infrastructure	12
6.2	Proposed Water System.....	12
6.3	Service Connections.....	12
7.0	SITE GRADING.....	13
8.0	SEDIMENTATION CONTROL MEASURES	14
9.0	UTILITIES.....	15
10.0	CONCLUSIONS	16

**FUNCTIONAL SERVICING AND SWM REPORT
2055 BROCK ROAD
CITY OF PICKERING**

LIST OF FIGURES

FIGURE 1 - STUDY AREA	3
FIGURE 2 - EXISTING SITE CONDITIONS	5
FIGURE 3 - PROPOSED SITE CONDITIONS	6
FIGURE 4 - REVISED REGIONAL FLOODLINE	8
SS - Preliminary Site Servicing Plan	(back pocket)
GR - Preliminary Site Grading Plan	(back pocket)
ESC 1 - Sedimentation Control Plan	(back pocket)
ESC 2 - Sedimentation Control Plan Details	(back pocket)

LIST OF APPENICES

- Appendix A - Storm Design Sheet
- Appendix B - Excerpts from Relevant Studies
- Appendix C - Sanitary Design Sheet

**FUNCTIONAL SERVICING AND SWM REPORT
2055 BROCK ROAD
CITY OF PICKERING**

LIST OF TABLES

TABLE 1: POPULATION DENSITIES - KNOWN LOT CONFIGURATIONS 10

1.0 INTRODUCTION

Sabourin Kimble & Associates (SKA) has been retained by Brock Road Duffins Forest Inc. to carry out a Functional Servicing and Stormwater Management Report (FSSR) for 2055 Brock Road, located within City of Pickering. 2055 Brock Road will be referred to in this report as the “subject site”.

The purpose of this FSSR is to provide municipal servicing information to address stormwater management, storm drainage, sanitary drainage, water supply, and grading for development of the subject site in support of site plan approval. This report has been prepared in keeping with the criteria and constraints outlined by the following previously approved reports:

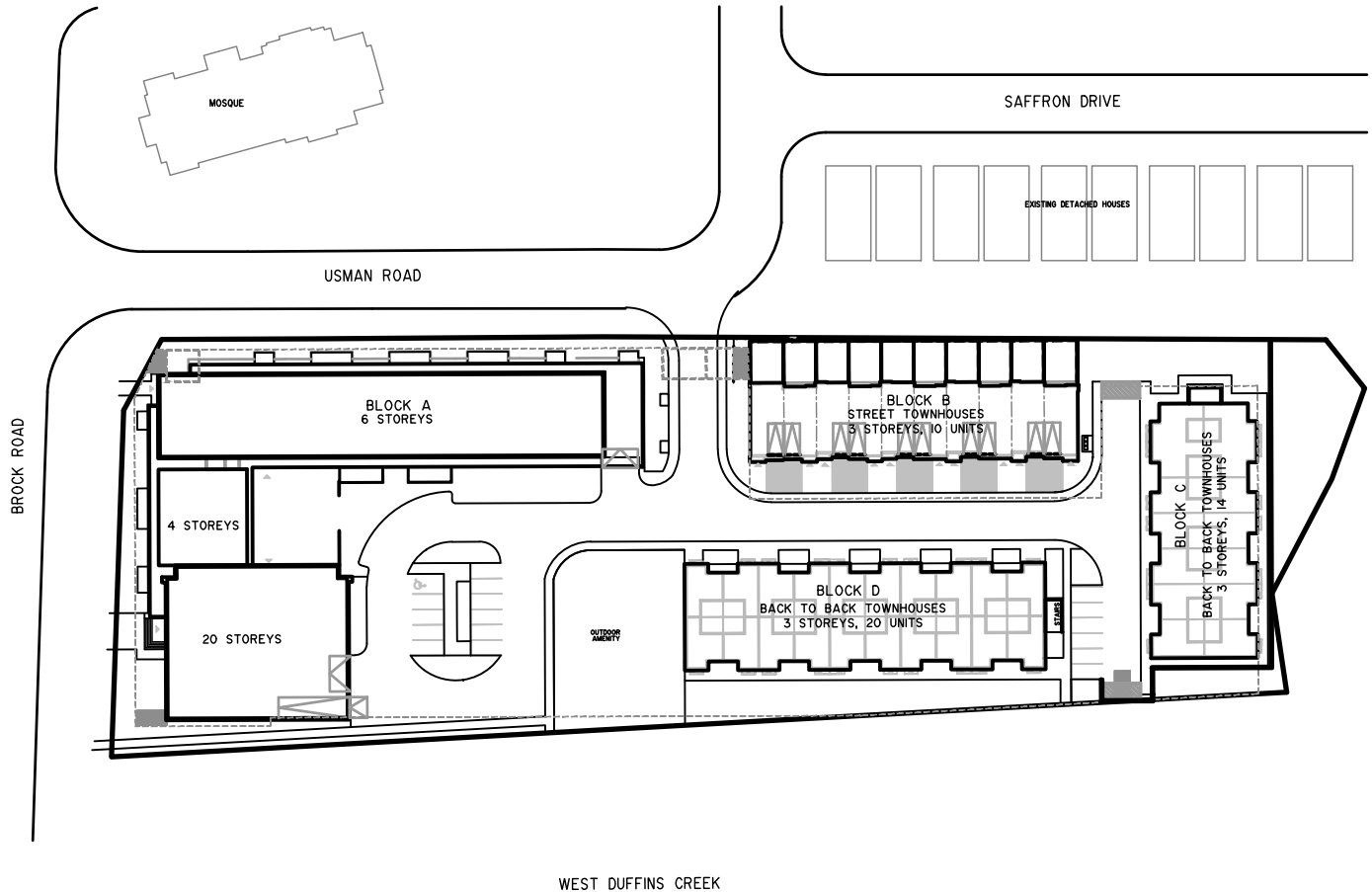
- Environmental Servicing Plan Update for the Duffins Precinct, Southern Lands, City of Pickering prepared by Sernas Associates (November 2012)
- Functional Servicing and Stormwater Report (FSSR) for the Kindwin Lands, City of Pickering, prepared by Sernas Associates (December 2012)
- Stormwater Management Report for the Kindwin Lands, City of Pickering, prepared by GHD Inc. (February 2015)

2.0 STUDY AREA

The subject site is located in the City of Pickering, Regional Municipality of Durham. The aforementioned previous servicing studies conducted by The Sernas Group for the development of the Duffins Precinct and the FSSR for the proposed Kindwin Lands determined the servicing potential of the subject site. Additionally, the SWM report for Kindwin Lands was consulted for all specific stormwater management requirements. The subject site is bounded by Usman Road to north, East Duffins Creek to the east, West Duffins Creek to the south and Brock Road to the west.

Figure 1 – Study Area, shows the location of the study area with reference to the surrounding land parcels including the road pattern, development areas, and limits of development.

Based on the proposed site plan for the subject site, this land will be developed as one high-rise complex and 44 townhouse units.



STUDY AREA



PROJECT NUMBER
19.411

FIGURE NO.
1

3.0 STORM DRAINAGE

3.1 Existing Site Drainage

The Subject Site is approximately 1.3 hectares in size and is located within the West Duffins Creek subwatershed. Under existing conditions, approximately 0.89 hectares drain southeasterly directly to the West Duffins Creek. The remaining portion of the site (0.42 hectares) drains northerly towards the existing subdivision, which drains to the East Duffins Creek. Please refer to Figure 2 for an illustration of the existing drainage.

3.2 Post Development Conditions

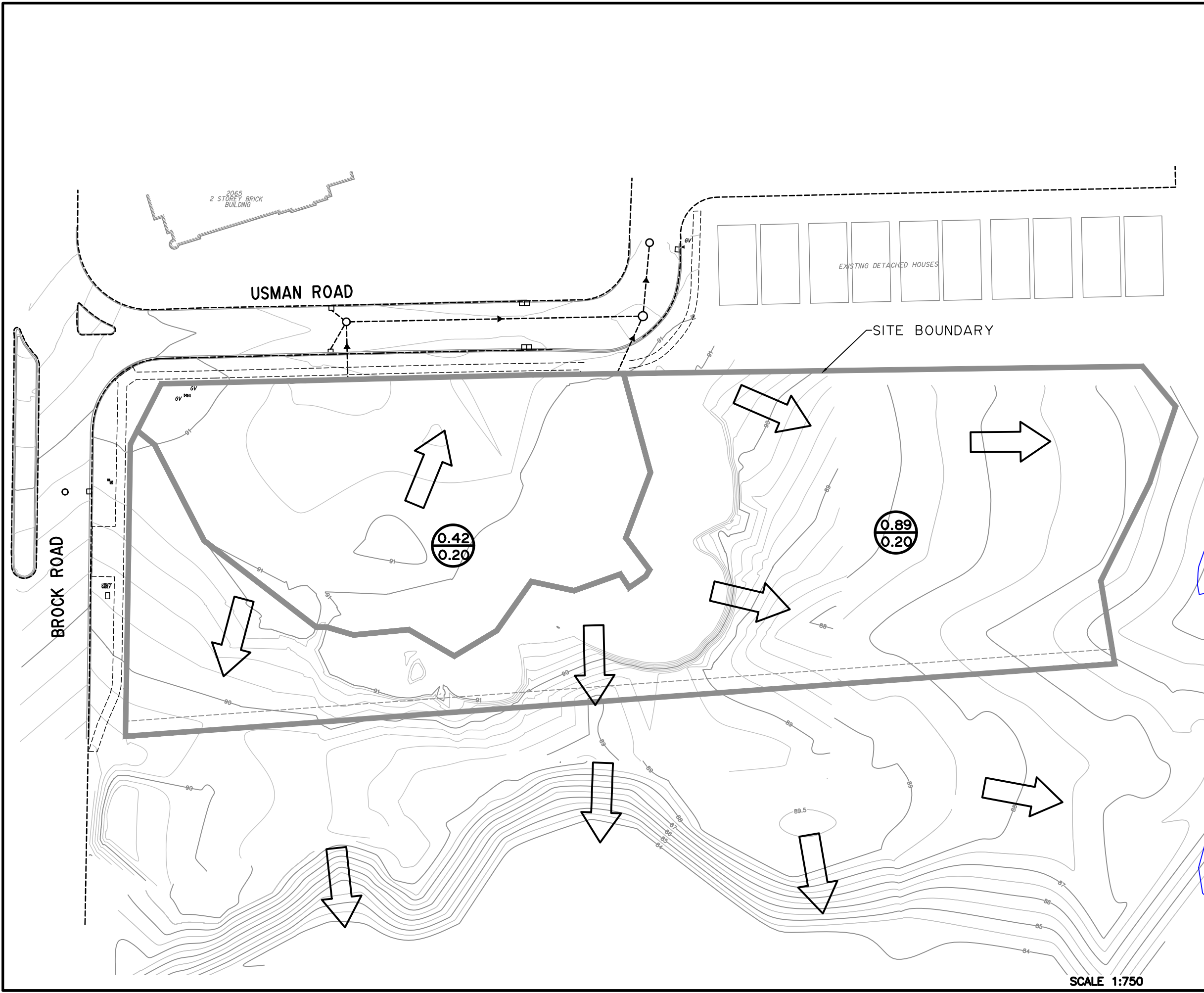
It was established in the aforementioned ESPU that the subject site should direct all roof drainage towards the existing wetland located southeast of the property limit to meet the water balance requirements. It was also determined that the SWM pond designed for the Kindwin Lands would be sized to accept the minor system drainage from the subject site and that the major system drainage would be conveyed directly from the subject site to the West Duffins Creek. This was further confirmed by the Stormwater Management Report for the Kindwin Lands. See Appendix A for the Storm Design Sheet.

A total roof drainage area of 0.52 hectares is available to be (0.26 hectares from the high-rise and 0.26 hectares from the townhomes) directed via a clean water collector (CWC) system to the existing wetland at the southeastern limit of the development. To avoid point source contributions to the wetland, a plunge pool and flow spreader are proposed for the outfall of the CWC. The remainder of the minor system drainage will be conveyed to the existing Kindwin SWM pond per the assumption made by the ESPU for Kindwin lands. Also in keeping with the ESPU, all major system flows will be directed directly to the West Duffins Creek as overland flow as per Figure 3. See Section 4.0 for further details.

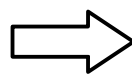
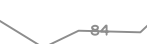


3.3 Service Connections

The foundation drains for the townhouse dwellings and high-rise complex will be connected to the CWC. All storm service connections will be constructed in accordance with municipal, regional and Ontario Building Code standards. As previously mentioned, all roof leaders will also be connected to the CWC.

CAD FILE: P:\19\411\Drawing Files\Phase 1\Figures\411 Drainage Figs.dwg



LEGEND

-  OVERLAND FLOW DIRECTION
-  GROUND ELEVATION CONTOUR
-  EXISTING CATCHBASIN
-  AREA (HECTARES)
RUNOFF COEFFICIENT

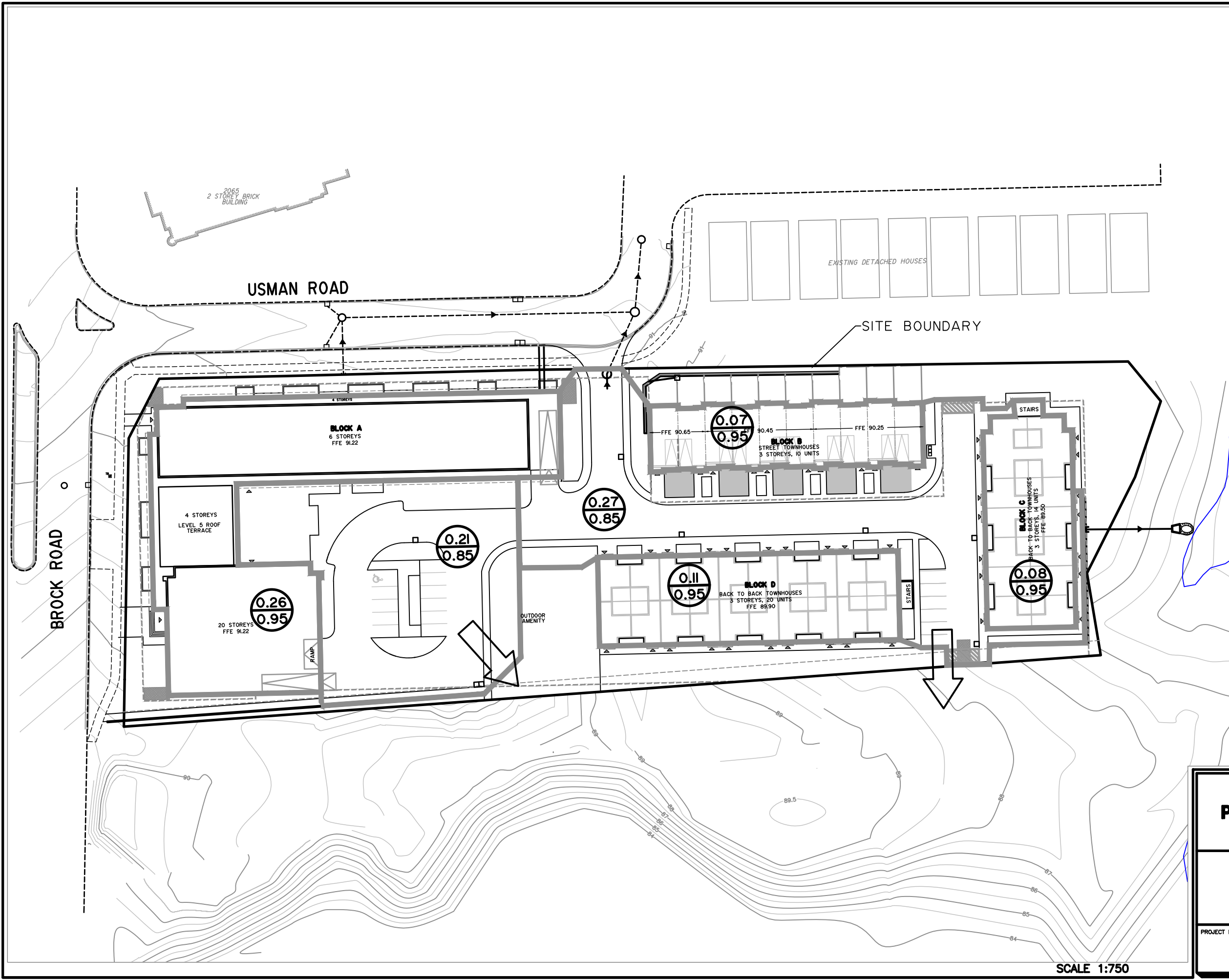
**2055 BROCK ROAD
EXISTING DRAINAGE PLAN**

SKA SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER 19,411	FIGURE NO. 2
---------------------------------	------------------------

SCALE 1:750

CAD FILE: P:\19\411\Drawing Files\Phase 4\11 Drainage Figs.dwg



LEGEND

- MAJOR SYSTEM FLOW DIRECTION
- GROUND ELEVATION CONTOUR
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN
- MINOR SYSTEM FLOW DIRECTION
- AREA (HECTARES)
RUNOFF COEFFICIENT

**2055 BROCK ROAD
PROPOSED DRAINAGE PLAN**

SKA SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER 19,411	FIGURE NO. 3
---------------------------------	------------------------

SCALE 1:750

4.0 STORMWATER MANAGEMENT

4.1 General

The stormwater management criteria for the subject site was established by the previous FSSR and SWM Brief for the Kindwin Lands, as previously mentioned. The criteria outlined in these reports was in keeping with the City of Pickering and the Toronto and Region Conservation Authority (TRCA) criteria at the time of their approval.

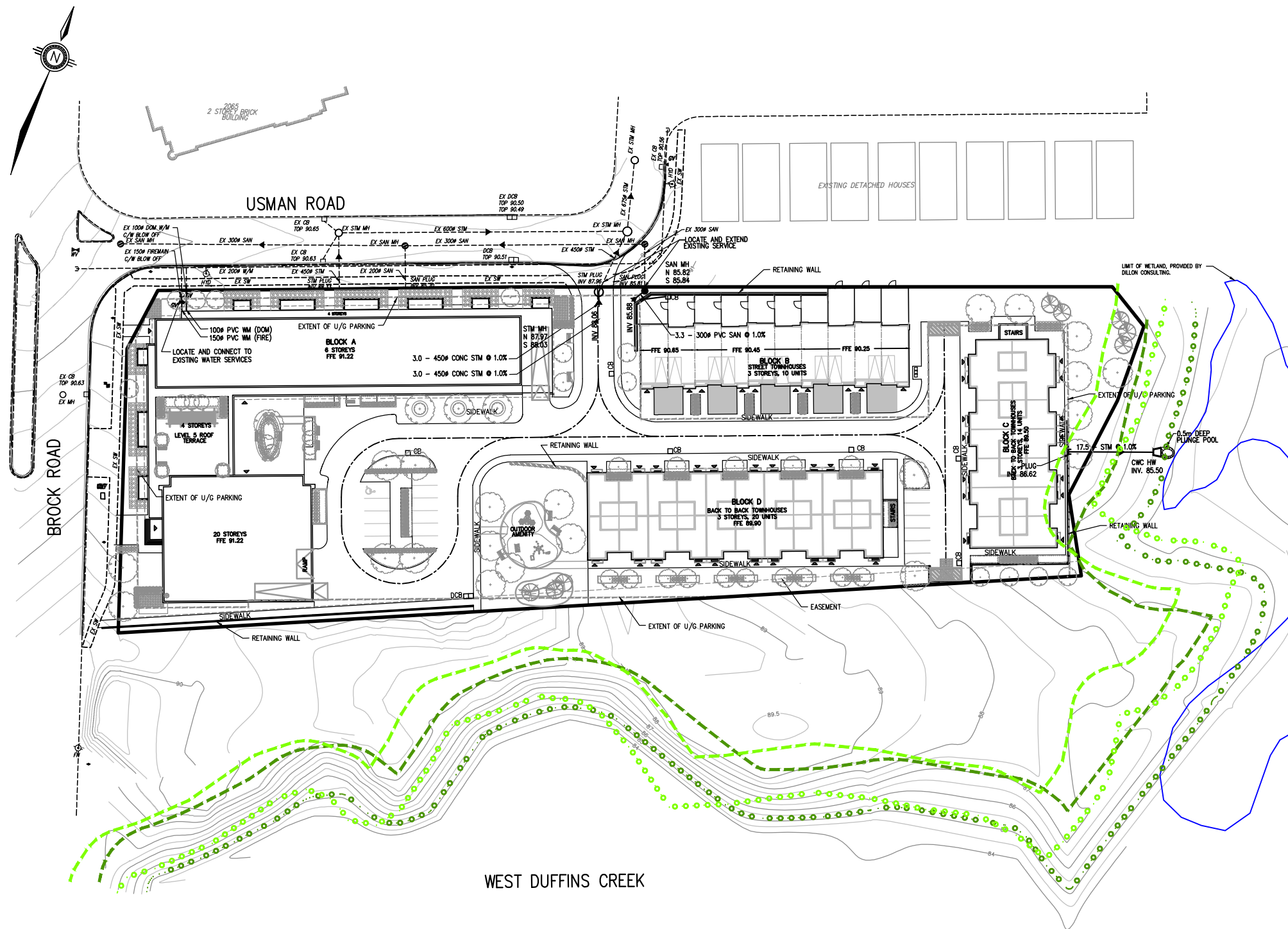
Under proposed conditions, the subject site will ultimately drain to the West Duffins Creek. All minor system flow will be conveyed to the existing stormwater management pond servicing the Kindwin Lands, which then discharges to West Duffins Creek. Major system flows will be conveyed directly to the creek, as specified in the Stormwater Management Report for the Kindwin Lands. The drainage from all roofs and foundations will be collected into a clean water collector and discharge to the existing wetland.

The existing Kindwin stormwater management pond has been designed to provide sufficient permanent pool and extended detention volumes to meet the quality and erosion control requirements for the tributary drainage area, which is inclusive of the subject site. Since the West Duffins Creek has no quantity control requirements, all flows above the erosion flow will be discharged directly from the subject site to the creek. Preliminary calculations based on the rational method have been completed and the estimated overland flow to the Duffin Creek under the 100 year storm-event is 0.144 m³/s. Calculations for the overland peak flow have been included in Appendix A and excerpts from the Kindwin SWM report have been included in Appendix B.

4.2 Regional Floodline

The Regional Flood line was obtained from the TRCA for the West Duffins Creek Tributary adjacent to the subject site and was overlaid onto SKA's existing ground-based topographic information. As shown on Figure 4 – Revised Regional Floodline, the TRCA Regional Floodline conflicted with the ground-based topographical information. To increase the accuracy of this floodline, the MIKE flood model output for this section of the West Duffins was obtained from the TRCA to determine the Regional water surface elevation adjacent to the subject site, which was found to be 85.20m. The more accurate “SKA revised Regional Floodline” was then plotted onto Figure 4 as well, and the 10m hazard buffer was regenerated to show that all proposed works are outside of this buffer.

CAD FILE: P:\19\411\Drawing Files\Phase 1\411 Base.dwg



LEGEND:	
○	STORM MANHOLE
●	SANITARY MANHOLE
□	CATCHBASIN MANHOLE
□	CATCHBASIN
□	DOUBLE CATCHBASIN
⊕	HYDRANT AND VALVE
⊗	VALVE AND BOX
⊗	VALVE AND CHAMBER
⊗	STORM SANITARY WATER
⊗	SERVICE CONNECTIONS
▭	PROPOSED DRIVEWAY
⋯	SKA REVISED REGIONAL FLOODLINE
—	SKA REVISED 10m BUFFER
⋯	TRCA REGIONAL FLOODLINE
—	TRCA 10m BUFFER

2055 BROCK ROAD
REVISED REGIONAL FLOODLINE



PROJECT NUMBER	FIGURE NO.
19:411	4

SCALE 1:1000

4.3 Water Balance

As outlined in the detailed water balance assessment (section 3.4.6 of the ESPU), the infiltration volumes were calculated for the pre-development and post-development conditions at a regional scale which was inclusive of all the southern lands of Duffins Precinct. The total infiltration deficit (11,600 m³/a) was then pro-rated for each property (i.e. the total target multiplied by the area of the property divided by total area of all 3 development blocks). The post-development infiltration target for 2077/2095 Brock Road and 2055 Brock Road (the subject site) were estimated to be 5,765 m³/a and 1,240 m³/a respectively. An excerpt from the ESPU has been included in Appendix B. However, the ESPU identified that 2077 Brock Road would be responsible for providing the required infiltration volume for 2055 Brock Road on-site in addition to providing their respective infiltration volume. This compensation was predicated on 2055 Brock Road directing all available roof runoff (0.42ha) to the wetland located southeast of the subject site.

Per the TRCA's request, an additional 30% of roof area can be directed towards the wetland as a contingency measure. Based on the detailed design SWM brief for the Kindwin lands, a total roof area of 0.32ha was required to be directed to the wetland and an additional 30% area would equate to 0.42ha. The proposed roof area available within the subject site is 0.52ha, therefore the 30% additional contributing area is possible to be directed to the wetland. This will be evaluated further at detailed design. Calculations for the roof top contributing drainage area is provided in Appendix A.

5.0 SANITARY DRAINAGE

5.1 Existing Conditions

Existing sanitary sewers are located on Usman Road. Sanitary drainage from the Study Area will drain to the 300mm sanitary sewer on Usman Road which was sized to accommodate sanitary drainage from this site. The sanitary sewer along Usman Road drains sanitary sewage to an existing trunk sewer located beneath Brock Road which is immediately to the west of the Study area.

5.2 Proposed Sanitary Servicing

5.2.1 Design Flow

In accordance with Region of Durham design guidelines, residential sewage flows shall be calculated on the basis of the following for residential areas

- Residential Average Flow – 364 litres/person/day
- Commercial Flow – 180,000 litres/gross floor area ha/day
- Infiltration – 22,500 litres/gross hectare/day when foundation drains are not connected to the sanitary sewer. Calculated on the number of gross hectares of residential lands tributary to the sanitary sewer systems.

All sanitary sewers shall be sized to handle the theoretical daily peak flow, where the peaking factor for sanitary drainage is calculated as follows:

$$\text{Peaking Factor, } K_H = 1 + \frac{14}{4 + P^{1/2}}$$

Where, P is population in thousands

K_H is the Harmon peaking factor, maximum of 3.8 and minimum of 1.5

The number and type of housing units within this development is known, therefore the calculation of population for the proposed development shall be based on the following:

Table 1: Population Densities - Known Lot Configurations

<u>Type of Housing</u>	<u>Persons Per Unit</u>	<u>Resultant Populations</u>
Townhouses	3.0	3 * 44 = 132
Apartments		
1 Bedroom	1.5	1.5 * 189 = 283
2 Bedroom	2.5	2.5 * 159 = 398
3 Bedroom	3.5	3.5 * 24 = 84

Based on the design flow, the minimum sewer size and gradient are calculated using Manning's Formula on the basis of full flow pipes. The sewer infrastructure located internal to the site will be privately owned and maintained with a control manhole located close to the where the sewer connects to the municipal sewer on Usman Road.

Sanitary servicing will be provided by proposed private local sanitary sewers within the common element roadway. The proposed sewers will drain to the existing 300mm diameter sanitary sewer on Usman Road. See Appendix C for the Sanitary Design Sheet.

5.3 Service Connections

Residential sanitary service connections will be constructed in accordance with regional and Ontario Building Code standards. In particular, all sanitary sewer service connections where multiple units will be serviced by one connection will be 200mm in diameter, minimum 2.0% gradient and a minimum of 2.0m deep, townhouse dwellings that require individual service connections shall be 100mm in diameter, minimum 2.0% gradient and minimum 2.0m depth. Connections to the main sewer shall be made with an approved manufactured tee or approved saddle.

6.0 WATER SUPPLY

6.1 Existing Water Supply Infrastructure

Water servicing for the proposed development will be provided by the Ajax Water Supply Plant. Water servicing for the site will be supplied from an existing 200mm watermain along Usman Drive which is fed by the existing 400mm watermain under Brock Road. The external watermain on Usman Road has been sized to service this development site and separate existing water service and fire supply plugs have been provided to the sites property line.

6.2 Proposed Water System

Proposed watermain servicing is illustrated in Figure SS – Preliminary Site Servicing Plans (located in back Pocket). The water distribution system shall be designed to meet Regional standards within the Subject Site for residual pressure under maximum hourly demand (40psi) as well as maximum daily demand plus fire flow (20psi). Proposed water mains shall be sized during detailed engineering design to meet water usage with adequate flow and adequate residual pressure. The water service and fire service will connect to the existing watermain plugs provided on Usman Road at the sites northern boundary. The water service provided will pass through a water meter complete with a backflow preventer before residential distribution.

6.3 Service Connections

Minimum sized service connections will be used in accordance with Region of Durham standards. All service connections to private properties for freehold residential dwellings shall be a nominal size of 19mm diameter type “K” copper water mains. Service connections for multiple family dwellings shall be sized to provide capacity equivalent to a 19mm diameter connection to each unit. Service connections for the residential blocks, and commercial areas shall be sized according to the intended use.

7.0 SITE GRADING

In accordance with road design grading criteria, the minimum desirable gradient on all roadways is 0.5%, and the maximum gradient on all roadways is 5.0%. Lot grading criteria requires a minimum swale grade of 2% and the maximum swale grade of 5.0%.

Road and parking structure grading has been designed to ensure all drainage is self contained and directed to appropriate storm sewer catchment devices. To contain 5 year storm site drainage the proposed ground level is elevated above the external existing grades on the south and west sides of the site which require several retaining walls. To convey overflow in excess of the 5 year storm, two drainage routes have proposed. See the preliminary site Grading Plan, Figure GR located in the back pocket.

8.0 SEDIMENTATION CONTROL MEASURES

There is existing residential properties and open space adjacent to the subject site. These environmental features and residential properties must be adequately protected from damage due to sedimentation runoff during construction.

During construction of any portion of the subject site, adequate erosion and sedimentation controls must be implemented to safeguard them against potential damage. In support of the detailed design for any development proposal, a comprehensive construction erosion and sedimentation control plan should be prepared in accordance with Pickering design standards. Works such as diversion swales, controlled stripping/earthworks practices, undisturbed buffers, rock check dams and catchbasin/storm sewer sediment traps should be implemented. In support of the erosion and sedimentation control plan, a Construction Management Plan and maintenance protocol should also be established.

The construction implementation plan and maintenance protocol should be completed in accordance with the Erosion and Sedimentation Control Guideline for Urban Construction, December 2006, which was created in cooperation with the greater Golden Horseshoe Area Conservation Authorities.

Sedimentation control practices will be implemented for all construction activities within the subject site, including during tree removal, topsoil stripping, underground sewer construction, road construction and house construction. Sedimentation control measures are to be installed and operational prior to any construction activity, and are to remain in place until such time that the residential dwellings are constructed and the lot grading complete with established sod.

9.0 UTILITIES

Utilities will be provided to the site by extending services from Brock Road to the east or Usman Road to the south or by adding additional infrastructure if it is required. Locations of services will be determined by the respective utility companies for hydro, gas, Bell, cable, etc.

10.0 CONCLUSIONS


Based on the information we have reviewed concerning this site, we find that the grading and servicing of the proposed development can be completed while generally adhering to the applicable Municipal and Regional standards.

The Site can be serviced using existing storm and sanitary sewers which have been sized and constructed to receive runoff from the proposed development. Domestic and Fire water supply services can be provided by the existing watermains located on Brock Road and Usman Road.

The site can be graded to contain site drainage with a limited amount of encroachment on the property to the south and will not exceed the maximum or minimum permissible grades. Overall the site will be in a cut condition.

Storm water management will be provided by an existing SWM pond located downstream of the site. The existing SWM pond was sized to handle the minor system runoff from the site. The major system flows will discharge directly to the Duffins Creek. The water balance and infiltration will be completed using LID design to match pre-development conditions. A clean water collector will convey rooftop drainage from all roof areas within the subject site and discharge them to a plunge pool and flow spreader at the east limit of the property, providing supplemental drainage to the existing wetland feature.

Appendix A
Storm Design Sheet

PROJECT TITLE:	2055 Brock Road		STORM SEWER DESIGN SHEET 5 - YEAR STORM PICKERING TOWNSHIP - REGION OF DURHAM DATE: OCTOBER 2021																			
PROJECT No.:	19:411																					
CLIENT:	Brock Road Duffins Forest Inc.																					
ISSUED FOR:	Second Submission FSSR																					
NOTES, STANDARDS AND DESIGN INPUT PARAMETERS																						
Captured Overland Flow = Q(100yr) - Q(5yr)			IDF Parameters:																			
Inlet Time (mins): 10.00			Storm: A B C			$I_{YR} = \frac{A}{(t + B)^C}$																
Run-off Coefficients: Paved Areas 0.85			5 - Year 1082.901 6.007 0.837																			
			25 - Year 1581.718 6.007 0.848																			
			100 - Year 2096.425 6.485 0.863																			
PROPERTY	Upstream Manhole	Downstream Manhole	A Developent Capture (ha)	A x R This Section (ha)	Acc. AR (ha)	t (min)	I (5yr) (mm/hr)	Q (5yr) (l/s)	I (25yr) (mm/hr)	Q (25yr) (l/s)	I (100yr) (mm/hr)	Q (100yr) (l/s)	Q(design) (l/s)	Type	Pipe (mm)	Grade (%)	Capacity (l/s)	Length (m)	Velocity (m/s)	Time (min)	Total Time (min)	Capacity (%)
2055 Brock Road	1	ExMH	0.48	0.408	0.408	10.00	115.82	131.26	175.42	198.82	252.79	286.49	131.26	CONC	450	1.00	297.43	45.5	1.81	0.42	10.42	44%

**Major Overland Flow
2055 Brock Road
City of Pickering
05/10/2021**

Storm Intensity Curve	2-year	5-year	25-year	100-year
A	715.076	1082.901	1581.718	2096.425
B	5.262	6.007	6.007	6.485
C	0.815	0.837	0.848	0.86
Intensity (mm/hr)	77.57	106.31	150.62	186.69

Time of Concentration = 10.000 min

Proposed	Area (ha)	Runoff Coefficient
	Impervious	0.48
Total	0.48	0.85

5-year Intensity = 106.312 mm/hr

5-year flow = 0.120 m³/s

100-year Intensity = 186.695 mm/hr

Correction Factor = 1.250

100-year flow = 0.265 m³/s

Overland Flow (Q₁₀₀ - Q₅) = 0.144 m³/s

19:411

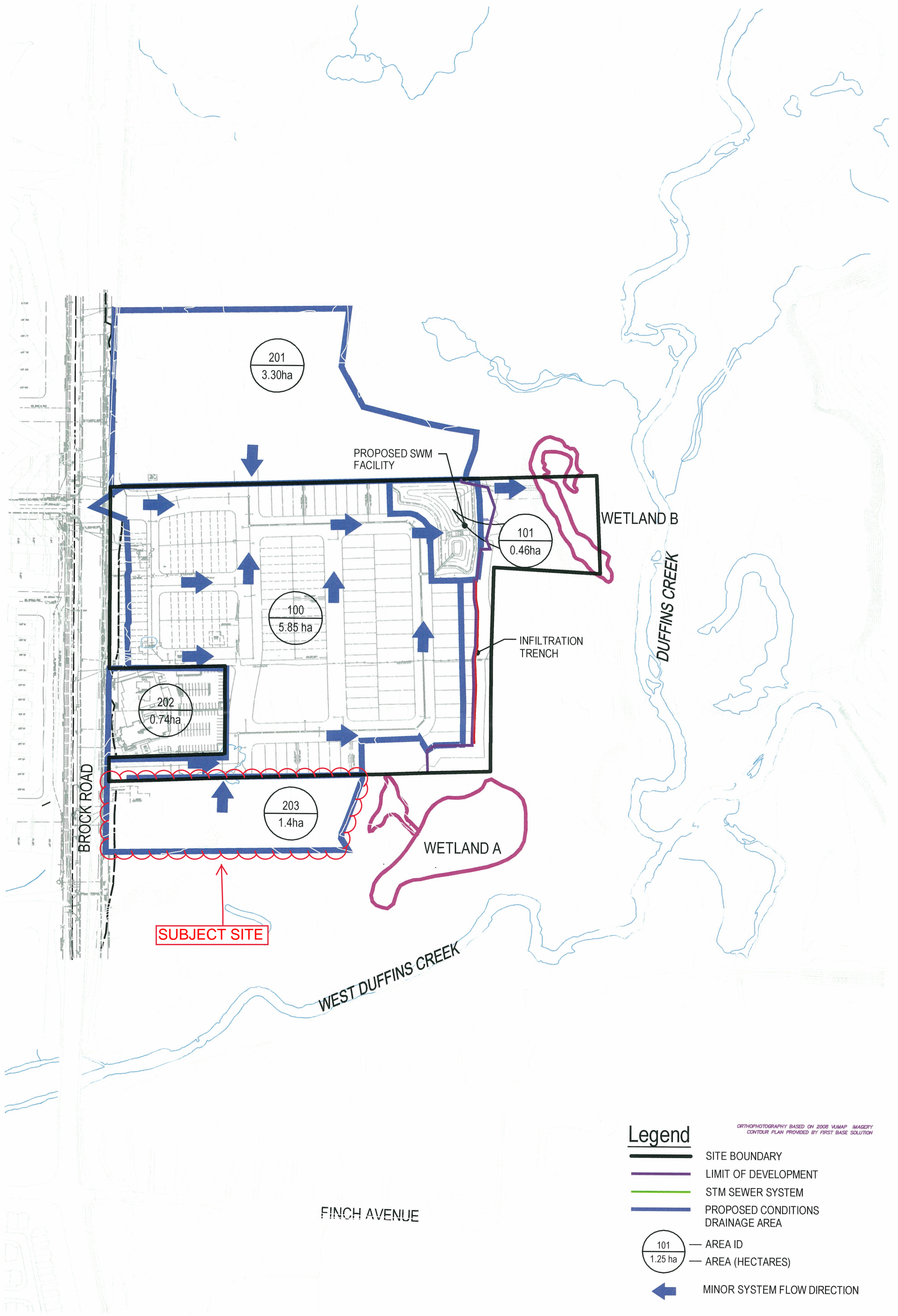
2055 Brock Road

Water Balance - Clean Water Collector Contributing Drainage

Water Balance Runoff Volume Targets Taken from Kindwin Report

Total Runoff Volume Required =	10070 m ³ /a
Total Area for Runoff to Wetland from Kindwin Lands =	7511 m ³ /a
Impervious Runoff Factor	788 mm/a
Remaining Area for Runoff to be provided from 2055 Brock Road =	2559 m ³ /a
Roof Drainage Area Required from 2055 Brock Road =	0.32 ha
Proposed Roof Drainage Area from 2055 Brock Road =	0.52 ha

Appendix B
Excerpts from Relevant Studies



Legend

- SITE BOUNDARY
- LIMIT OF DEVELOPMENT
- STM SEWER SYSTEM
- PROPOSED CONDITIONS DRAINAGE AREA
- AREA ID
AREA (HECTARES)
- MINOR SYSTEM FLOW DIRECTION

ORTHOGRAPHY BASED ON 2008 VMAP IMAGERY
CONTOUR PLAN PROVIDED BY FIRST BASE SOLUTION



KINDWIN

**PROPOSED DRAINAGE CONDITIONS
MINOR SYSTEM**

Job Number | 02112
Revision | A
Date | June 2014

Figure 3.1

Project Name:	Kindwin Development
Project No.:	02112
Description:	Permanent Pool Volume Calculation - Ultimate Conditions

Criteria: 80% T.S.S Removal

Area: 10.19 ha

Imperviousness: 73 %

DESCRIPTION	ID	AREA	Imperviousness	AI
Kindwin (Low/Medium Density) *	100	4.71	63	297
Pond area	101	0.46	50	23
North Lands	201	3.30	80	264
Pickering Islamic centre	202	0.74	95	70
SUBJECT SITE → South lands (2055 Brock Rd.)**	203	0.98	95	93
Total		10.19	73	747

*Based on total area of 5.85 ha excluding 1.14 ha of roof area

**Based on total area of 1.4 ha excluding 0.42 ha of roof area

Runoff from the roof area will be captured by CWP and directed to wetland.

Refer to Wetland Water Balance - Runoff Volume Calculations.

IMPERVIOUSNESS = 73 %

$$\begin{aligned} \text{Permanent Pool Volume}^1 &= (228\text{m}^3/\text{ha} - 40\text{ m}^3/\text{ha}) \times \text{Area} \\ &= 1917\text{ m}^3 \end{aligned}$$

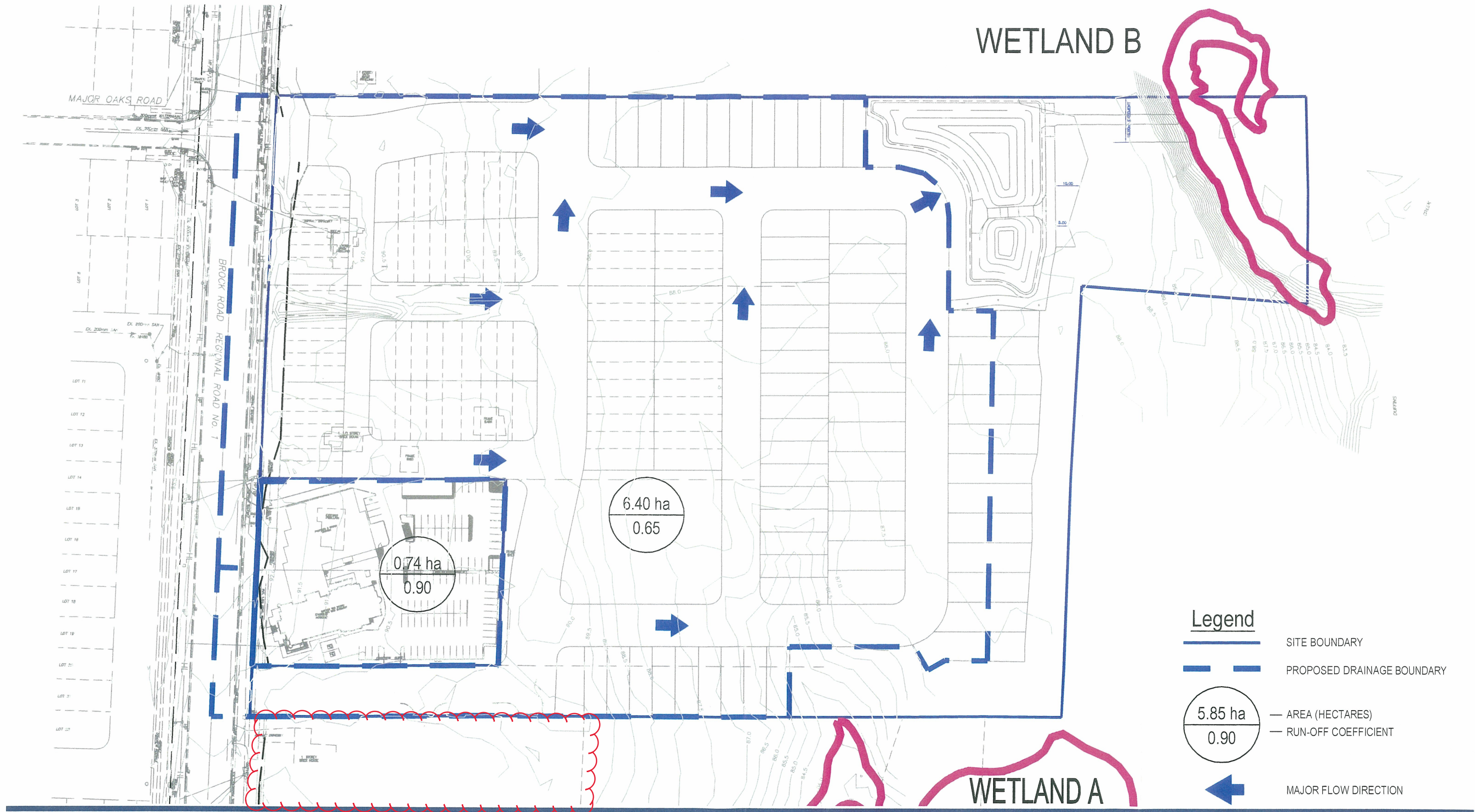
¹ As per the Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003

Detailed calculations of Area 100

Land use	AREA	Imperviousness	AI
Townhouses	1.41	80	113
Park	0.33	0	0
Single houses	3.19	60	191
Roads	0.92	70	64
TOTAL	5.85	63	369

Date: 11/06/2014

File Location: X:\GMS\Proj\2002\02112\Water Resources\Detailed design\Calculations\02112 Outlet design[Quality]



WETLAND B

WETLAND A

Legend

- SITE BOUNDARY
- PROPOSED DRAINAGE BOUNDARY
- AREA (HECTARES)
— RUN-OFF COEFFICIENT
- MAJOR FLOW DIRECTION

0.74 ha
0.90

6.40 ha
0.65

SUBJECT SITE



KINDWIN

PROPOSED DRAINAGE CONDITIONS
MAJOR SYSTEM

Job Number 02112
Revision A
Date May 2014
Figure 3.2

Project:	Kindwin Development
Project No.:	02112
Description:	Wetland Water Balance - Runoff Volume Calculations

Water Balance Runoff Volume Targets

Pervious Runoff Factor	145	mm/a	As per Hydrogeology Investigation and Water balance report Table G-3 (Dillon, March 2013)
Impervious Runoff Factor	788	mm/a	As per Hydrogeology Investigation and Water balance report Table G-3 (Dillon, March 2013)

Total Runoff Volume Required	10070	cu.m/a	As per Hydrogeology Investigation and Water balance report Table 8 (Dillon, March 2013)
-------------------------------------	--------------	--------	---

2055 Brock Road Development Area	1.4	ha	
Assumed Roof Area from 2055 Brock Road (30%)	4200	sq.m	
Total Runoff Volume from 2055 Brock Road	3310	cu.m/a	

← SUBJECT SITE

Total Runoff Volume Required from Kindwin Lands (Total - 2077 and 2095 Brock Road)	6760	cu.m/a	
--	------	--------	--

Drainage Area Required from Kindwin Lands	8579	sq.m	
--	------	------	--

Total Drainage Area Required (2055 Brock Road and Kindwin Lands)	12779	sq.m	
--	-------	------	--

Drainage Area Provided from Kindwin Lands

Roof Area

Assuming an average roof area for towns	95	sq.m		
Assuming an average roof area for 11.6m singles:	185	sq.m		
Assuming an average roof area for 9.1m singles:	120	sq.m		
Townhouses	24	units	1805	sq.m
Single 11.9m	22	units	4070	sq.m
Single 9.1m	27	units	3240	sq.m
Total Roof Area			9115	sq.m
				7183 cu.m/a Total volume

Rear Yard Area*

Assuming an average rear yard area for towns:	49	sq.m	7.0m Frontage Townhouse	
Assuming an average rear yard area for 9.1m singles:	64	sq.m	9.1m Frontage singles	
Townhouse	20	units	1274	sq.m
Single 9.1m	10	units	987	sq.m
Total Rear Yard Area			2261	sq.m
				328 cu.m/a Total volume

Total Area for Runoff to Wetland from Kindwin Lands	11376	sq.m	7511	cu.m/a Total Runoff
Total Area for Runoff to Wetland	15576	sq.m	10820	cu.m/a Total Runoff

*NOTE: Rear yard area of 10 single units will drain overland to the wetland;
Rear yard area of 28 townhouse units will be captured by rear yard catchbasins and directed to CWP, in order to capture 100% of half of the roof area.

Appendix C
Sanitary Design Sheet

PROJECT TITLE: 2055 Brock Road, Pickering
 PROJECT No.: 19-411
 CLIENT: Brock Road Duffins Forest Inc.
 ISSUED FOR: Second Submission FSSR

SANITARY SEWER DESIGN SHEET
PICKERING TOWNSHIP - DURHAM REGION
 DATE: OCTOBER 2021

ENGINEER'S SEAL

PREPARED BY:

NOTES, STANDARDS AND DESIGN INPUT PARAMETERS

Densities (persons/unit):

Single Family, Semi-Detached Residential	3.5
Townhouse, Multi-Family Residential	3.0
Apartments - 1 Bedroom	1.5
- 2 Bedroom	2.5
- 3 Bedroom	3.5
- 4 Bedrooms or Larger	4.5

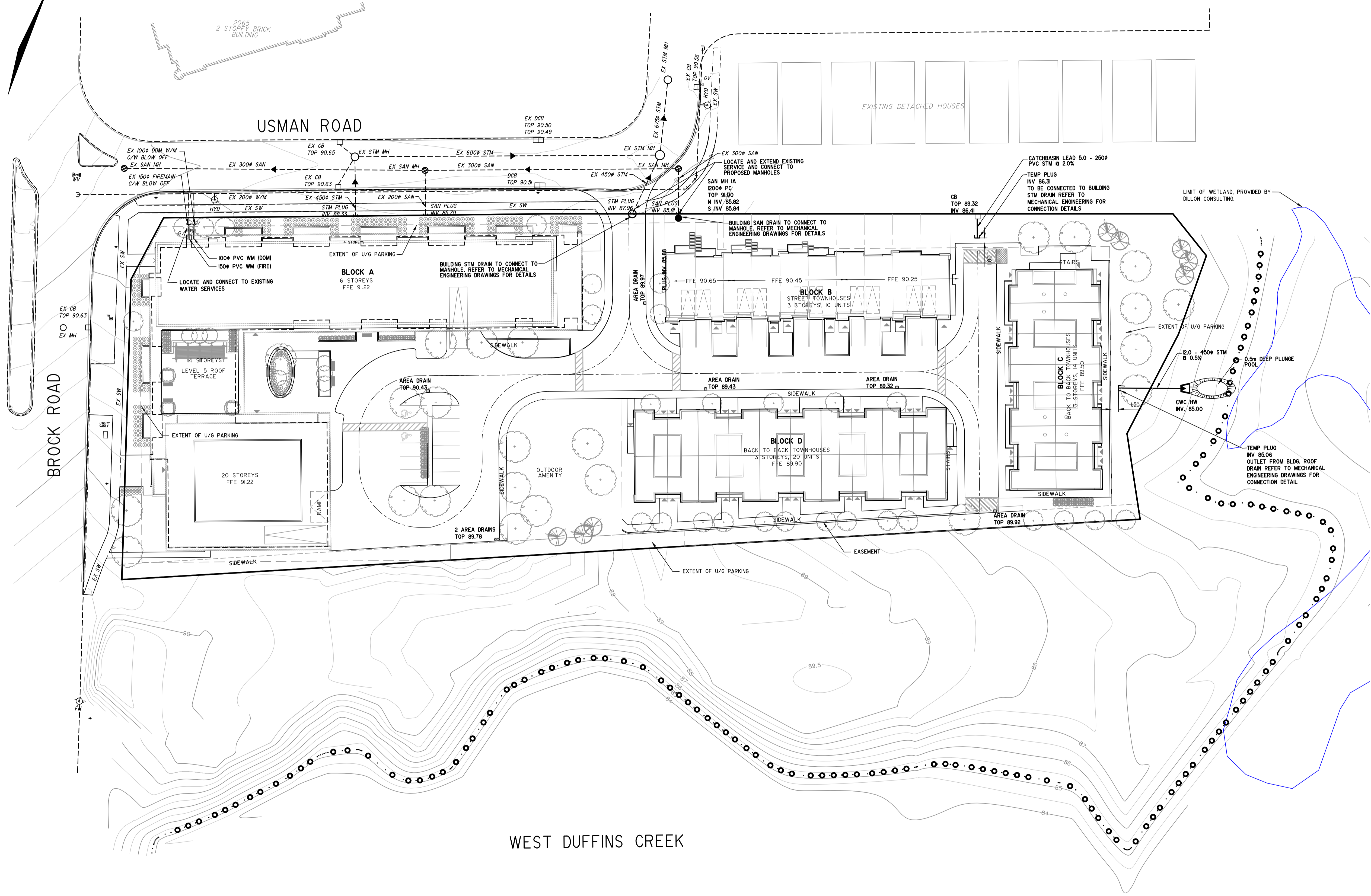
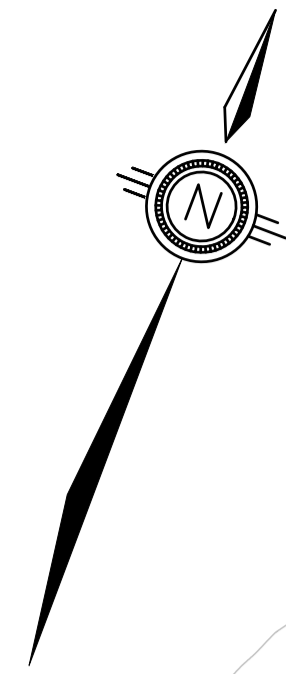
Harmon Peaking Factor:
 Maximum: 3.8
 Minimum: 1.5
 Formula: $K_{14} = 1 + \frac{14}{(4 + P)^2}$
 where; K_{14} = Harmon Peaking Factor
 P = Population in Thousands

Design Flows:
 Residential Flow 364 L/person/day
 Infiltration Flow 22.5 m³/gross floor area ha/day
 Commercial Flow 180 m³/gross floor area ha/day
 Floor Space Index 0.5 of gross lot area
 Institutional Flow 112 m³/gross ha/day
 Industrial Flow 180 m³/gross ha/day

Note: PVC pipe is manufactured in metric dimensions, therefore, the pipe diameter stated is used to calculate capacity and velocity. However, since concrete pipe is manufactured in imperial dimensions, standard imperial equivalent sizes for the diameter stated have been used to calculate capacity and velocity.



PROPERTY	STREET	Upstream Manhole	Downstream Manhole	RESIDENTIAL											COMMERCIAL				INSTITUTIONAL			INDUSTRIAL		EXTERNAL FLOWS		TOTAL AREA AND FLOWS				PIPE DESIGN										
				Section Area (ha)	Cumulative Area (ha)	Single Family Units	Townhouse Units	Apartment Units			Unplanned Land (ha)	Section Population	Cumulative Population (thousands)	Harmon Peaking Factor	Residential Flow (L/s)	Infiltration Flow (L/s)	Section Area (ha)	Gross Floor Area (ha)	Cumulative Gross Floor Area (ha)	Commercial Flow (L/s)	Section Area (ha)	Cumulative Area (ha)	Institutional Flow (L/s)	Section Area (ha)	Cumulative Area (ha)	Industrial Flow (L/s)	Total External Flow (L/s)	Cumulative External Flow (L/s)	Total Section Area (ha)	Total Cumulative Area (ha)	Total Design Flow (L/s)	Type	Pipe (mm)	Grade (%)	Capacity (l/s)	Length (m)	Velocity (m/s)	Down-stream Velocity (m/s)	Change in Velocity (m/s)	Capacity (%)
								1 Bed	2 Bed	3 Bed																														
Kindwin		MH-18-0116	MH-18-0115			42	102.00					453	0.453	3.80	7.25	0.00	0.00	0.00	0.00	6.65	6.65	8.62			0.00	0.00	0.00	6.65	6.65	15.87	PVC	300	0.28	51.17	100.70	0.72	0.76	0.04	31%	
Brock Rd Duffins Forest	2055 Brock Rd	PLUG3A	MH-18-0115	0.10	1.31		44	189	159	24		897	0.897	3.80	14.36	0.34	0.00	0.00	0.00	6.65	6.65	8.62			0.00	0.00	0.00	6.75	6.75	23.32	PVC	200	1.00	32.80	100.70	1.04	0.76	0.28	71%	
Kindwin		MH-18-0115	MH-18-0114									0	1.350	3.71	21.11	0.00	0.00	0.00	6.65	19.95	25.86			0.00	0.00	0.00	6.65	20.05	46.97	PVC	300	0.31	53.84	100.70	0.76	N/A		87%		



KEYMAP N.T.S.

- LEGEND:**
- STORM MANHOLE
 - SANITARY MANHOLE
 - CATCHBASIN MANHOLE
 - CATCHBASIN
 - DOUBLE CATCHBASIN
 - ⊕ HYDRANT AND VALVE
 - ⊕ VALVE AND BOX
 - ⊕ VALVE AND CHAMBER
 - ⊕ STORM SANITARY WATER SERVICE CONNECTIONS
 - ▭ PROPOSED DRIVEWAY
 - REGIONAL FLOODLINE

APPROVED BY: _____ P.ENG.
 ORIGINALY SIGNED BY: _____
 ENGINEERING SERVICES DEPARTMENT
 APPROVAL TO WORKS REQUIRED BY THE CITY OF PICKERING AND AS DEFINED IN THE SUBDIVISION AGREEMENT. THE CITY IS RELYING ON THE TECHNICAL SKILLS AND ABILITY OF THE P.ENG. SEALING AND SIGNING THIS DRAWING.

DATE: _____
 APPROVED
 APPROVAL OF THE REGIONAL WORKS DEPT. FOR THE PURPOSES DESCRIBED IN THE APPLICABLE REGIONAL SUBDIVISION OR SERVICING AGREEMENT. THE REGION IS RELYING ON THE TECHNICAL SKILL AND ABILITY OF THE P. ENG. SEALING AND SIGNING THE DRAWINGS.

BY: _____
 DATE: _____

BENCHMARK:
 CITY OF PICKERING, BENCHMARK No. 2-035
 ELEVATION 85.465m

NOTE:
 ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE. ALL PIPE SIZES IN MILLIMETRES. SEE INDEX DRAWING FOR GENERAL NOTES AND PROJECT SPECIFICATIONS.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
2.	ISSUED FOR ZBA 2ND SUBMISSION	B.J.L.	11/10/2022	
1.	ISSUED FOR ZBA 1ST SUBMISSION	K.D.	3/04/2021	

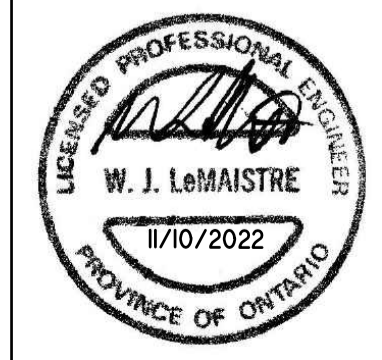
ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
 2055 BROCK ROAD DEVELOPMENT

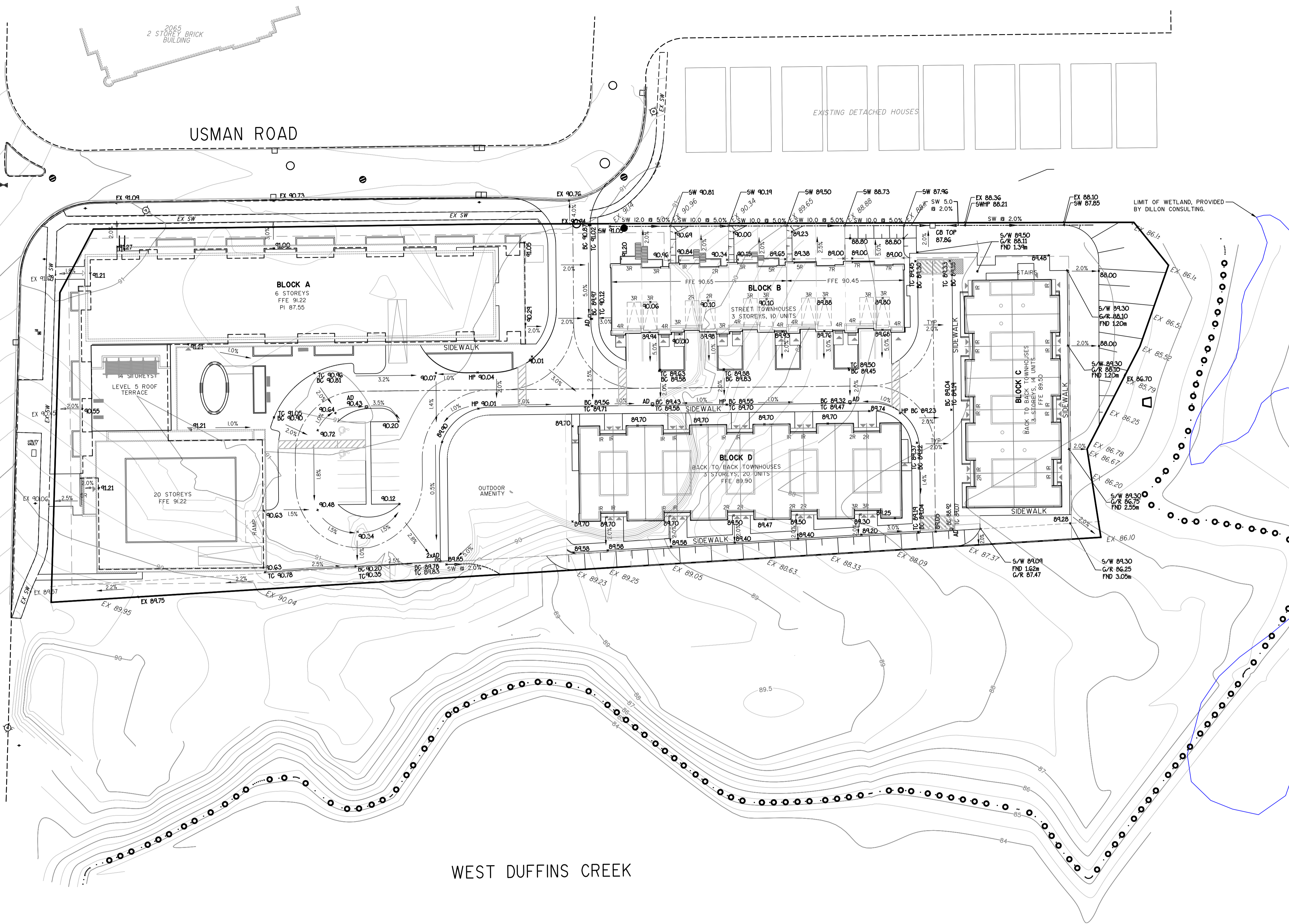
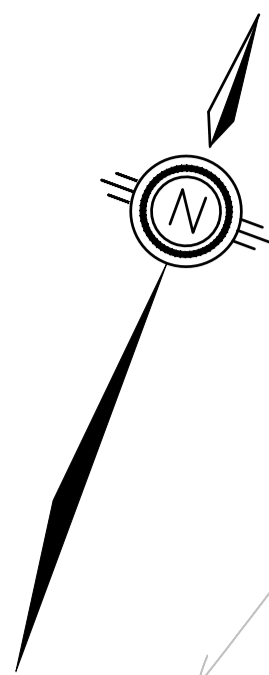
MUNICIPALITY
 CITY OF PICKERING
 REGION OF DURHAM

PROJECT TITLE
 BROCK ROAD DUFFINS FOREST INC.

SHEET TITLE
 SITE SERVICING PLAN



DESIGNED	KD	DRAWN	CK	CHECKED	W.J.L.
SCALE	1:400	DATE	OCTOBER 2022		
PROJECT NUMBER	19:411	DWG. NUMBER	SS		



KEYMAP N.T.S.

- LEGEND:**
- STORM MANHOLE
 - SANITARY MANHOLE
 - CATCHBASIN MANHOLE
 - CATCHBASIN
 - DOUBLE CATCHBASIN
 - HYDRANT AND VALVE
 - VALVE AND BOX
 - VALVE AND CHAMBER
 - STORM SANITARY WATER SERVICE CONNECTIONS
 - ▭ PROPOSED DRIVEWAY
 - 306.80 PROPOSED GRADING
 - EX 306.80 EXISTING GRADE
 - 4.3% PROPOSED SLOPE
 - REGIONAL FLOODLINE

APPROVED BY: _____ P.ENG.
 ORIGINALY SIGNED BY: _____
ENGINEERING SERVICES DEPARTMENT
 APPROVAL TO WORKS REQUIRED BY THE CITY OF PICKERING AND AS DEFINED IN THE SUBDIVISION AGREEMENT. THE CITY IS RELYING ON THE TECHNICAL SKILLS AND ABILITY OF THE P.ENG. SEALING AND SIGNING THIS DRAWING.

DATE: _____
APPROVED
 APPROVAL OF THE REGIONAL WORKS DEPT. FOR THE PURPOSES DESCRIBED IN THE APPLICABLE REGIONAL SUBDIVISION OR SERVICING AGREEMENT. THE REGION IS RELYING ON THE TECHNICAL SKILL AND ABILITY OF THE P. ENG. SEALING AND SIGNING THE DRAWINGS.

BY: _____
 DATE: _____

BENCHMARK:
 CITY OF PICKERING, BENCHMARK No. 2-035
 ELEVATION 85.465m

NOTE:
 ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE.
 ALL PIPE SIZES IN MILLIMETRES.
 SEE INDEX DRAWING FOR GENERAL NOTES AND PROJECT SPECIFICATIONS.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
1.	ISSUED FOR ZBA 2ND SUBMISSION		11/10/2022	BUL
1.	ISSUED FOR ZBA 1ST SUBMISSION		3/04/2022	KD

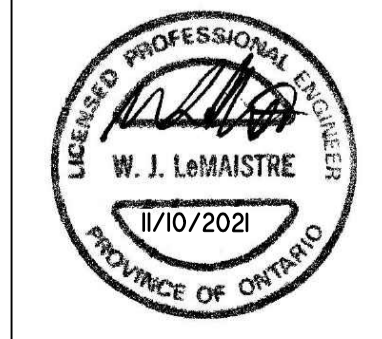
ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
 2055 BROCK ROAD DEVELOPMENT

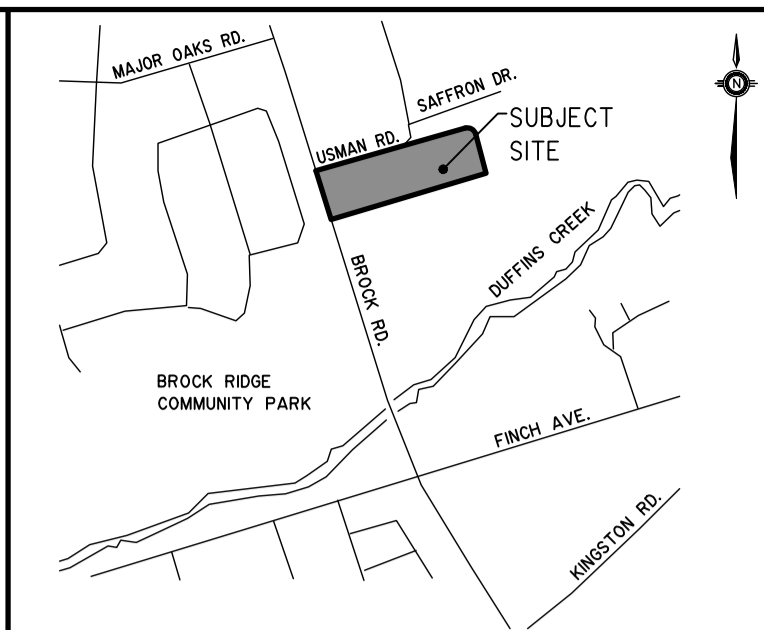
MUNICIPALITY
 CITY OF PICKERING
 REGION OF DURHAM

PROJECT TITLE
 BROCK ROAD DUFFINS FOREST INC.

SHEET TITLE
 SITE GRADING PLAN



DESIGNED: KD DRAWN: CK CHECKED: WJL
 SCALE: 1:400 DATE: OCTOBER 2022
 PROJECT NUMBER: 19:411 DWG. NUMBER: GR



KEYMAP N.T.S.

APPROVED BY: _____ P.ENG.
 ENGINEERING SERVICES DEPARTMENT
 APPROVAL TO WORKS REQUIRED BY THE CITY OF PICKERING AND AS DEFINED IN THE SUBDIVISION AGREEMENT. THE CITY IS RELYING ON THE TECHNICAL SKILLS AND ABILITY OF THE P.ENG. SEALING AND SIGNING THIS DRAWING.
 DATE: _____

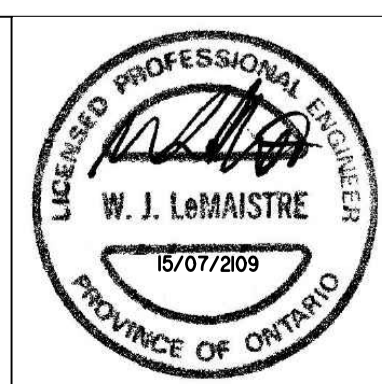
APPROVED
 APPROVAL OF THE REGIONAL WORKS DEPT. FOR THE PURPOSES DESCRIBED IN THE APPLICABLE REGIONAL SUBDIVISION OR SERVICING AGREEMENT. THE REGION IS RELYING ON THE TECHNICAL SKILL AND ABILITY OF THE P.ENG. SEALING AND SIGNING THE DRAWINGS.
 DATE: _____

BENCHMARK:
 CITY OF PICKERING, BENCH MARK No. 2-035
 ELEVATION 85.465m

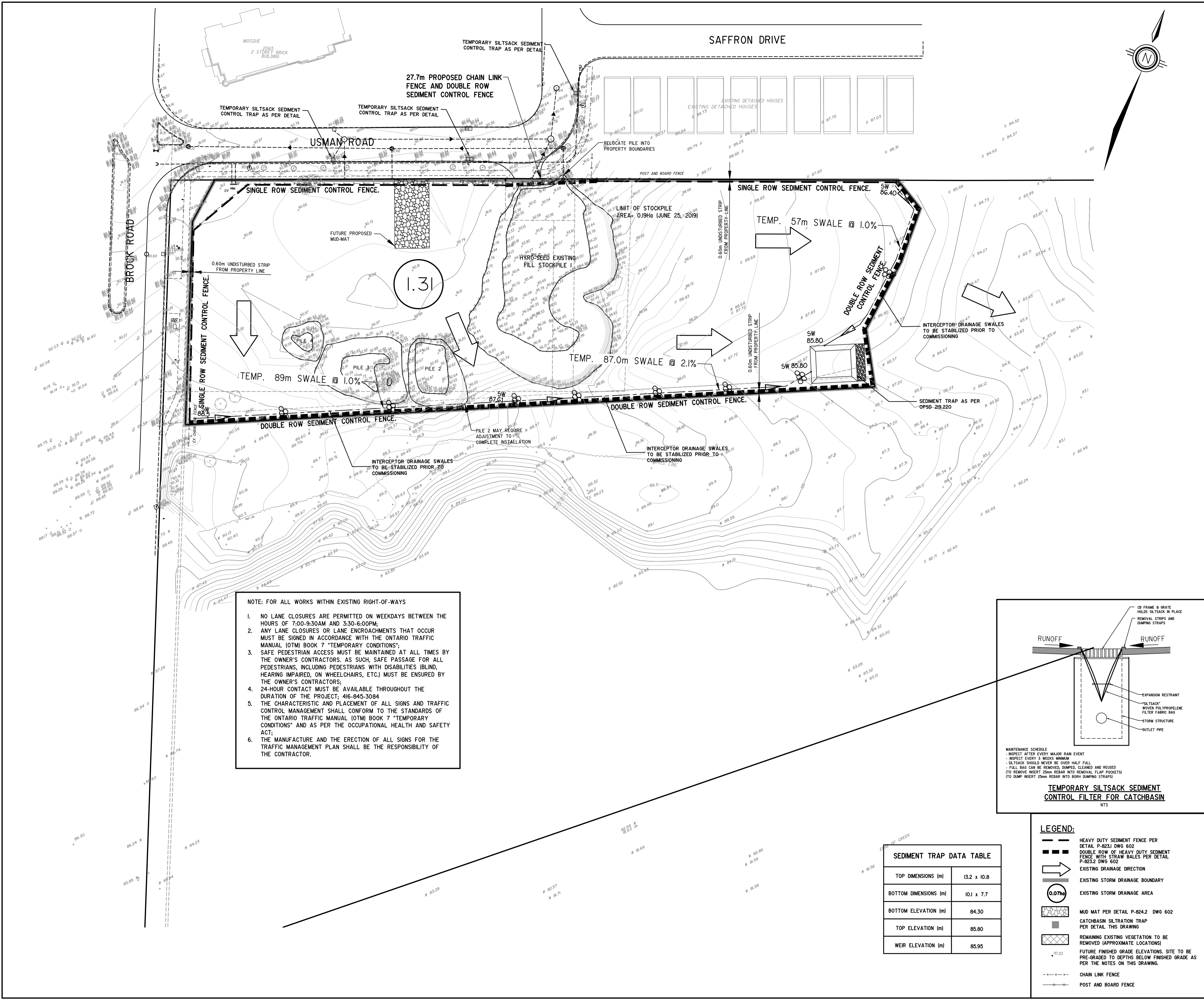
NOTE: ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE. ALL PIPE SIZES IN MILLIMETRES.

1.	ISSUED FOR CONSTRUCTION	KLD	AUG/06/19
No.	REVISIONS TO DRAWING	BY	DATE
ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED			

CLIENT: BROCK ROAD DUFFINS FOREST INC.
 MUNICIPALITY: TOWN OF PICKERING REGION OF DURHAM
 PROJECT TITLE: 2055 BROCK ROAD DEVELOPMENT
 SHEET TITLE: SITE ALTERATION PLAN EROSION & SEDIMENT CONTROL

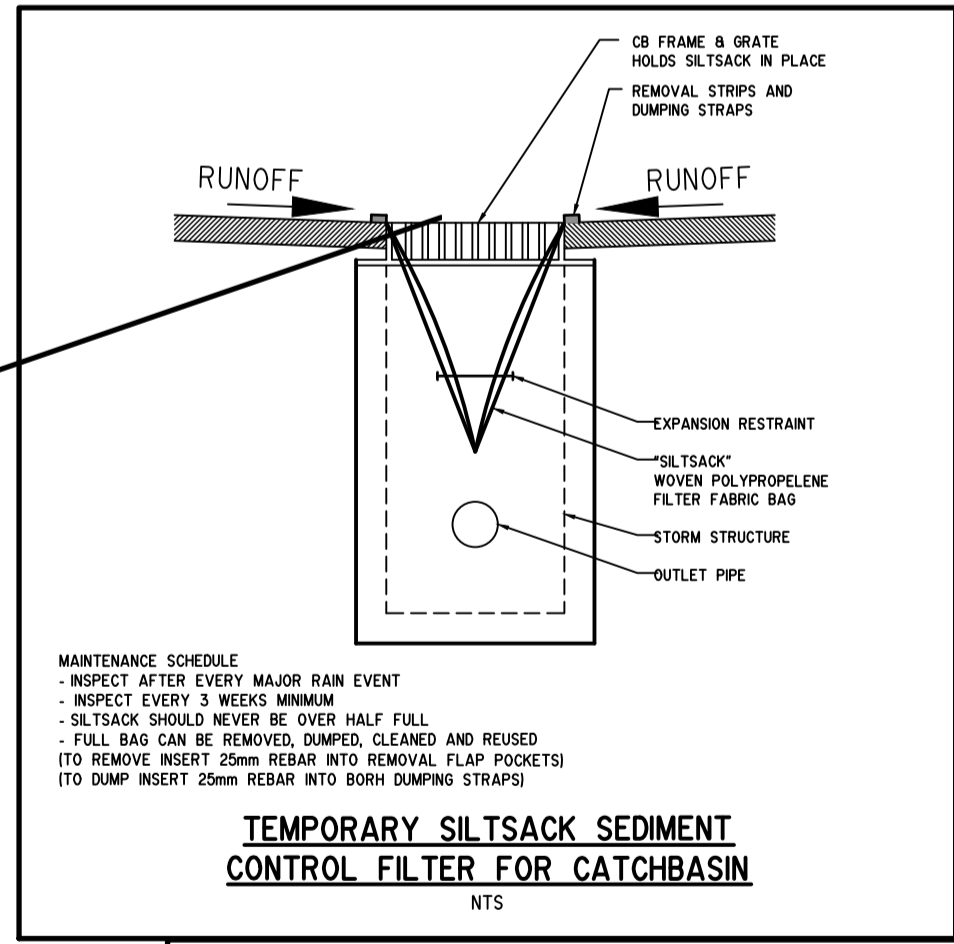


DESIGNED: KLD DRAWN: SWS CHECKED: WJL
 SCALE: 1:500 DATE: OCTOBER 2022
 PROJECT NUMBER: 19:411 DWG. NUMBER: ESC1



NOTE: FOR ALL WORKS WITHIN EXISTING RIGHT-OF-WAYS

- NO LANE CLOSURES ARE PERMITTED ON WEEKDAYS BETWEEN THE HOURS OF 7:00-9:30AM AND 3:30-6:00PM;
- ANY LANE CLOSURES OR LANE ENCROACHMENTS THAT OCCUR MUST BE SIGNED IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL (OTM) BOOK 7 "TEMPORARY CONDITIONS";
- SAFE PEDESTRIAN ACCESS MUST BE MAINTAINED AT ALL TIMES BY THE OWNER'S CONTRACTORS. AS SUCH, SAFE PASSAGE FOR ALL PEDESTRIANS, INCLUDING PEDESTRIANS WITH DISABILITIES (BLIND, HEARING IMPAIRED, ON WHEELCHAIRS, ETC.) MUST BE ENSURED BY THE OWNER'S CONTRACTORS;
- 24-HOUR CONTACT MUST BE AVAILABLE THROUGHOUT THE DURATION OF THE PROJECT; 416-845-3084
- THE CHARACTERISTIC AND PLACEMENT OF ALL SIGNS AND TRAFFIC CONTROL MANAGEMENT SHALL CONFORM TO THE STANDARDS OF THE ONTARIO TRAFFIC MANUAL (OTM) BOOK 7 "TEMPORARY CONDITIONS" AND AS PER THE OCCUPATIONAL HEALTH AND SAFETY ACT;
- THE MANUFACTURE AND THE ERECTION OF ALL SIGNS FOR THE TRAFFIC MANAGEMENT PLAN SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.



MAINTENANCE SCHEDULE
 - INSPECT AFTER EVERY MAJOR RAIN EVENT
 - INSPECT EVERY 3 WEEKS MINIMUM
 - SILTSACK SHOULD NEVER BE OVER HALF FULL
 - FULL BAG CAN BE REMOVED, DUMPED, CLEANED AND REUSED (TO REMOVE, INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS) (TO DUMP, INSERT 25mm REBAR INTO BORN DUMPING STRAPS)

LEGEND:
 - - - - HEAVY DUTY SEDIMENT FENCE PER DETAIL P-823.1 DWG 602
 - - - - DOUBLE ROW OF HEAVY DUTY SEDIMENT FENCE WITH STRAW BALES PER DETAIL P-823.2 DWG 602
 → EXISTING DRAINAGE DIRECTION
 - - - - EXISTING STORM DRAINAGE BOUNDARY
 ○ 0.07m EXISTING STORM DRAINAGE AREA
 ■ MUD MAT PER DETAIL P-824.2 DWG 602
 ■ CATCHBASIN SILTRATION TRAP PER DETAIL THIS DRAWING
 ■ REMAINING EXISTING VEGETATION TO BE REMOVED (APPROXIMATE LOCATIONS)
 * FUTURE FINISHED GRADE ELEVATIONS. SITE TO BE PRE-GRADED TO DEPTHS BELOW FINISHED GRADE AS PER THE NOTES ON THIS DRAWING.
 - - - - CHAIN LINK FENCE
 - - - - POST AND BOARD FENCE

SEDIMENT TRAP DATA TABLE

TOP DIMENSIONS (m)	13.2 x 10.8
BOTTOM DIMENSIONS (m)	10.1 x 7.7
BOTTOM ELEVATION (m)	84.30
TOP ELEVATION (m)	85.80
WEIR ELEVATION (m)	85.95

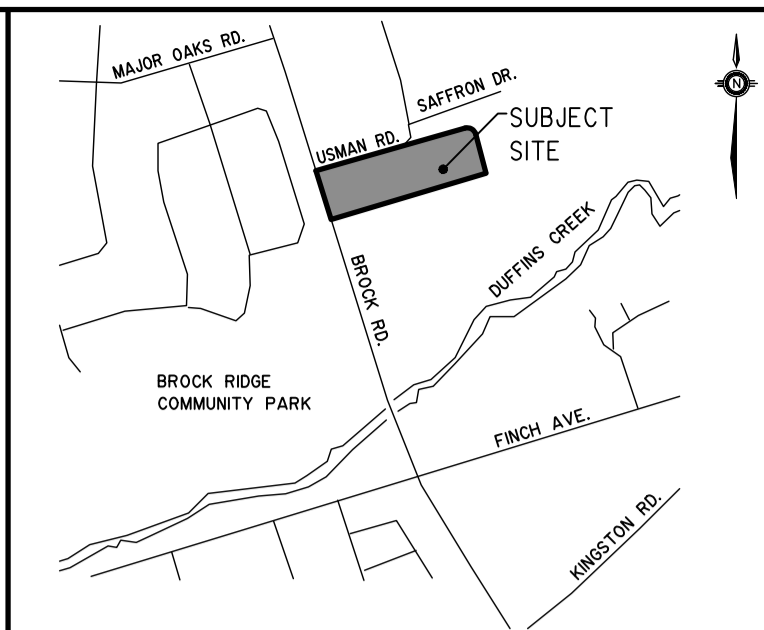
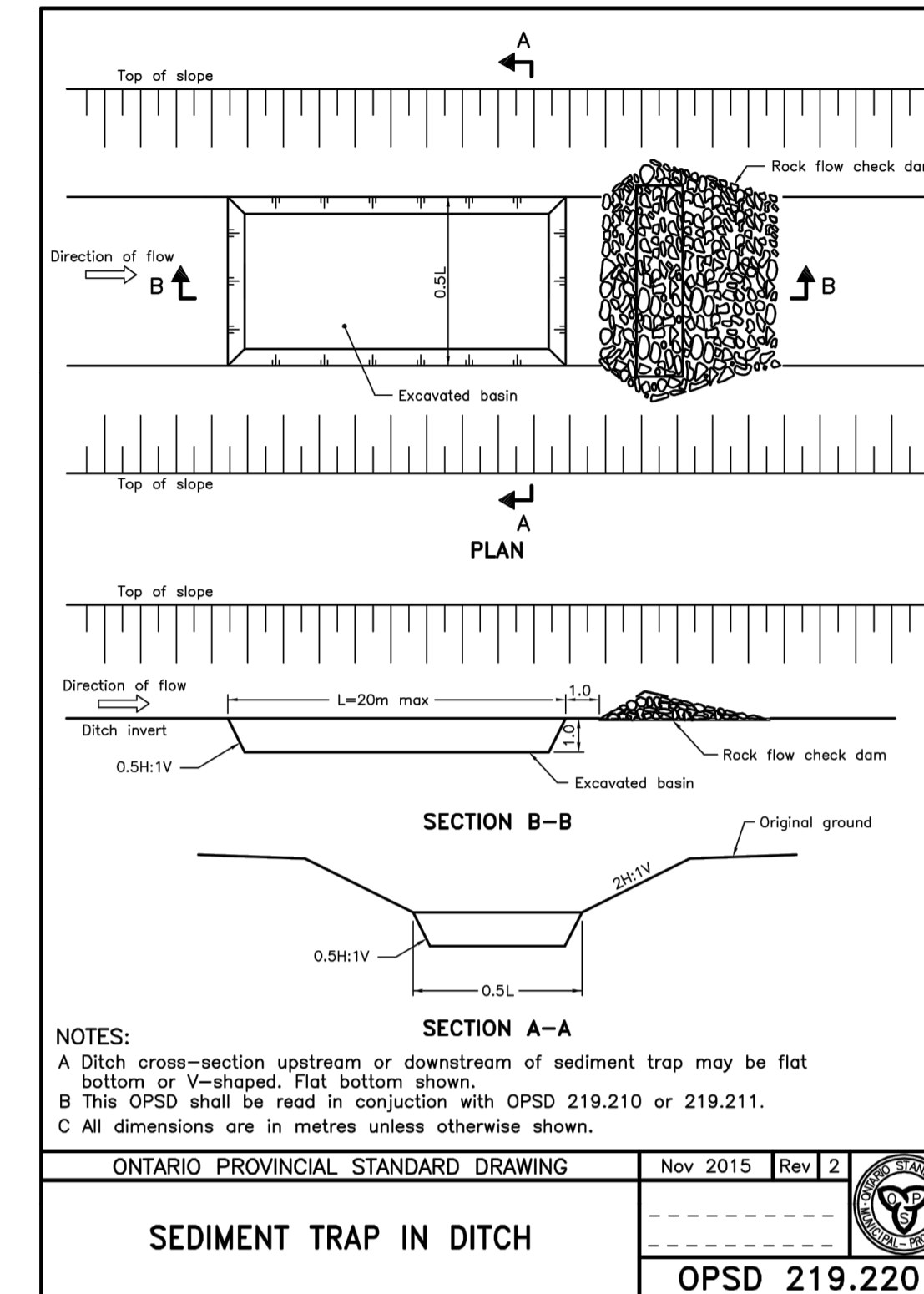
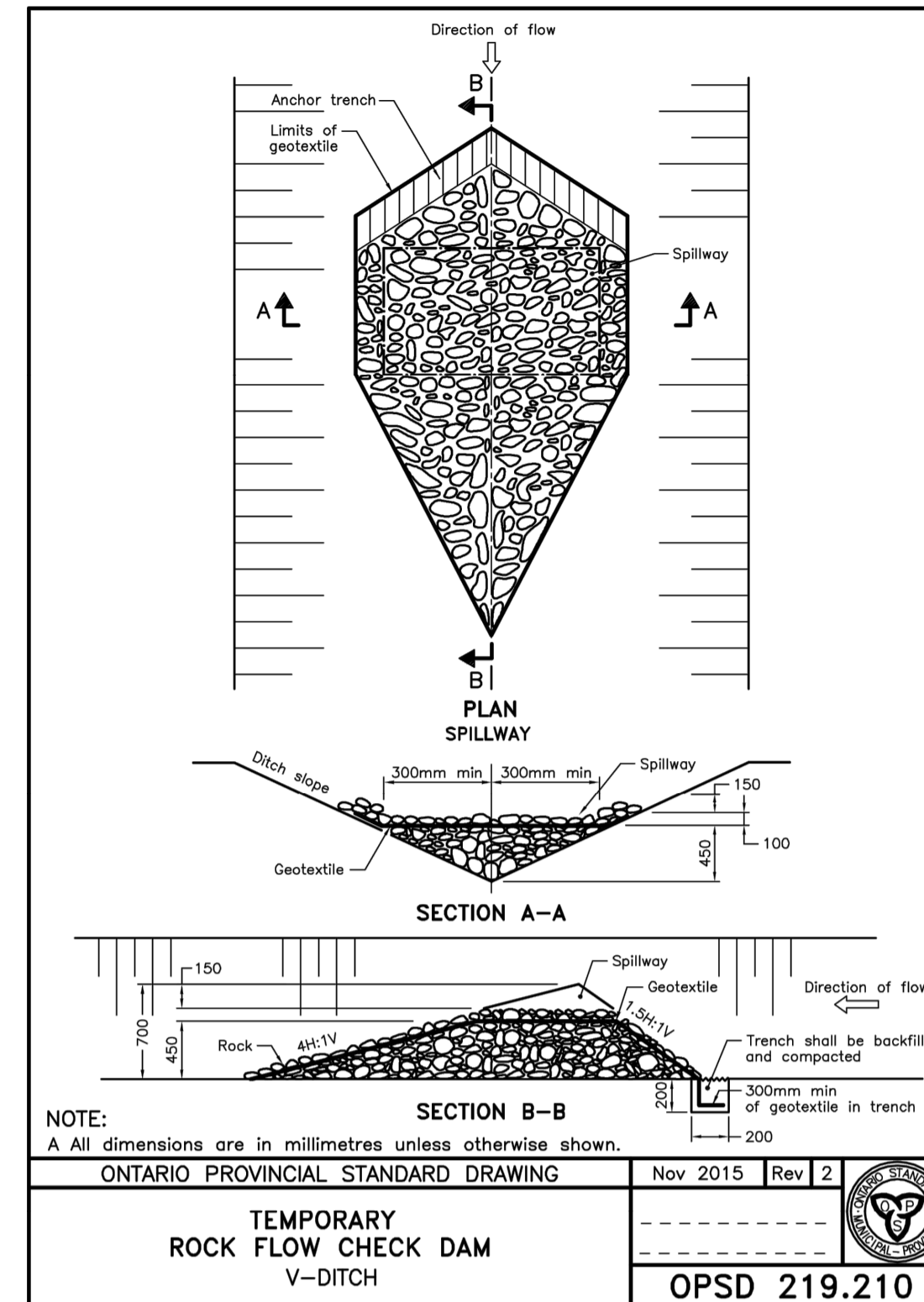
City of
PICKERING Erosion and Sediment Control General Notes

- Prior to commencement of any on-site work/topsoil stripping, erosion and sediment control (ESC) measures, as per approved Erosion & Sediment Control Plan, must be installed to prevent surface runoff from leaving the site "untreated". All ESC measures are to be maintained until the site has been stabilized.
- The contractor shall be responsible for the proper installation, maintenance and removal of all temporary erosion and sediment control measures during construction, as directed by the Engineer or the City of Pickering.
- Sediment control fence to use geotextile with weave density of 270R terrafix or equivalent.
- All exposed soils shall be immediately stabilized as directed by the Engineer or City of Pickering.
- Check dams are to be used in any temporary drainage swales required during the construction period.
- Additional erosion and sediment control measures may be required and shall be determined by the Engineer or the City of Pickering.
- All swales are to be stabilized prior to use.
- Inspection of the proposed erosion and sediment control measures will occur on a weekly basis, after rainfall events exceeding 10mm or after rapid snow melt events and daily during extended rain or snow melt periods. The silt control fence must be inspected for rips or tears, broken stakes, blow outs and accumulation of sediment. The silt control fence must be fixed and/or replaced immediately when damaged. Accumulated sediment must be removed from the silt control fence when accumulation reaches 50% of the height of the fence.
- Rock check dams are to be cleaned of all accumulated sediment as soon as sediment has accumulated to a depth greater than 50% of all the upstream check dams.
- Cleaning and repair of mud mats and any other temporary sediment control measures shall be done as necessary through regular inspection or as directed by the Engineer or City of Pickering. All damaged ESC measures shall be repaired and/or replaced within 48 hours of the inspection.
- Materials to repair damaged ESC measures must be kept on-site at all times.
- The ESC strategies on these plans are not static and may need to be upgraded/amended as site conditions change to prevent sediment releases. Failed ESC measures must be repaired immediately.

Page 1 of 2

- No construction activity or machinery shall intrude beyond the silt control fence or limit of development. All construction vehicles shall leave the site at designated locations as shown on the plans. All materials and equipment shall be stored on site in a designated area. No materials or equipment shall be stored on the Municipal right of way. No construction vehicles will park on Municipal roads.
- Servicing of construction equipment on site is prohibited.
- The contractor must clean adjacent roads on a regular basis. The road shall be, at a minimum scraped daily and flushed (if necessary) on Friday evenings or Saturday mornings.
- Dust control to be reviewed daily. Water truck or calcium chloride is to be provided on-site and haul roads/working areas are to be treated as required to ensure that dust is controlled on-site.
- At the end of construction period, accumulated sediment is to be removed off site prior to the removal of the silt fence.
- All litter and debris shall be monitored and disposed of daily or as necessary through regular inspection.
- All topsoil stockpiles shall be surrounded with sediment control fence and stabilized with seed mix as per this drawing.
- Disturbed areas are to be minimized to the extent possible and stabilized as the work progresses. Any area exposed for more than 30 days will be stabilized.

Page 2 of 2



APPROVED BY: _____ P.ENG.
 ENGINEERING SERVICES DEPARTMENT
 APPROVAL TO WORKS REQUIRED BY THE CITY OF PICKERING AND AS DEFINED IN THE SUBDIVISION AGREEMENT. THE CITY IS RELYING ON THE TECHNICAL SKILLS AND ABILITY OF THE P.ENG. SEALING AND SIGNING THIS DRAWING.

APPROVED APPROVAL OF THE REGIONAL WORKS DEPT. FOR THE PURPOSES DESCRIBED IN THE APPLICABLE REGIONAL SUBDIVISION OR SERVICING AGREEMENT. THE REGION IS RELYING ON THE TECHNICAL SKILL AND ABILITY OF THE P. ENG. SEALING AND SIGNING THE DRAWINGS.

BENCHMARK: CITY OF PICKERING, BENCH MARK No. 2-035 ELEVATION 85.465m

NOTE: ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE. ALL PIPE SIZES IN MILLIMETRES.

No.	ISSUED FOR CONSTRUCTION	KLD	AUG/06/19
1.	ISSUED FOR CONSTRUCTION	KLD	AUG/06/19
2.	REVISIONS TO DRAWING	BY	DATE
ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED			

CLIENT: **BROCK ROAD DUFFINS FOREST INC.**

MUNICIPALITY: **TOWN OF PICKERING REGION OF DURHAM**

PROJECT TITLE: **2055 BROCK ROAD DEVELOPMENT**

SHEET TITLE: **SITE ALTERATION PLAN EROSION & SEDIMENT DETAILS**

DESIGNED: KLD DRAWN: SWS CHECKED: WJL
 SCALE: 1:500 DATE: OCTOBER 2022
 PROJECT NUMBER: 19:411 DWG. NUMBER: ESC2

SKA SABOURIN KIMBLE & ASSOCIATES LTD. CONSULTING ENGINEERS

APPROVED BY: _____
 W. J. LeMAISTRE
 15/07/2019
 PROFESSIONAL ENGINEER
 PROVINCE OF ONTARIO

"LOW GROWING NATIVE LAND MIX (OSC PRODUCT 8125)"
 (FOR INTERCEPTOR SWALES, ROADS, LOT BLOCKS, TOPSOIL STOCKPILES)

- 25% CANADA BLUEGRASS (POA PALUSTRIS)
- 30% CANADA WILD RYE (ELYMUS CANADENSIS)
- 15% LITTLE BLUESTEM (SCHZACHYRIUM SCOPARIUM)
- 30% SAND DROPSEED (SPOROBOLUS CRYPTANDRUS)

APPLICATION RATE: 27.8 Kg/ha

(ADDITIONAL SEED MIX)
 NURSE CROP
 ANNUAL RYEGRASS (LOLIUM MULTIFLORUM)

APPLICATION RATE: 22-25 Kg/ha

