RAMPEN HOLDINGS INC. (COSCORP) ENVIRONMENTAL IMPLEMENTATION REPORT AND FUNCTIONAL SERVICING STUDY

ADDENDUM #5 to the
Final Joshua's Creek Tributaries EIR/FSS

July 2022

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1.0 INTRODUCTION

1.1 STUDY PURPOSE AND OBJECTIVES

This Environmental Implementation Report (EIR) and Functional Servicing Study (FSS) Addendum (herein referred to as the Addendum) is an update to the Joshua's Creek Tributaries and the Mattamy Lands EIR/FSS prepared by DSEL et. al. dated August 2019 (herein referred to as the *JCT EIR/FSS*). This Addendum will address the following objectives, as outlined in the approved EIR/FSS Terms of Reference, for the lands located at 1086 Burnhamthorpe Road (herein referred to as the Subject Lands):

- Demonstrate how the subwatershed requirements set out in the North Oakville Creeks Subwatershed Study (NOCSS) Management Report (including targets), the Implementation Report and the Secondary Plan are being fulfilled in the proposed Draft Plan;
- Provide sufficient level of conceptual design to ensure that the various components of the NHS and infrastructure can be implemented, as envisaged in NOCSS and Secondary Plan, and to ensure that the Draft Plan is consistent with this conceptual design;
- Ensure servicing requirements, as determined in the FSS for the areas external to the Draft Plan, are adequate;
- Identify details regarding any potential development constraints or conflicts and how they are to be resolved;
- Provide any further implementation details as required;
- Streamline the Draft Plan approval process; and,
- Facilitate the preparation of Draft Plan conditions.

In addition to the objectives as outlined above, this Addendum will also demonstrate conformity with the recommendations of the *JCT EIR/FSS*, as applicable. The *JCT EIR/FSS* served its purpose to assist in the development of Draft Plan Conditions for the Mattamy Bressa and Dunoak draft plan(s) located in the JC9A subcatchment however, detailed site work was not undertaken on the Subject Lands as part of the *JCT EIR/FSS*. As a result, this Addendum is necessary in order to provide specific management recommendations for the Subject Lands.

Within the JC9A and JC17 subcatchments that are the subject of this Addendum, Rampen Holdings Inc. (herein referred to as Coscorp) is proceeding with development. As a result, this Addendum addresses EIR/FSS requirements in support of the Coscorp Draft Plan of Subdivision. Additional work, including potential addendums to the *JCT EIR/FSS* or this Addendum, will be required for those lands to the west and north of Coscorp if/when development proceeds on those lands.

This Addendum should be read in conjunction with the *JCT EIR/FSS*. There are significant sections of the original *JCT EIR/FSS* that do not require any updates however, the preamble to each Section identifies those sections that remain unchanged, those that have minor revisions and those that are new or re-written as compared to the *JCT EIR/FSS*.

Additionally, figures throughout the *JCT EIR/FSS* have been updated to include the Subject Lands, Study Area, wetland staking conducted by the Ministry of Natural Resources and Forestry (MNRF), woodland dripline conducted by the Region of Halton (Halton) and top of bank conducted by Conservation Halton (CH). Within each Section, the introductory paragraph advises which Figures, Drawings and/or Appendices, for that Section, have been updated to address the Subject Lands.

For **Section 1.0**, this includes updates to **Figures 1.1 – 1.4 inclusive** from the *JCT EIR/FSS*. The updates to **Section 1.0** figures are generally to include the Subject Lands and Study Area for this Addendum. Appendix A, from the *JCT EIR/FSS*, remains valid and has not been updated as part of this Addendum.

1.2 STUDY AREAS AND PROPOSED DRAFT PLAN

The EIR Subcatchment Area for the *JCT EIR/FSS* included JC17, JC16, JC12-West, JC6 and JC9A. The focus of the *JCT EIR/FSS* was on the Mattamy Bressa and Dunoak developments (refer to **Figure 1.4**), however it also demonstrated servicing feasibility for other lands in the Subcatchment Area in accordance with the EIR/FSS Terms of Reference. This Addendum focuses on the Subject Lands within the JC9A and JC17 subcatchments defined to be the lands at 1086 Burnhamthorpe Road. **Figure 1.1** illustrates the location of the Subject Lands. As part of the draft plan of subdivision, Coscorp is proposing to sever approximately ¾ of the landholdings at 1086 Burnhamthorpe Road while the remaining ¼ of the landholdings (retained lands) will remain within the ownership of the Rampen family (refer to **Figure 1.4**). The Coscorp draft plan is 15.36 ha while the retained lands are 5.72 ha. At this time, the Rampen family intends to maintain the art studio and other uses on the retained parcel. There are provisions in the North Oakville East Secondary Plan (NOESP) which allow for these uses to continue, and potentially expand however, there are no current plans for expansion and any proposed expansion may need to be accompanied by a separate EIR/FSS and is beyond the scope of this Addendum.

TABLE 1-1 AREA OF SUBJECT LANDS

Landowner	Area (ha)
Rampen Holdings Inc. (Coscorp)	15.36
Rampen Family	5.72
Total Area	21.08

Land use within the Coscorp Draft Plan will include single detached dwellings and street townhouses on public roads. It is intended that this Addendum will allow for the Draft Plan Approval of the Coscorp lands.

1.2.1 EIR SUBCATCHMENT AREA & FSS STUDY AREA

The Subject Lands lie within the Joshua Creek (JC9A and JC17) subwatershed. The JC-7 tributary of Joshua's Creek flows in an easterly direction through the Subject Lands. The limit of the subcatchments are shown on **Figure 1.4**. The EIR Subcatchment Area and the FSS Study Area are shown on **Figure 1.2.**

This Addendum uses the following four terms when referring to various land areas:

- "Subject Lands" referring to the lands at 1086 Burnhamthorpe Road;
- "FSS Study Area" referring to the Coscorp draft plan area;
- "EIR Subcatchment Area" referring to the JC9A and JC17 subcatchment areas; and,
- "Study Areas", referring to both the EIR Subcatchment and the FSS Study Areas.

1.2.2 PARTICIPATING LANDOWNERSHIP

The landowners participating in this Addendum are Coscorp. Coordination with the landowner to the east (Mattamy) has taken place throughout the preparation of this document. Attempts have been made to coordinate with the landowner to the west however, at this time, that landowner is not interested in pursuing development discussions.

1.3 STUDY TEAM

The study team for this Addendum consists of the following:

- Project Management, Servicing/Grading and Stormwater Management – David Schaeffer Engineering Ltd.
- Study Team Coordination and Environmental Planning – Jennifer Lawrence and Associates Inc.
- Natural Heritage – Savanta Inc.
- Geology and Hydrogeology – R. J. Burnside & Associates Ltd.
- Fluvial Geomorphology – GEO Morphix Ltd.
- Robert Russell Planning Consultants – Draft Plan of Subdivision

1.4 NORTH OAKVILLE EAST SECONDARY PLAN

The Subject Lands are subject to the detailed planning framework established through the North Oakville East Secondary Plan (NOESP) – OPA 272.

Figure NOE2 (Land Use) within the NOESP, designates the lands primarily as Neighbourhood Area with smaller areas identified as Natural Heritage System Area and Joshua's Creek Flood Plain Area. Within the Neighbourhood Area, the Master Plan shows General Urban and Sub Urban Areas, with the Sub Urban Area generally adjacent to Core 10 and the Optional Linkage Preserve Area.

From a water resources and natural heritage perspective, the following NOESP policies are applicable to the Subject Lands and this Addendum has ensured conformity with the policy requirements:

1.4.1 Joshua's Creek Flood Plain Area

Figure NOE2 (Land Use) within the NOESP includes a footnote related to the Joshua's Creek Flood Plain Area directing the reader to Sections 7.4.13.1 and 7.6.17 within the NOESP. Policy 7.4.13.1 (Floodplains) subsection (b) is specific to the flood plain on, and adjacent to, the Subject Lands. This flood plain is associated with the tributary to the west of the Subject Lands and not that portion of the tributary that flows through the confined valley on the Subject Lands. Specifically, the policy states:

7.4.13.1 Floodplains

b) Notwithstanding any other policy of this Plan, it is recognized that the floodplain limits established in the North Oakville Creeks Subwatershed Study for the portion of Joshua's Creek located east of Trafalgar Road, south of Burnhamthorpe Road reflect an area of shallow flooding and are based on studies carried out in accordance with the Subwatershed Study and may be further modified in accordance with the provisions of Subsection a). Lands in the floodplain in this area, and adjacent lands shall be subject to the following policies:

i) lands in the floodplain that do not form part of the Natural Heritage Component of the Natural Heritage and Open Space System, and are designated "Joshua Creek Floodplain Area" on Figure NOE2, may only be used for new development which is not susceptible to flood damage or flood risk or which will not cause adverse impacts to existing upstream or downstream development and which is compatible with development in the adjacent Park and Neighbourhood Area designations. Such development shall be limited to flood or erosion control structures; roads, utilities and related facilities which by their nature must be located near water or traverse watercourses; recreational facilities and ancillary facilities of an adjacent land use which are of a passive non-structural nature and do not adversely affect the ability of the flood plain to pass flood waters and may include not more than one stormwater management pond in the location north of Core 10 shown conceptually on Figure NOE3, subject to Section 7.4.7.3;

ii) any adjacent park may utilize lands in the floodplain subject to studies prepared by the Town of Oakville, in consultation with Conservation Halton however, such land will not be considered as part of the parkland dedication under the Planning Act; and,

iii) should a revised floodplain boundary be established in accordance with the provisions of subsection a) the following shall be applicable to the lands outside of any revised floodplain boundary:

- *the boundary of the Linkage Preserve Area as designated on Figure NOE3 shall be reviewed and may be modified to take into account any revised floodplain boundary; and,*
- *the lands outside the revised floodplain boundary shall be considered for development in accordance with the Joshua Creek Community Park Area and Neighbourhood Area land use designations and the related policies of Sections 7.6.11 and 7.6.7 however such lands will only be acceptable as part of the parkland dedication if the land is a configuration and size that can be used effectively as part of a Community Park.*

As noted above, Coscorp has attempted to engage the landowner to the west to discuss options for refining the flood plain limits as per the above policy however, to date, the adjacent landowner is not interested in participating in the development process. Details pertaining to the existing flood plain, and proposed on-site modifications, can be found in **Section 7.11.1**. The Coscorp draft plan has been designed so as to remain outside of the modified flood plain plus an additional 7.5m. However, the ultimate goal is to work with the adjacent landowner to reduce the limit of flooding on the Subject Lands and the lands to the west. As a result, the draft plan has been designed such that the road network can be extended to the west once the flood plain lands are refined.

1.4.2 Linkage Preserve Area

Figure 6.3.11 in NOCSS identifies an Optional Linkage Preserve Area (OLPA) of 100m that connects the northern limit of Core 10 to Core 11. The purpose of the OLPA was to allow for the intervening landowners to relocate the tributary (JC-7) into the OLPA if such a realignment was appropriate. If the landowners opted not to realign the watercourse into the OLPA, the LPA was to be located along the Joshua's Creek tributary. This OLPA is also shown on Figure NOE2 (Land Use) within the NOESP with a footnote referring the reader to Sections 7.4.7.3(c)(viii) and 7.4.14.3(d). These policies, as well as 7.4.7.1 (Natural Heritage Designations) are provided below for context.

7.4.7.1 (Natural Heritage Designations)

The Natural Heritage component of the Natural Heritage and Open Space System, reflecting an alternative Greenlands System as intended by the Regional Plan, is comprised of lands designated "Natural Heritage System Area" on Figures NOE1, NOE2 and NOE4 and "Core Preserve Area", "Linkage Preserve Area", "Optional Linkage Preserve Area", "High Constraint Stream Corridor Area" and "Medium Constraint Stream Corridor Area" on Figure NOE3. It also includes watercourses and features designated as "Other Hydrological Features" on Figure NOE3, to the extent that they are maintained after development occurs, in accordance with policies in Section 7.4.8.

The Natural Heritage System Area designation is comprised of the following key areas:

b) Linkage Preserve Areas and Optional Linkage Preserve Areas

The Linkage Preserve Area and Optional Linkage Preserve Area designations on Figure NOE3 include areas which are designed to link the Core Preserve Areas together to maintain and enhance their environmental sustainability. They follow natural features whenever possible and are intended to be of sufficient size and character to ensure the functionality and sustainability of the Natural Heritage component of the System.

i) The length, width and general location of the Linkage Preserve Areas and Optional Linkage Preserve Areas have been defined based on factors established through the North Oakville Creeks Subwatershed Study including:

- *Composition of potential linkage feature;*
- *Character of the surrounding habitats;*
- *Presence and size of discontinuities; and,*
- *Required buffers*

ii) *The Optional Linkage Preserve Areas have been established based on the potential to relocate adjacent Medium Constraint Streams into the area designated as "Optional Linkage Preserve Area". However, if the adjacent stream is not relocated into the lands designated "Optional Linkage Preserve Area", and remains in place in a manner which satisfied the requirements to serve a linkage function as set out in Subsection 7.4.7.1d), then the lands in the Optional Linkage Preserve Area designation, without the need for amendment to this Plan, may be developed in accordance with the abutting land use designation. Otherwise the lands in the Optional Linkage Preserve Area designation shall be subject to the policies of the Linkage Preserve Area designation.*

d) *Medium Constraint Stream Corridor Areas*

Medium Constraint Stream Corridor Areas, as designated on Figure NOE3, include certain watercourses and adjacent riparian lands, including buffers measured from the stable top-of-bank or meander belts. These areas are located primarily inside Core and Linkage Preserve Areas, but are also found outside such areas. They must be protected for hydrological and ecological reasons. These watercourses may be deepened and/or relocated and consolidated with other watercourses provided that the watercourse feature, as well as the function of the watercourse, is maintained in accordance with the directions established in the North Oakville Creeks Subwatershed Study and Federal, Provincial and Conservation Authority regulations, and natural channel design is used. Where a Medium Constraint Stream Corridor Area is relocated, the land use designation of the abutting lands on Figure NOE2, not the Natural Heritage System Area designation, shall apply to the lands from which the stream is moved. Further, where a Medium Constraint Stream adjacent to an "Optional Linkage Preserve Area" is not being relocated into the "Optional Linkage Preserve Area", then that Medium Constraint Stream shall serve a linkage function similar to a Linkage Preserve Area, in addition to its role as a Medium Constraint Stream. This would include maintaining a minimum linkage width as established in the North Oakville Creeks Subwatershed Study along the Medium Constraint Stream. No modifications may be made to the location of such a stream unless that linkage function can be maintained.

The *JCT EIR/FSS* did not propose the realignment of JC-7 into an OLPA but rather, left JC-7 in-situ. As such, JC-7 will also remain in-situ on the Subject Lands and the 100m LPA will be provided along the existing creek corridor, consistent with the approach to the east.

7.4.7.3 Permitted Uses, Buildings and Structures

(c)(viii) The adaptive re-use of heritage buildings for institutional uses, including an art gallery and art school, in the Linkage Preserve Area associated with Reach JC-7, as identified on Figure 6.3.13 of the North Oakville Creeks Subwatershed Study is permitted. The extension of such buildings or the construction of new buildings and structures may also be permitted, subject to Conservation Halton's regulations and the preparation of an Environmental Implementation Report to the satisfaction of the Town and Conservation Halton, which addresses how the impact to the linkage will be minimized.

In addition to the above, Policy 7.4.14.3 (Integration of Heritage Resources), subsections (a) and (d) provide direction with respect to the existing and future uses on the Subject Lands as follows:

7.4.14.3 Integration of Heritage Resources

a) In evaluating development applications, the Town shall:

i. Encourage the use or adaptive reuse of cultural heritage resources, or key components of such resources, whenever possible as part of the new development in situ, or on an alternate site;

d) In accordance with the policies of Section 7.4.14.3a)i), the existing art school use and expansions to that use, and an art gallery and other similar uses are permitted in the designated heritage buildings and expansions to those buildings or additional buildings approved by the town in accordance with the provisions of the Heritage Act and the Planning Act at 1086 Burnhamthorpe Road East in the East Half of the North Half of Part of Lot 10, Concession I (NDS).

On July 9, 2018, Oakville Town Council issued a Notice of Intention to Designate under Section 29, Part IV of the *Ontario Heritage Act* for the cultural heritage landscape of 1086 Burnhamthorpe Road East, identified as Part 1, 20R-21170 (see **Drawing 11**). The designation effectively restricts development of the retained lands, except for limited repair or expansion of the Arts Centre, in accordance with the above noted NOESP policies.

Based on the above, the NOESP anticipated that a portion of the lands north of JC-7 would be within the 100m LPA and provides for policy considerations to maintain and, potentially expand, the existing uses on the retained parcel. Such expansions are not being proposed at this time and are outside of the scope of this Addendum.

1.5 PREVIOUS STUDIES, REPORTS AND PLANNING DOCUMENTS

The following studies/guidelines/documents were reviewed during the preparation of this Addendum:

- Joshua's Creek Tributaries and the Mattamy Lands EIR/FSS, DSEL et al, August 2019;
- Joshua's Creek Tributaries and the Mattamy Phase 3 EIR/FSS Addendum, DSEL et al, July 2022;
- Fluvial Geomorphic Guidelines, CVC, 2015
- Crossing Guideline for Valley and Stream Corridors, TRCA, 2015
- Town of Oakville North Oakville Creeks Subwatershed Study, August 2006;
- Town of Oakville Draft North Oakville Creeks Subwatershed Study Addendum, September 2007;
- Ontario Municipal Board Mediation Agreements, 2007;
- Town of Oakville Official Plan Amendment 272 (North Oakville East Secondary Plan), August 2007;
- North Oakville Environmental Implementation Report and Functional Servicing Study Terms of Reference, August 2, 2013;
- North Oakville – Milton East Wetland Complex, MNR, 2006;
- Stormwater Management Planning and Design Manual, Ministry of Environment, March 2003 (SWMP Design Manual);
- Stormwater Monitoring Guidelines North of Dundas Street Town of Oakville, January 2012;
- Town of Oakville Development Engineering Procedures and Guidelines Manual, January 2011;
- Design Criteria, Contract Specifications and Standard Drawings, Region of Halton, February 2001 (updated February 2012), and;
- Area Servicing Plan prepared by MMM Group for North Oakville Community Builders Inc. (NOCBI), April 2011.

1.6 EIR/FSS LAYOUT

The sections and information provided in this report are based on the Town of Oakville "North Oakville Environmental Implementation Report and Functional Servicing Study Terms of Reference" (August 2013) and remain in generally the same format as that which was presented in the *JCT EIR/FSS*.

2.0 NATURAL HERITAGE SYSTEM FRAMEWORK

Within this Section, **Figure 2.1** has been updated from the *JCT EIR/FSS* to include the Subject Lands, Study Area and proposed 100m Linkage Preserve Area along JC-7. **Figure 2.2** remains unchanged and reference should be made to the *JCT EIR/FSS* for this figure.

The NOESP, NOCSS and the NOCSS Addendum provide policies and/or directions with respect to the protection and management of the North Oakville East Natural Heritage/Open Space System. The NOCSS is divided into four sections, which follow the four phases of a subwatershed management approach. They include Characterization (Section 4.0), Analysis (Section 5.0), Management Strategy (Section 6.0) and Implementation (Section 7.0). For this Addendum, the NOCSS Management Strategy and Implementation sections provide the framework and primary direction for how environmental features are to be addressed with respect to the specific development plan.

The Management Strategy outlines requirements with regard to lands that are restricted from development, lands with development limitations or constraints, stormwater management, input to land use policies and servicing requirements. The Implementation Plan outlines the implementation requirements for the recommended management strategy, studies needed in subsequent stages of the development process, environmental reporting requirements, agency responsibilities, and the approval process with the Town of Oakville, Halton Region and Conservation Halton, and, where applicable, MNRF and DFO. With the recent transition of the *Endangered Species Act* responsibilities to the Ministry of Environment, Conservation and Parks (MECP), there is also a need to consult with this agency.

2.1 NATURAL HERITAGE SYSTEM COMPONENTS

The information related to the Natural Heritage System Framework, as presented in the *JCT EIR/FSS*, remains valid however, it was generally focused on the Mattamy Bressa and Dunoak lands. Please refer to the *JCT EIR/FSS* for the Natural Heritage System characterization for those lands. The following information is specific to the Subject Lands:

Core Preserve Areas

Core Preserve Areas include key natural features, or groupings of key natural features, together with required buffers and adjacent lands intended to protect the function of those features and ensure the long-term sustainability of the Natural Heritage System (NHS). Core Preserve Areas are generally comprised of Areas of Natural and Scientific Interest (ANSIs), Provincially Significant Wetlands (PSWs) and significant woodlands.

A portion of Core 10 (Buttonbush) is located on the Subject Lands. Discussion on this Core can be found in **Section 3.0.**

Linkage and Optional Linkage Preserve Areas

Linkage Preserve Areas (LPA) and Optional Linkage Preserve Areas (OLPA) are defined in NOCSS as areas that connect Core Preserve Areas together, following natural features where existing and/or feasible, with the intention of protecting and, where possible, enhancing the Core Preserve Area features and their functions. LPAs and OLPAs are intended to be of sufficient size and character to ensure the functionality and sustainability of the NHS.

Figure 6.3.11 in NOCSS identifies an OLPA of 100m, across the Subject Lands, that connects the northern limit of Core 10 to Core 11. The purpose of the OLPA was to allow for the intervening landowners to relocate the tributary (JC-7) into the OLPA if such a realignment was appropriate. If the landowners opted not to realign the watercourse

into the OLPA, the LPA was to be located along the existing Joshua's Creek (JC-7) tributary. Additional discussion on the LPA on the Subject Lands can be found in **Section 4.0**.

Medium Constraint Stream Corridors (Blue Streams)

JC-7, on the Subject Lands, was identified as a medium constraint (blue stream) within NOCSS. As set out in OPA 272 policies, medium constraint streams may be deepened and/or relocated however, they must remain open for hydrological and ecological reasons. Given the planning decisions related to the downstream reach of this watercourse on the Mattamy lands to the east, there is no proposal to realign the watercourse on the Subject Lands. The watercourse will remain in situ within the 100m LPA as detailed in **Section 4.0**.

Other Hydrological Features

Other Hydrological Features include Low Constraint Streams, Hydrologic Features A and Hydrologic Features B. There are no Low Constraint Streams or Hydrologic Features A or B on the Subject Lands. There are 3 Ponds on the Subject Lands (i.e., topographic depressions, ponds and pits (DPP)). DPPs do not form part of the NHS however, they must be addressed as part of the SWM system design. Constructed ponds do not need to be included in the assessment of depressional storage. There are three DPPs on the Subject Lands identified as P-31, P-32 and P-33 in the *JCT EIR/FSS* and all are found along JC-7 as shown on **Figure 2.1**. **Table 2-1** provides the feature description, type and catchment location. Since all of these ponds are within the JC-7 watercourse corridor, and are constructed ponds with no plans for realignment or removal, no additional assessments have been undertaken.

Table 2-1 Pits, Ponds and Depressions

Feature Identification	Catchment	Origin	Comment
P-31	JC9A	Constructed	Feature is within the NHS so will not be altered.
P-32	JC9A	Constructed	Feature is within the NHS so will not be altered.
P-33	JC9A	Constructed	Feature is within the NHS so will not be altered.

2.2 PERMITTED USES IN THE NATURAL HERITAGE SYSTEM

2.2.1 OPA 272 and NOCSS

OPA 272, Policy 7.4.7.3 identifies potential permitted uses in the NHS. This policy addresses permitted uses including development, land disturbance, roads and related utilities, expansion of existing water and wastewater services, trails and passive recreational uses, SWM facilities, grading, private driveways and the adaptive use of institutional buildings. Table 2-2 summarizes policy direction on permitted uses and notes report sections in this Addendum that address these permitted uses, where applicable.

Section 7.3.1 of NOCSS also lists permitted uses in Cores, Linkages and High and Medium Constraint Stream Corridors. These include:

- Development or land disturbances required for flood and stream bank erosion control and protection of fish, wildlife and conservation management;
- Infrastructure/utility access and crossings;
- Public pedestrian trails; and,
- SWM facilities.

These uses are subject to studies such as this Addendum to address the placement of facilities / uses to ensure that they are compatible with core area management set out in Section 6.3.5 of NOCSS. Management recommendations for Core 10 are listed in **Section 3.0**.

Section 6.3.5.2 of NOCSS, OMB Minutes of Settlement and some mediation agreements also address permitted uses in the NHS. With respect to this Addendum, reference was made to direction provided on trails in the NHS in Section 6.3.5.2 of NOCSS.

Direction presented in NOCSS Section 6.3.5.3 on permissible grading in the NHS was also referenced and provided guidance to the preparation of the preliminary grading plan for the Subject Lands.

2.2.2 Results of OMB Mediation and Settlement

Several water resource related agreements were made between the Town, CH and the Landowners during the OMB hearing mediation discussions. Also, Minutes of Settlement (MOS) were entered into between the Town, CH, the Region and the Landowners. The mediation agreements and MOS have been reviewed and matters relating to the EIR study components were addressed through the preparation of this Addendum.

The relevant sections of the MOS that are pertinent to this Addendum include:

June 15, 2006 MOS, Sections regarding Natural Heritage Lands:

Section 4(b) states that, *"subject to Sections 6 to 9, the Natural Heritage Lands shall be dedicated on an 'as-is, where-is' basis. The boundaries of the Natural Heritage Lands are more particularly delineated on Schedule 'D' hereto. The final precise boundaries of the Natural Heritage Lands shall be determined by an Environmental Implementation Report accepted by the Town in accordance with the Town's Position (which is intended to 'ground truth', but not substantially revise, the boundaries as shown on Schedule 'D' hereto."*

Section 7 states that, "*…the Town will not require the Landowners to undertake or fund, directly or indirectly,*

a) Any maintenance after dedication;
b) Any works to enhance the Natural Heritage Lands; and,
c) Any monitoring of the Natural Heritage Lands, other than in respect of the Landowner's stormwater management facilities."

Section 8 notes, "*The Town and Landowners agree that Sections 4(b) and 7 shall not apply:*

c) In respect to works undertaken on the Natural Heritage Lands that relate to municipal services such as roads, watermains, sanitary sewers, stormwater management works or trails (provided that nothing herein shall be deemed to grant any approval or permission to undertake such works)."

Mediation Agreements include:

- Stage-Storage-Discharge Characteristics dated February 21, 2007;
- Infiltration dated February 22, 2007;
- Depressional Storage dated May 30, 2007;
- Regional Storm Flood Protection dated May 30, 2007;
- Total Phosphorus dated May 31, 2007;
- Erosion Control for SWM and Erosion Thresholds dated May 31, 2007;
- Hydrology Model and Hydraulics Model for a portion of Joshua's Creek flood plain mapping dated May 31, 2007;
- SWM Ponds Outside of Core and Linkages dated June 19, 2007;
- Changes to EIR Subcatchment Boundaries dated June 29, 2007;
- Flow Rates/Hydrology dated July 4, 2007;
- Stormwater Management – Temperature and Dissolved Oxygen Targets dated July 12, 2007;
- Monitoring dated July 26, 2007;
- EIR/FSS Terms of Reference dated August 2, 2007; and,
- Grading and the Natural Heritage System, undated.

Table 2-2 Permitted Uses and Policy Direction within Natural Heritage Lands

OPA 272 Policy #	Potential Permitted Use	Policy Direction	Addressed in Addendum Section(s)
7.4.7.3c)i)	Development or land disturbance	Permitted in accordance with the directions of NOCSS and any related EIR and Federal, Provincial and CA regulations for required flood and stream bank erosion control; for fish, wildlife and conservation management, to accommodate a stormwater outfall; or in Medium Constraint Stream Corridor Areas.	Not applicable to this Addendum
7.4.7.3c)ii)	Roads and related utilities	Permitted only to cross the designation in the general area of the road designations shown on Figures NOE2 and NOE4 or as defined through an EA; road design criteria are identified in policies.	Not applicable to this Addendum
7.4.7.3c)iii)	Expansion to existing Water and Wastewater Services	Expansion permitted to existing Water and Wastewater Services which are located on sites with existing facilities subject to any required EA.	Not applicable to this Addendum
7.4.7.3c)iv)	Trails, interpretive displays or signage or other similar passive recreation uses	Permitted if consistent with the purpose of the applicable designation and criteria listed in policy.	Section 6
7.4.7.3c)v)	Stormwater Management Facilities	Permitted subject to direction of NOCSS, conformance with technical performance specifications listed in policy and as shown conceptually on Figure NOE3.	Not applicable to this Addendum
7.4.7.3c)vi)	Grading in the Natural Heritage component of the Natural Heritage and Open Space System	Permitted in accordance with the direction established in NOCSS or appropriate EA.	Section 6
7.4.7.3c)vii)	Private driveways	Permitted across the LPA joining the north area and south area of the Core Preserve Area located north of Burnhamthorpe Road and west of Trafalgar Road.	Not applicable to this Addendum
7.4.7.3c)viii)	Adaptive re-use of heritage buildings for institutional uses	Art gallery and art school permitted in the LPA associated with Reach JC-7.	Section 2

3.0 NHS DELINEATION

Sections 3.0, 3.1 and 3.2 include new information based on work that has been completed subsequent to the submission of the *JCT EIR/FSS* on the Subject Lands on the north side of Core 10 and along the JC-7 watercourse corridor. Information within Section 3.0 of the *JCT EIR/FSS* related to the NHS on the Mattamy Bressa and Dunoak lands remains valid and reference to that report should be made for those details. **Figure 3.1** has been added to this Addendum to detail the NHS staking limits on the Subject Lands. **Appendices B-1 and B-2** from the *JCT EIR/FSS* remain valid and reference should be made to that document for those appendices. **Appendix B-3** has been added to incorporate agency correspondence related to the NHS stakings that took place on the Subject Lands.

3.1 DELINEATION OF BOUNDARIES

3.1.1 Core 10

Subsequent to the issuance of the *JCT EIR/FSS*, the Core 10 boundary has been updated to reflect staking that took place on June 28, 2017 by CH, MNRF, Town of Oakville and Halton staff on the Subject Lands**. Figure 3.1** reflects the Core 10 and JC-7 watercourse corridor boundaries.

There are four Provincially Significant Wetlands (PSWs) on the Subject Lands, identified as PSWs 31, 32, 33 and 60 in the North Oakville Milton East Wetland Complex. PSWs 31 and 60 are contained entirely within the wooded portion of Core 10 whereas PSWs 32 and 33 are located within the agricultural field north of the woodland. On June 28, 2017, MNRF staff (S. Varga) attended on-site with representatives of the Addendum study team to stake the limit of the PSWs. While on-site, MNRF staff identified one small wetland pocket, within the woodland, that was not previously identified in NOCSS. This feature is identified as PSW 31a on **Figure 3.1**. A 30 m buffer has been applied to each wetland, including PSW 31a, as shown on **Figure 3.1**.

In order to establish the Core 10 boundary, it was also necessary to stake the limit of the woodland dripline. On June 28, 2017, Halton Region staff (J. Elliott) staked the woodland dripline in the field with representatives of the Town of Oakville and CH present. Stakes were subsequently surveyed, and appropriate buffers added to establish the Core 10 boundary on these sites. The details of these stakings were summarized in a letter to the agencies dated January 17, 2019 with subsequent mapping updates provided on February 22, 2019 (**Appendix B-3**). The NHS limits, as shown on **Figure 3.1** were approved by CH and the Region in letters/emails dated May 7, 2019 and February 19, 2019 respectively (**Appendix B-3).** A copy of the wetland survey was provided in CAD format to Mr. Steve Varga at MNRF on May 9, 2019 **(Appendix B-3).**

Figure 3.1 illustrates the Core boundary on the Subject Lands. Consistent with NOCSS requirements, the Core boundary on the Subject Lands was established as follows:

- 30m buffers to PSWs 31, 31a, 32, 33 and 60;
- 10m buffer to woodland dripline; and,
- Diagonal line drawn from the greatest buffer limit at the northeast corner of Core 10 (Coscorp/Mattamy property line) to the Coscorp westerly property line, ensuring that 30m buffers were provided to all PSWs. The diagonal line trajectory is based on the line as shown on Figure 6.3.11 of NOCSS.

The Core boundary along the Coscorp / Mattamy boundary has been rationalized and information has been shared with Mattamy.

3.1.2 JC-7 Watercourse Corridor and Linkage Preserve Area

As outlined in **Section 2.1**, Linkage Preserve Areas (LPA) and Optional Linkage Preserve Areas (OLPA) are defined in NOCSS as areas that connect Core Preserve Areas together, following natural features where existing and/or feasible, with the intention of protecting and, where possible, enhancing the Core Preserve Area features and their functions. Figure 6.3.11 in NOCSS identifies an OLPA of 100m, across the Subject Lands, that connects the northern limit of Core 10 (to the west of the Subject Lands) to Core 11 (to the east of the Subject Lands). The purpose of the OLPA was to allow for the intervening landowners to relocate the tributary (JC-7) into the OLPA if such a realignment was appropriate. If the landowners opted not to realign the watercourse into the OLPA, the LPA was to be located along the existing Joshua's Creek tributary.

The NOESP includes the following policies related to LPAs and OLPAs. Policy 7.4.7.1(b)(ii) is specific to the OLPA on the Subject Lands and 7.4.7.1(d) provides direction with respect to the width of the LPA if the landowners opt not to utilize the OLPA:

7.4.7.1 (Natural Heritage Designations)

The Natural Heritage component of the Natural Heritage and Open Space System, reflecting an alternative Greenlands System as intended by the Regional Plan, is comprised of lands designated "Natural Heritage System Area" on Figures NOE1, NOE2 and NOE4 and "Core Preserve Area", "Linkage Preserve Area", "Optional Linkage Preserve Area", "High Constraint Stream Corridor Area" and "Medium Constraint Stream Corridor Area" on Figure NOE3. It also includes watercourses and features designated as "Other Hydrological Features" on Figure NOE3, to the extent that they are maintained after development occurs, in accordance with policies in Section 7.4.8.

The Natural Heritage System Area designation is comprised of the following key areas:

b) Linkage Preserve Areas and Optional Linkage Preserve Areas

The Linkage Preserve Area and Optional Linkage Preserve Area designations on Figure NOE3 include areas which are designed to link the Core Preserve Areas together to maintain and enhance their environmental sustainability. They follow natural features whenever possible and are intended to be of sufficient size and character to ensure the functionality and sustainability of the Natural Heritage component of the System.

i) The length, width and general location of the Linkage Preserve Areas and Optional Linkage Preserve Areas have been defined based on factors established through the North Oakville Creeks Subwatershed Study including:

- *Composition of potential linkage feature;*
- *Character of the surrounding habitats;*
- *Presence and size of discontinuities; and,*
- *Required buffers*

ii) The Optional Linkage Preserve Areas have been established based on the potential to relocate adjacent Medium Constraint Streams into the area designated as "Optional Linkage Preserve Area". However, if the adjacent stream is not relocated into the lands designated "Optional Linkage Preserve Area", and remains in place in a manner which satisfied the requirements to serve a linkage function as set out in Subsection 7.4.7.1d), then the lands in the Optional Linkage Preserve Area designation, without the need for amendment to this Plan, may be developed in accordance with the abutting land use designation. Otherwise the lands in the Optional Linkage Preserve Area designation shall be subject to the policies of the Linkage Preserve Area designation.

d) Medium Constraint Stream Corridor Areas

Medium Constraint Stream Corridor Areas, as designated on Figure NOE3, include certain watercourses and adjacent riparian lands, including buffers measured from the stable top-of-bank or meander belts. These areas are located primarily inside Core and Linkage Preserve Areas, but are also found outside such areas. They must be protected for hydrological and ecological reasons. These watercourses may be deepened and/or relocated and consolidated with other watercourses provided that the watercourse feature, as well as the function of the watercourse, is maintained in accordance with the directions established in the North Oakville Creeks Subwatershed Study and Federal, Provincial and Conservation Authority regulations, and natural channel design is used. Where a Medium Constraint Stream Corridor Area is relocated, the land use designation of the abutting lands on Figure NOE2, not the Natural Heritage System Area designation, shall apply to the lands from which the stream is moved. Further, where a Medium Constraint Stream adjacent to an "Optional Linkage Preserve Area" is not being relocated into the "Optional Linkage Preserve Area", then that Medium Constraint Stream shall serve a linkage function similar to a Linkage Preserve Area, in addition to its role as a Medium Constraint Stream. This would include maintaining a minimum linkage width as established in the North Oakville Creeks Subwatershed Study along the Medium Constraint Stream. No modifications may be made to the location of such a stream unless that linkage function can be maintained.

The *JCT EIR/FSS* to the east of the Subject Property did not propose the realignment of JC-7 into an OLPA but rather, left JC-7 in-situ. As such, JC-7 will also remain in-situ on the retained parcel and the LPA will be maintained along the existing creek corridor, consistent with the approach to the east. The eastern limit of the LPA on the Subject Lands has been designed to match the LPA limit to the east that was approved through the *JCT EIR/FSS*.

On June 28, 2017, CH staff staked the top of bank limits on the north and south sides of the JC-7 valley system. The details of these stakings were summarized in a letter to the agencies dated January 17, 2019 with subsequent mapping updates provided on February 22, 2019 (**Appendix B-3**). The watercourse corridor limits, as shown on **Figure 3.1** were approved by CH in a letter dated May 7, 2019 (**Appendix B-4**). As noted in the January 17, 2019 letter to the agencies (**Appendix B-3**), there was some discussion in the field with respect to whether there is a confined valley system (i.e., physical top of bank) along the north side of JC-7 west of the existing house. Given that no development is proposed in this area, it was agreed that determination of a top of bank feature could be deferred to a future Addendum. This has been noted on **Figure 3.1** and in **Section 13.1**.

The watercourse corridor limits, as shown on **Figure 3.1**, are based on the greater of the following constraints:

- Physical top of bank plus 7.5m;
- Regional Storm flood plain plus 7.5m;
- Meander belt plus 7.5m;
- 15m on either side of the bankfull channel for fisheries; and,
- 100 m Linkage Preserve Area generally centred along the watercourse corridor.

There is only one location, at the very eastern limit of the Subject Lands, where the watercourse is in close proximity to the toe of slope. This would normally necessitate a stable top of bank assessment however, given the extent of the 100m Linkage Preserve area on the south side of the watercourse corridor in this location, CH staff agreed, in their letter of May 7, 2019, that the stable top of bank assessment would not be necessary (**Appendix B-3**).

In addition to the LPA associated with JC-7 through the northern portion of the Subject Lands, there is also a component of the LPA that may need to be accommodated along the western limit of the Subject Lands, depending on the ultimate alignment of JC-8 that flows along the property limit between the Subject Lands and the lands to the west (**Figure 2.1**). As noted in **Section 1.2.2**, the landowners to the west are not currently interested in discussing development options. As a result, some minor cut and fill is proposed on the Subject Lands in order to contain a shallow but expansive flood

plain on the Subject Lands associated with JC-8. It is anticipated that, once the landowner to the west advances for development, there may be an opportunity to lower/realign that portion of JC-8 along the property limits to further minimize the flood plain encroachment. **Figure 3.1** provides a conservative LPA that is centred on the watercourse channel (i.e., 50m on either side) as identified in the Land Information Ontario database and verified through the use of aerial imagery.

4.0 GEOLOGY AND HYDROGEOLOGY

Geology and hydrogeology, including scope of work, physiography and topography, drainage, climate, geology, water quality and geotechnical investigations are discussed in detail in the *JCT EIR/FSS*. This information has been supplemented with site-specific groundwater monitoring undertaken by R. J. Burnside and Associates on the Subject Lands and this section has been updated to reflect this site-specific data collection. **Figures 4.1** to **4.6** and **4.11** have been updated to include the Subject Lands. **Appendix C** also includes the site-specific data collection for the Subject Lands.

4.1 SCOPE OF WORK

The scope of work completed for the hydrogeological component of the EIR/FSS Addendum was designed to address the technical requirements as set out in the EIR Hydrogeological Terms of Reference for North Oakville (TOR, 2007). These requirements were outlined in Section 4.1 of the *JCT EIR/FSS*.

The detailed scope of work for the Subject Lands included:

1. Review of Ministry of the Environment, Conservation and Parks (MECP) water supply well records and available geotechnical reports for the Subject Lands to assess the regional hydrogeological setting and soil conditions. A listing of the MECP water supply well records for the area is provided in **Appendix C-1**. The locations of the water supply wells (as recorded in the MECP records) and the borehole locations are illustrated on **Figure 4.1**.
2. Drilling and installation of one monitoring well (MW), one MW nest (with one shallow and one deep well), one piezometer (PZ) and one PZ nest (with one shallow and one deep piezometer) on the Subject Lands to investigate the site-specific soil and groundwater conditions. The borehole, groundwater monitoring wells and piezometer locations on and around the Subject Lands are shown on **Figure 4.1** and copies of the borehole logs and observation well construction details are provided in **Appendix C-2**.
3. Single well response testing of 3 groundwater monitoring wells (RJB1, RJB2s, RJB2d) to estimate the in-situ hydraulic conductivity of the geological units. The field testing results are included in **Appendix C-3**.
4. Monitoring of groundwater levels to measure the depth to the water table and assess the horizontal and vertical groundwater flow conditions. For this study, water level monitoring data was collected monthly during the first year of monitoring (July 2017 to June 2018), bi-monthly from June 2018 to August 2019, and quarterly since August 2019 (last monitored in December 2019). In addition to the manually recorded groundwater levels, automatic water level recorders (dataloggers) were installed in two monitoring wells and one piezometer to record detailed and continuous water level measurements over the period of monitoring. The groundwater monitoring data are summarized in **Table C-4-1** in **Appendix C-4**. Hydrographs are also provided in **Appendix C-4**.
5. A surface water monitoring station was established along the watercourse that crosses the Subject Lands. Monthly field measurements of the surface water level and estimated flow were completed from July 2017 to June 2018, bi-monthly from June 2018 to August 2019, and quarterly since August 2019. Surface water monitoring data are provided in **Appendix C-5**. Flow, when present, was estimated utilizing a stream area - velocity method. The surface water flow data are summarized in **Appendix C-5**.
6. Collection of groundwater samples from two monitoring wells (RJB1 and RJB2s) for laboratory testing to characterize the background water quality. Samples collected on June 14, 2018 were submitted to a qualified laboratory for analyses of general quality indicators (e.g., pH, hardness, conductivity), basic ions (including chloride and nitrate) and selected metals. The water quality data are provided in **Table C-6-1** in **Appendix C-6**.
7. Collection of surface water samples from the monitoring station SS1 to characterize the surface water quality. Samples collected on December 19, 2017 were submitted to a qualified laboratory for analysis of general quality indicators (e.g., pH, hardness, conductivity), basic ions (including chloride and nitrate) and selected metals. Field testing of temperature, pH, conductivity and total dissolved solids was also completed when flow was present. The laboratory and field water quality data are provided in **Tables C-6-2** and **C-6-3**, respectively in **Appendix C-6**.

8. Pre-development water balance calculations (based on existing land use conditions) and post-development water balance calculations (based on the proposed development plan) for the Subject Lands to assess the potential impacts of development on the local groundwater resources. The local climate data and detailed monthly water balance calculations are provided in **Appendix C-7**.

4.2 PHYSIOGRAPHY AND TOPOGRAPHY

The regional physiographic setting and topography of the Joshua's Creek subcatchments was described in Section 4.2 of the *JCT EIR/FSS*.

The land surface on the Subject Lands slopes gently to the south and east. The Subject Lands are characterized by a low relief undulating till surface. Analysis of the detailed topography indicates a maximum relief amplitude of about 10m. The highest elevations (up to 184 masl - m above mean sea level) are found along the northern portions of the Subject Lands. The JC-7 creek flows across the northern part of the Subject Lands from west to east. The stream corridor is bordered by steep banks up to four metres tall as it crosses out of the property towards the east. The lowest elevations (170 masl) are found along JC-7 and towards the south edge of the Subject Lands (**Figure 4.2**).

4.3 DRAINAGE

The drainage areas for the EIR Subwatershed Area are illustrated on **Figure 4.2**. The Subject Lands primarily fall in the JC9A subcatchment, which drains to the southeast via the tributary crossing the north part of the property (JC-7, NOCSS). Runoff in the north part of the property drains towards the tributary, while south of the tributary, runoff drains west towards the tributary off of the property. The south end of the Subject Lands is in the Joshua's Creek West Tributary Subcatchment (JC17). Based on topographic mapping, runoff in this area drains towards PSWs 60 and 31 at the south edge of the Subject Lands (**Figure 4.2**).

Surface water flow monitoring for the Subject Lands was conducted monthly at SS1 from July 2017 to June 2018, bimonthly from June 2018 to August 2019, and quarterly after August 2019. The monitoring data are summarized in **Appendix C-5**. This monitoring was conducted to confirm intermittent versus perennial flow conditions as part of the groundwater/surface water interaction assessment, and therefore, when possible, the flow monitoring was completed during dry weather conditions. The monitoring data supplements historical long-term flow monitoring data collected since 2001 in Joshua's Creek Subwatershed during the previous subwatershed studies (NOMI North Oakville East Subwatersheds Study, 2004).

The flow monitoring completed between July 2017 and December 2019 found there was typically only measurable flow at the flow monitoring station SS1 during the spring (**Table C-5-1**, **Appendix C-5**). Dry conditions were observed in the 2018 and 2019 summers. Precipitation recorded at the Hamilton A climate station indicates the precipitation during the monitoring period was generally close to historic levels during the monitoring period, with the exception of a significant decrease from normal in September 2017, an increase in April 2018, and higher than normal for most of 2019. (**Figure C-7-1**, **Appendix C-7**). These data confirm the ephemeral nature of the drainage, the lack of baseflow contribution from groundwater in the subcatchment and the surface water runoff function of the watercourse. These flow monitoring data are consistent with the subwatershed study historical flow monitoring data from August 2001 to June 2006 that reported measurable flows only in response to precipitation and seasonal water runoff events.

A staff gauge (SG1) was installed in the JC-7 to monitor creek levels. The surface water is highest during the spring with levels up to 20cm and 45cm deep recorded during the spring of 2018 and 2019. No surface water was recorded during the summer of 2017 and 2018, and lower levels up to 6cm were recorded during the late fall in 2017 and 2018 (**Table C-5-2**, **Appendix C**).

There are two ponds on the Subject Lands along the JC-7 watercourse on either side of the existing creek crossing. These features are interpreted to be excavated into the water table. Groundwater flow through the features is limited

due to the nature of the soils; however, the saturated, low hydraulic conductivity till aids ponding of the precipitation and surface water runoff that provides the main source of water to these ponds.

4.4 CLIMATE

The climate data, as presented and discussed in the *JCT EIR/FSS*, was utilized for this study.

4.5 GEOLOGY

The following geology sections have been reproduced from *JCT EIR/FSS*, with the data collected form the Subject Lands added to refine the interpretations.

4.5.1 Stratigraphy

The MECP maintains a database that provides geological records of water supply wells drilled in the province. A list of the available MECP water well records for local private wells is provided in **Appendix C-1** and the well locations are plotted on **Figure 4.5**. These records have been referenced, along with geological information obtained from local geotechnical boreholes and groundwater observation wells (**Appendix C-2**), to assess the regional stratigraphy. To illustrate the geological conditions, a schematic cross-section through the Study Area has been prepared. The cross-section location is illustrated on **Figure 4.5** and the interpreted cross-section is provided on **Figure 4.6**. The cross-section illustrates the stratigraphy of the North Oakville area, with glacial till overburden sediments overlying shale bedrock. The characteristics of the overburden sediments and shale bedrock are described in the following sections.

4.5.2 Surficial Geology

Surficial geology mapping published by the Ontario Geological Survey (2003) indicates the Subject Lands are covered by clayey silt to silt glacial till deposits as illustrated on **Figure 4.3**. Regionally, the overburden sediments range in thickness from 0m to 25m.

Site specific soil conditions for the Subject Lands were documented by the 2018 installation of 3 monitoring wells. The drilling locations and adjacent wells completed for the *JCT EIR/FSS* are shown on **Figure 4.5**, and the logs for the monitoring wells are provided in **Appendix C-2**. At the wells, the overburden ranges from 5.1m to 5.5m in thickness and includes an upper layer of clayey silt till ranging from about 3m to 4m in depth. The surficial layer is underlain by a lower deposit of silty sand/sandy silt ranging from about 1m to 2.5m in thickness which overlies the shale bedrock. The borehole log for DL1, located just east of the northern end of the Subject Lands shows sandy silt overlying clayey silt till. The well logs have been used to create an interpreted cross-section (**Figure 4.6**).

4.5.3 Bedrock Geology

Published bedrock geology mapping of the area indicates the broader region is underlain by shale bedrock of the Queenston Formation as shown in **Figure 4.4**. This late-Ordovician aged bedrock consists of relatively soft, friable, red and green shale containing thin (< 30cm) interbeds of fine sandstone and siltstone. Within the EIR Subcatchment Area, the bedrock elevation is generally between about 173 masl to 176 masl (**Figures 4.6**), located about 3m to 5m below ground surface.

4.6 HYDROGEOLOGY

4.6.1 Local Groundwater Use

The local groundwater use was discussed in the *JCT EIR/FSS*. The MECP water well database has no record of private water supply wells located on the Subject Lands. It is noted that it is possible for some wells to either not be included or to be improperly located in the online database. With this in mind it is acknowledged that there may be a private well

associated with an existing house on the lands to be retained. However, there are wells close to the property along Burnhamthorpe Road associated with the existing residences.

4.6.2 Groundwater Levels

Groundwater monitoring was conducted as part of the *JCT EIR/FSS* and the results were presented in that report. The conclusions of the *JCT EIR/FSS* indicate the following regarding groundwater:

- In southern Ontario, there is a seasonal groundwater fluctuation pattern that typically appears on groundwater level hydrographs from shallow wells. The groundwater levels tend to be the highest in the spring, decline throughout the summer and early fall and then rise again in the late fall/early winter. The recorded depth to the water level in the monitoring wells generally ranged from grade to 5.6m below ground.
- Data from the monitoring well nests and piezometer nests indicated that groundwater recharge conditions occur in the upland areas, and ponded surface water in wetlands and depressions recharges the shallow soils and supports high groundwater table conditions.

Groundwater levels in MWs and PZs were measured monthly from July 2017 until June 2018, bimonthly between June 2018 and May 2019, and quarterly beginning August 2019 (**Table C-4-1**, **Appendix C-4**). The available groundwater monitoring data are summarized in **Table C-4** and hydrographs are provided on **Figures C-4-1** through **C-4-6** in **Appendix C-4**. In addition to the manual water level measurements recorded at each location, automatic water level recorders (dataloggers) were installed in July 2017 at RJB2s and PZ1s. In April 2018, an additional data logger was installed at RJB2d to record continuous water levels. The datalogger hydrographs are presented on **Figure C-4-2** and **Figure C-4-5** in **Appendix C-4**.

The groundwater monitoring data indicate the following (refer to **Figure 4.1** for the monitoring well locations and the hydrographs in **Appendix C-4**):

- The groundwater levels in the Subject Lands monitoring wells follow the typical seasonal patterns discussed in the *JCT EIR/FSS*. The seasonal water level fluctuation of shallow MWs on the Subject Lands ranged from 1.7m to 2.7m during the monitoring period (refer to **Figures C-4-1** through **C-4-6**).
- Ground elevations are illustrated on the hydrographs in **Appendix C-4**. The depth below grade to the water table on the Subject Lands generally ranges from 0.6m above grade (at RJB2s; **Figure C-4-2**, **Appendix C-4**) to about 3.1m below grade (at RJB1, **Figure C-4-1**, **Appendix C-4**).
- One nest of MWs (i.e., one shallow and one deep well at the same location) was completed at the south end of the Subject Lands (RJB2s/RJB2d on **Figure 4.1**). The deeper well RJB2d was constructed in February 2018. At this nest, the water level in the shallow well has consistently been higher than the level in RJB2d (**Figures C-4-2**; **Appendix C-4**), indicating a downward gradient (i.e. groundwater recharge).
- The detailed water level measurements provided by automatic dataloggers in RJB2s, RJB2d illustrate the relationship between the groundwater levels and precipitation. As evident on **Figure C-4-2**, the water levels in the shallower well appear to respond rapidly to precipitation events; while in the deeper well, there is little to no response. This is interpreted to be due to decreasing hydraulic conductivity with depth in the till.
- The groundwater levels at PZ1 ranged from 0.9m below ground (Sept 2017) to 0.1m above ground (May 2, 2019). The hydrograph (**Figure C-4-5**, **Appendix C-4**) shows the water level at PZ1 does not have a direct response to precipitation. The water level generally rises in the weeks following a period of increased precipitation but does not appear to respond to individual events.
- One piezometer nest (PZ2sd) was installed on the Subject Lands to monitor shallow groundwater level interaction with surface water features. The water level at PZ2s is higher than PZ2d for most of the monitoring period, except for late fall in 2017 and August 2019, indicating a downward gradient (i.e. groundwater recharge). The periods where the level in the shallow piezometer is interpreted to be caused by a quicker drying out of the shallow soils in response to dry conditions.

4.6.3 Groundwater Flow Conditions

Groundwater elevation data from *JCT EIR/FSS* are provided on **Figure 4.11**. The interpreted groundwater elevation contours indicate that the groundwater flow is generally moving southeast and is consistent with the regional groundwater flow mapping that confirms groundwater flows from the topographic high of the Trafalgar Moraine southeast towards Lake Ontario (NOCSS, 2006). The groundwater flow contours illustrate the interpreted convergence of flow along the topographically lower areas of the Joshua's Creek Main Tributary and the Joshua's Creek West Tributary watercourses (**Figure 4.2**).

On the Subject Lands, the interpreted groundwater flow direction is predominantly towards the east, the exception being in the vicinity of the incised watercourse which draws groundwater north and south down from the tops of its banks.

4.6.4 Hydraulic Conductivity

There are various methods that can be applied to assess soil hydraulic conductivity, i.e. the ability of the soil to transmit groundwater. Grain-size data and soil characteristics can be utilized to provide a general estimate of hydraulic conductivity. In-situ bail down or slug-testing methods are used in groundwater monitoring wells to assess site-specific hydraulic conductivity. Bail-down tests were conducted in several monitoring wells as part of the *JCT EIR/FSS* and details of that work were included in Section 4.6.3 of that report. The results of the testing indicated hydraulic conductivities ranging from 10^{-5} to 10^{-7} cm/sec. These are considered to be low values.

The silty clay nature of the surficial till suggests that the hydraulic conductivity of the till is very low; although the effective hydraulic conductivity of the uppermost weathered layer of the till at surface may be higher due to fractures, vegetation roots, etc.

Bail-down tests were conducted at RJB1 and RJB2s which are screened into the lower silty sand deposits. The analysis is shown in **Appendix C-3** and the results indicate a hydraulic conductivity in the order of 1 x 10^{-5} cm/s (**Figures C-3-1**, **C-3-2**; **Appendix C-3**), which is considered low.

Bail-down tests were conducted at RJB2d, which is screened into the top of the underlying shale. The analysis is shown in **Appendix C-3** and the results indicate a hydraulic conductivity in the order of 1 x 10^{-5} cm/s (**Figures C-3-3**; **Appendix C-3**), which is considered low.

4.6.5 Recharge and Discharge Conditions

As discussed in the *JCT EIR/FSS*, infiltration to the water table and groundwater movement throughout the area is thought to be predominantly controlled by fracturing within the till and upper weathered shale. Groundwater seepage (discharge conditions) generally occurs along topographic lows associated with incised watercourses. It has been concluded, based on work completed for the *JCT EIR/FSS*, that groundwater recharge conditions occur in upland areas. The recharge occurs through the overburden materials and vertically down to the bedrock. The vertical flow downwards through the overburden to the shale may be several orders of magnitude higher than the lateral flows.

The groundwater levels at the RJB2sd nest show a downward gradient with an average vertical flow gradient of about 0.3 since RJB2d was installed in February 2018. The groundwater monitoring indicates the lateral flow gradient across the Subject Lands is very low (less than 0.01).

4.7 WATER QUALITY

4.7.1 Groundwater Quality

The groundwater quality was described in Section 4.7.1 of the *JCT EIR/FSS*. To characterize the shallow groundwater quality within the *JCT EIR/FSS* study area, groundwater samples were collected from six monitoring wells and analyzed

for general water quality indicator parameters (pH, conductivity, hardness, total suspended solids, et.), basic ions, such as chloride and nitrate, and selected metals. The groundwater chemistry results were summarized in Appendix C-6 of the *JCT EIR/FSS* report.

In order to characterize the site-specific groundwater quality on the Subject Lands, groundwater samples were collected on June 14, 2018 from RJB1 and RJB2s. Both wells are screened in the silty sand overburden (refer to well logs in **Appendix C-2**). The samples were analyzed for general water quality indicator parameters (pH, conductivity, hardness, total dissolved solids (TDS), etc.), basic ions such as chloride and nitrate, and selected metals. The groundwater chemistry results are summarized in **Table C-6-1**, **Appendix C-6**.

The groundwater test results also show the following:

- The reported chloride concentrations in the observation wells ranged from 4.6 mg/L to 9.2 mg/L.
- None of the groundwater samples reported dissolved phosphorus concentrations (orthophosphate). The total phosphorus levels ranged from 0.08 mg/L at RJB2s to 8.80 mg/L at RJB1.
- The analyses data show that nitrogen levels (nitrate and nitrite) were generally low (<0.25 mg/L to 2.14 mg/L) compared to the ODWQS of 10 mg/L. Ammonia in the monitoring wells ranged from 0.06 mg/L to 0.14 mg/L, which suggests some minor impact from the agricultural land use activities.
- Dissolved metal concentrations are generally low and below the ODWQS with the exception of uranium (0.03 mg/L) in RJB2s. Total dissolved solids and total hardness exceed the ODWQS in both sampled wells. The values exceeding the ODWQS are considered to be naturally occurring, reflecting the soil chemistry.

4.7.2 Surface Water Quality

The local surface water quality was described in Section 4.7.2 of *JCT EIR/FSS*. Surface water samples were collected as part of the *JCT EIR/FSS* and analyzed for general water quality indicator parameters (pH, conductivity, hardness, total suspended solids, et.), basic ions, such as chloride and nitrate, and selected metals. The laboratory groundwater chemistry results were summarized in Appendix C-6 of the *JCT EIR/FSS*.

In order to characterize the site-specific surface water quality on the Subject Lands, surface water samples were collected on December 2018 at SS1 (see **Figure 4.1**). The samples were analyzed for general water quality indicator parameters (pH, conductivity, hardness, TDS, etc.), basic ions such as chloride and nitrate, and selected metals. The laboratory surface water chemistry results are provided in **Table C-6-2** in **Appendix C-6**.

The surface water quality data indicate:

- Chloride concentrations were 679 mg/L. Road salt is a common source of chloride and the concentration in the runoff will depend on the amount of surface water runoff available for dilution.
- Nitrate, nitrite were generally below detection limits, and ammonia was at 0.08 mg/L, reflecting minimal impact from agricultural activities at the time of sampling.
- The total phosphorus concentrations were 0.07 mg/L. There is no firm PWQO for phosphorus; however, these concentrations exceed the 0.03 mg/L generally recommended phosphorus concentration for streams. Total phosphorus is a measure of all forms of phosphorus (dissolved or particulate) that are found in the water sample. There was no dissolved phosphorus (orthophosphate) reported in the surface water samples suggesting the reported concentrations are particulate.

Measurements of general water quality indicator parameters were taken of surface water at SS1, when present, as part of the monthly monitoring. The results are shown in **Table C-6-3** in **Appendix C-6**. The pH ranged from 8.6 to 8.1 and the conductivity ranged from 1.97 g/L to 0.52 mg/L during the monitoring events.

Overall, the water quality data suggest that the surface water and groundwater quality in the Subject Lands area are relatively poor compared to the provincial drinking water and surface water quality guidelines. The data suggest that the shallow water quality may locally be affected by anthropogenic influences (i.e., agricultural land uses and road salt).

5.0 STREAM, AQUATIC AND TERRESTRIAL SYSTEMS INCLUDING SPECIES AT RISK

The Stream, Aquatic and Terrestrial Systems were assessed and evaluated in detail in the *JCT EIR/FSS*. The majority of that information remains valid and unchanged but is supplemented with site specific fieldwork undertaken on the Subject Lands. Refer to the *JCT EIR/FSS* for information related to those watercourses and natural heritage features on the Mattamy Bressa and Dunoak lands. **Figure 5.1a** has been included to provide ELC data on the Subject Lands however, **Figures 5.1.1, 5.2, 5.6A – D, 5.7 and 5.8A-C** pertain specifically to the Mattamy Bressa and Dunoak lands and reference to the *JCT EIR/FSS* should be made for those figures. Those portions of Table 5-1 from the *JCT EIR/FSS*, that are relevant to the Subject Lands, have been reproduced in **Section 5.1**.

5.1 OVERVIEW OF JOSHUA'S CREEK CHARACTERISTICS

The Joshua's Creek system is the second largest natural valley system in North Oakville, second only to Sixteen Mile Creek. It dominates the eastern portion of North Oakville. The drainage area for Joshua's Creek extends to the north and east of the North Oakville area. North of Burnhamthorpe Road and east of Trafalgar Road, there are four tributaries, all of which eventually flow south through the overall EIR Subcatchment Areas. Specific to this Addendum are the two westerly tributaries defined by Stream Reaches JC-11, JC-10, JC-10A, JC-9, JC-8, JC-7, JC-6 and JC-5. These tributaries receive flow from north of Highway 407 and west of Trafalgar Road. The two tributary channels join south of Burnhamthorpe Road. All of the reaches, north of and many of the reaches south of the road to about 260m south of the confluence, are poorly defined, frequently channelized, with agricultural activities to the flow channel and little to now riparian community. Southwest of these sections (in Stream Reach JC-7 near the eastern extent of the Subject Lands), the tributary enters a defined valley system with thicket-to-wooded riparian communities.

Table 5-1 summarizes the Stream Reaches, their subcatchments, lengths and locations relative to this Addendum Study Area.

Table 5-1 Stream Reaches within Study Area

Subcatchments (see Fig. 1.2)	Area in EIR Subcatchment Area (ha)	Area in Subject Lands (ha)	Area in FSS Subcatchment Area (ha)	Area Owned by Others (ha)	Reaches in EIR Subcatchment Area	Reach Status	Reach Length in EIR Subcatchment Area (m)	Reach Length in Subject Lands (m)	Reach Length in FSS Subcatchment Area (m)	Comment
JC9A	51.5	40.7	41.5	10.8	JC-5	Red	380	380	380	Entirely within Core 11
					JC-6	Red-hatch	712	712	712	Partially within Core 11
					JC-7	Blue	1028	565	246	Centre-line of upstream portion is subcatchment limit; east bank and area in EIR Subcatchment Area.
					JC-8	Blue	390	88	88	Centre-line is subcatchment limit; east bank and area in EIR Subcatchment Area.

NOCSS and OPA 272 identify several components of the NHS within the Joshua's Creek subcatchments. Figure 2.1 reproduces the NHS components from the North Oakville East Secondary Plan (NOESP) Figure NOE3. NHS components on the Subject Lands include one Core Preserve Area (Core 10), Linkage Preserve Area and Optional Linkage Preserve Area, Medium Constraint Stream and Hydrologic Features B. In addition, there are several wetland units of the North Oakville-Milton East Wetland Complex (not identified on Figure NOE3 but shown on Figure 2.1). The stream and water-feature components are as follows:

- **Medium Constraint Streams** – the categorization of each reach within the Addendum Study Area is presented in **Table 5-1**. The locations of the breaks between the reaches are discussed in **Section 5.3**. The characteristics of each stream reach are discussed in **Section 5.4**.

- **Hydrologic Features** – within the Subject Lands there are three Hydrologic Features B along JC-7 as described in **Section 2.0** and **Table 2.1**. These Hydrologic Features B are ponds within the existing watercourse corridor.

- **Linkage Preserve and Optional Linkage Preserve Area** – NOCSS and the NOESP identified a 100m Linkage Preserve Area and an Optional 100m Linkage Preserve Area on the Subject Lands. The Optional LPA provided the opportunity for landowners to realign JC-7, through the Subject Lands and lands to the east, rather than following the existing alignment. The 100m Linkage is intended to connect the western limit of Core 11 to the northeastern limit of Core 10. Through the *JCT EIR/FSS* it was decided to not realign JC-7 through the Optional LPA but rather, to have the LPA follow the existing JC-7 alignment.

- **Provincially Significant Wetlands (PSWs)** – there are four PSW units of the North Oakville-Milton East Wetland Complex (MNRF 2006; revised July 2009) located within the Subject Lands (PSWs 31, 32, 33 and 60). As outlined in **Section 3.1.1**, MNRF identified another wetland while completing the on-site wetland staking, referred to as PSW 31a, within the Core 10 woodlands.

    - **PSWs 31, 31a and 60** – these PSWs are in the eastern portion of Core 10 within the FSS Study Area. The catchment area for PSW 60 is entirely contained in Core 10 and is not impacted by the development. The catchment areas for PSW 31a and PSW 31 are largely contained in Core 10, with small portions of the catchment within the development limit. Drainage into these wetlands, and proposed mitigation measures, is discussed in **Section 7.10**.
    - **PSWs 32 and 33** – these PSWs are located within the agricultural field north of the Core 10 woodlands. The catchment areas for both PSW 32 and 33 are entirely contained in Core 10 and therefore not impacted by development Consequently, development within the FSS Study Area will not impact the features or functions of these wetlands.

5.1.1 Species at Risk

Occurrences of species at risk (SAR) on or in near proximity to the developable portion of the Subject Lands were considered as a component of this study. Information on existing records of SAR from the vicinity of the Subject Lands was requested from MNRF on July 28, 2017, with a response received on October 30, 2017. In their response MNRF indicated that they had records of the following species from the study area:

- Eastern Meadowlark (*Sturnella magna*) – listed as Threatened on the Species at Risk in Ontario (SARO) List
- Snapping Turtle (*Chelydra serptentina*) – listed as being of Special Concern on the SARO List

In addition, MNRF identified that the following species have the potential to be found on the Subject Lands:

- American Ginseng (*Panax quinquefolius*) – listed as Endangered on the SARO List
- Eastern Small-Footed Myotis (*Myotis leibii*) – listed as Endangered on the SARO List
- Little Brown Myotis (*Myotis lucifugus*) – listed as Endangered on the SARO List
- Northern Myotis (*Myotis septentrionalis*) – listed as Endangered on the SARO List
- Tri-coloured Bat (*Perimyotis subflacus*) – listed as Endangered on the SARO List
- Barn Swallow (*Hirundo rustica*) – listed as Threatened on the SARO List
- Bobolink (*Dolichonyx oryzivorus*) – listed as Threatened on the SARO List
- Monarch (*Danaus plexippus*) – listed as being of Special Concern on the SARO List

The species listed above are discussed further below.

- American Ginseng – American Ginseng are a species associated with woodland communities. As a result, the species would not be found within the developable portion of the Subject Lands.
- Snapping Turtle – No Snapping Turtles have been observed on the Subject Lands, though targeted surveys of Joshua's Creek were not completed given that the creek will be protected from development. It is noted that the landowners (Rampens) have reported that two Snapping Turtles are present within Joshua's Creek on their property and have been nesting within their gardens for the past 60 years. These gardens will remain in private ownership (retained lands) and therefore, this Addendum does not address potential impacts on Snapping Turtles. When/if the retained lands advance for development in the future, impacts on this species would need to be included in an EIR Addendum.
- Monarch – No Monarch were observed during baseline surveys on the Subject Lands. Suitable habitat for Monarch (i.e. Milkweed plants) is not commonly abundant within the developable portion of the Subject Lands.
- Bat Species – Suitable habitat for SAR bats is considered present within the woodlands associated with Core 10 at the southern end of the Subject Lands. No development is proposed within these features, and therefore in accordance with MNRF protocols, this feature is treated as suitable habitat for SAR bats, and targeted acoustic monitoring surveys of the feature were not completed. Though unlikely, it is considered possible that trees within hedgerows on the Subject Lands may provide habitat for SAR bats. In accordance with MNRF requirements, these locations are not considered to be critical habitat for the species, and to avoid impacts on the species, these trees should be removed outside of the bat active period (typically April 1 through October 31).
- Bobolink/Eastern Meadowlark – No Eastern Meadowlark were observed on the Subject Lands, however one male Bobolink was observed within a small (approximately 2 ha) cultural meadow community that is on lands that will remain in private ownership (retained lands). This male Bobolink was only observed on the first survey and was not observed in subsequent surveys. The habitat in which the individual was observed is considered unsuitable for the species given size, shrub presence, and maintenance of a mowed labyrinth within this area, which suggests this was likely a male making an unsuccessful breeding attempt within poor quality habitat. As a result, this portion of the EIR Study Area is not considered habitat for these species under the definitions of the *Endangered Species Act*.
- Barn Swallow – Barn Swallow were occasionally observed foraging over the Subject Lands. There are no suitable nesting structures present within the portions of the Subject Lands planned for development at this time; however nesting is likely occurring within the structures on lands that will remain in private ownership (retained lands). When/if the retained lands advance for development in the future, these structures would require targeted searches, and if present within, impacts on this species would need to be included in an EIR Addendum, and any removals completed in compliance with the requirements of the *Endangered Species Act*.

5.1.2 Habitat Protection/Mitigation Requirements

Where works are proposed in close proximity to natural areas, (i.e., Core 10, LPA), as well as where hedgerows are proposed for removal, the following recommendations should be followed:

- The limits of work areas should be clearly delineated on site prior to construction;
- Tree Protection Zone measures:
    - The construction contractor's Site Supervisor will be familiar with these recommendations and aware of the purpose and function of Tree Protection Zones (TPZ);
    - Tree protection hoarding/fencing will be installed in locations as prescribed and to specification of Town of Oakville requirements. All supports and bracing used to safely secure the barrier should be located outside the TPZ;
    - Tree protection hoarding/barrier must be erected prior to commencement of work;
    - If required, minor alterations to the current design (and/or field-fit decision making) is encouraged if it results in the preservation of native species or habitat trees;
    - Any area inside the TPZ must be left undisturbed (including overhead) to protect tree trunks, branches, and roots. No altering of grade, excavating, trenching, scraping, storing of equipment or materials, moving of equipment, vehicles or pedestrians, dumping or disturbance of any kind shall occur within this zone without approval by the Town of Oakville;
    - No signs or objects should be displayed or affixed to any trees identified for protection;
    - Disposal of any liquids shall not occur within the TPZ;
- Tree removal should be completed at a time of year to ensure compliance with the federal *Migratory Bird Convention Act* (MBCA; in respect of migratory breeding birds), provincial *Fish and Wildlife Conservation Act* (FWCA; in respect of other breeding birds), as well as the provincial *Endangered Species Act* (in respect of SAR bats). Environment Canada identifies recommended timing restrictions for vegetation clearing during the breeding bird season as being between early April and late August for this area. MECP recommends tree removal outside of early April through late October for SAR bats;
- Any tree pruning or root cutting required is to be conducted by a Certified Arborist or Town Forester and shall comply with ANSI A300 Pruning Standard or suitable equivalent;
- Where feasible, underbrush should be cleared by hand (contractors should be cognizant of poison ivy hazards);
- Should any additional, incidental or accidental tree injuries occur during construction, a qualified Arborist or Town Forester should be consulted to determine if additional mitigation measures should be employed; and,
- Removal and disposal of Ash trees is to comply with the CFIA phytosanitary requirements to prevent the introduction into and spread within Canada of Emerald Ash Borer.

5.2 COMPARISON OF EIR/FSS DRAINAGE AREA TO NOCSS DRAINAGE AREA

This Addendum has not changed the findings of the *JCT EIR/FSS*, which are summarized as follows. The overall EIR Subcatchment boundaries are similar to NOCSS and the drainage area differences are relatively minor. The internal boundary changes did not impact the target unit flow rates at the outlets within the EIR Subcatchment Area.

5.3 CONFIRMATION OF JOSHUA'S CREEK REACH BREAKS

The NOCSS only identifies one stream reach within the Subject Lands (JC-7). Based on site inspections, this reach has been further refined through the delineation of sub-reaches JC-7a and JC-7b. Reach JC-7b was not assessed in the field due to its location within private property to the west. Stream Reach JC-8 is not located within the Subject Lands, however the floodplain associated with this reach does encroach into the western portion of the Subject Lands. Watercourse characteristics within each assessed sub-reach are described in detail in **Section 5.4** below. The extent of each sub-reach is shown in **Appendix E-4**.

5.4 CHARACTERISTICS OF REACHES JC-7, JC-7A, AND JC-8

General Reach Observations

Reach JC-7 was characterized as having an intermittent flow regime and was situated within a confined valley. There was limited flow at the time of the assessment. Adjacent land uses consisted of predominantly agriculture and rural residences. The reach contained a poorly defined channel with significant vegetation encroachment. The riparian buffer was approximately 4-10 channel widths but was fragmented by manicured lawn / landscaped vegetation. Bankfull width and depth were variable, ranging from 0.5 m to 1.55 m, and 0.2 to 0.53 m, respectively. While scattered cobbles were present near the downstream extent of the reach, channel substrate consisted of clay and silt and the channel banks consisted of clay, silt, sand and gravel.

Reach JC-7a was also confined and was characterized as having an intermittent flow regime. This reach extended from the online pond near the eastern driveway crossing to approximately 50 m upstream of the Subject Lands. Riparian vegetation largely consisted of grasses, manicured lawn and isolated trees downstream of the eastern driveway, and landscaped trees and manicured lawn upstream of the eastern driveway. A relatively narrow, straight channel was present upstream of the online pond, and contained a series of rock weirs. An offline pond was present north of the channel, separated from the reach by an earthen berm. No direct connection between the offline pond and Reach JC-7a was observed during the field assessment, although an overflow pathway was apparent near the downstream extent of the pond. The culvert at the western (upstream) driveway crossing was slightly perched, with a shallow pool of standing water downstream of the crossing at the time of the assessment. Riffles and pools were absent and bankfull channel width and depth were approximately 0.6 and 0.2, respectively. Both channel substrate and bank material consisted of clay and silt.

Reach JC-8 is a Medium Constraint Stream that is located to the west of the Subject Lands. The reach is defined as a narrow ditch that runs through an agricultural field toward a frequent flow channel. The entire length of the channel is densely vegetated with primarily cattail, intermixed with CUM species which occupies and rims the channel with no well-defined valley.

See **Section 3.1.2** for discussion related to a potential unconfined portion of the valley system on the Subject Lands to be determined through a future Addendum. **Table 5-4A** has been modified and updated from the *JCT EIR/FSS* to only include Reaches JC-7 and JC-7a and to provide some additional information in the Characteristics column.

Table 5-4A Characteristics of Blue Streams on Subject Lands

Reach	Subcatchment	Length (m)	Characteristics
JC-7	JC9A	1028 (148 m on Subject Lands)	Confined valley setting, Poorly defined channel with significant vegetation encroachment (grasses, manicured lawn), clay and silt substrate
JC-7a	JC9A	220 m (166m on Subject Lands)	Confined valley setting, online ponds present at driveway crossing, straightened channel adjacent to offline pond, riparian vegetation consisted largely of grasses, manicured lawn and isolated trees
JC-8	JC9A	390 (0m on Subject Lands)	Centre-line of upstream portion is subcatchment

Reach	Subcatchment	Length (m)	Characteristics
			limit; east bank and area in EIR Subcatchment Area. Located to west of FSS Study Area on non-participating lands.

Reconnaissance-level Assessments

Channel stability was semi-quantified through the application of the MOE (2003) RGA. Observations were quantified using an index that identifies channel sensitivity based on evidence of aggradation, degradation, channel widening, and planimetric form adjustment. The index produces values that indicate whether the channel is stable/in regime (score <0.20), stressed/transitional (score 0.21-0.40) or adjusting (score >0.41). The RGA for Reach JC-7 resulted in a score of 0, indicating that the portion of reach assessed was in regime. It is noted that this value is lower than that determined for the JCT EIR/FSS for lands to the east however, the portion of Reach JC-7 assessed as part of that study was also evaluated as in regime based on the RGA score (0.14). The RGA score of 0 reflects conditions along the portion of Reach JC-7 within the Subject Lands. The RGA for Reach JC-7a also resulted in a score of 0, indicating that the reach was in regime.

The Rapid Stream Assessment Technique (RSAT) is typically employed to provide a broader view of the system and considers the ecological function of the watercourse (Galli, 1996). Observations of channel stability, channel scouring or sediment deposition, instream and riparian habitats, and water quality are recorded as part of the assessment to provide an overall score that ranks the channel as maintaining a poor (<13), fair (13-24), good (25-34), or excellent (35-42) degree of stream health. The RSAT was not applied to either reach assessed within the Subject Lands as they displayed limited channel form (i.e. no riffle and pools present) and there was limited flow at the time of the assessment.

The portions of Reaches JC-7 and JC-7a within the Subject Lands were classified as S- Stable according to a modified Downs (1995) Channel Evolution Model. The Downs Model describes successional stages of a channel as a result of a perturbation, namely hydromodification. Understanding the current stage of the system is beneficial as this allows one to predict how the channel will continue to evolve or respond to an alteration to the system.

Although no fish were found during the NOCSS investigations, based on its flow pattern, connectivity to a large flood plain upstream and vegetation characteristics, the aquatic habitat of JC-7 has been categorized as Marginal fish habitat. NOCSS states that the habitat is very common within the Study Area and does not currently contribute to fisheries (Appendix FF – Aquatic Characterization and Appendix X – Aquatic Habitat Characterization).

Table 5-5A is a modified Table 5-5 from the *JCT EIR/FSS* that summarizes vegetation types (communities) within the Subject Lands, as mapped on **Figure 5.1**. These community types and the species are typical and common in the area.

Table 5-5A ELC Vegetation Communities Along Stream Reach JC-7 on the Subject Lands

ELC Code	Description
CUM1-1 Dry-Moist Old Field Meadow	• Composed of several native and exotic species, the dominants being Smooth Brome (*Bromus inermis*) and Tall Goldenrod (*Solidago altissima*). • Associates are Timothy (*Phleum pratense*), Kentucky Bluegrass (*Poa pratensis*), Orchard Grass (*Dactylis glomerata*), Common Milkweed (*Asclepias syriaca*), Bird's-foot Trefoil (*Lotus corniculatus*), Canada Thistle (*Cirsium arvense*) and Tufted Vetch (*Vicia cracca*). • Occasional shrubs and tree saplings include Common Buckthorn (*Rhamnus cathartica*), Tartarian Honeysuckle (*Lonicera tatarica*), White Poplar (*Populus alba*), and Black Walnut (*Juglans nigra*). • Components of this unit are maintained as a labyrinth for use by the current landowners.
CUT Cultural Thicket	• Variable physiognomy unit composed of low and tall shrubs and young trees, the main ones being Common Buckthorn, Tartarian Honeysuckle, Grey Dogwood (*Cornus foemina*), Red Raspberry (*Rubus idaeus*), Black Walnut and White Poplar. • Ground cover varies from sparse where shrubs grow densely to open and resembling the Old Field Meadow.
CUW Cultural Woodland	• Both originally growing trees and those planted compose this semi-open community, mostly in the vicinity of the house. • The main species are Weeping Willow (*Salix babylonica*), Reddish Willow (*S.* x *rubens*), Catalpa (*Catalpa speciosa*), Black Walnut and White Pine (*Pinus strobus*). • Numerous planted shrubs and ornamentals grow in the understorey, while the ground cover is mostly manicured lawn.
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	• Dominated by Reed-canary Grass (*Phalaris arundinacea*). • Associates are Purple Loosestrife (*Lythrum salicaria*) and White Panicled Aster (*Symphyotrichum lanceolatum*). • Inclusions of Cattail (*Typha*) and clusters of Grey Dogwood (*Cornus foemina*).

5.5 STREAM CORRIDOR BOUNDARIES

The extent of the JC-7 and JC-8 stream corridors are based on the greater of the following constraints:

- Physical/stable top of bank plus 7.5m;
- Regional Storm flood plain plus 7.5m;
- Meander belt plus 7.5m; and
- 100 m LPA

5.5.1 Top of Bank

The physical top of bank of Joshua's Creek (JC-7) was staked by CH staff (S. Norman) on June 28, 2017. During the site walk, it was agreed that the feature is generally a confined valley however, on the north side, west of the existing house (between TOB stakes 1 and 2, **Appendix B-3**), it was difficult to clearly identify a top of bank feature. During the site walk it was agreed that CH would make a determination as to the presence of a top of bank feature in that location, upon receipt of the topographic survey with the top of bank staking overlay. In their letter of May 7, 2019 (**Appendix B-3**) CH staff note it appears that a transition to an unconfined valley system may occur between TOB stakes 1 and 2 however, given that no development is proposed on the north side of the valley at this time, they prefer to defer the final decision on the presence of a top of bank in this location to a future development application. As such, **Figure 3.1** includes a notation to this effect between TOB stakes 1 and 2 and the requirement to undertake this additional review at the time of a future development application on the north side of the creek has been added to **Section 13.1**.

There is no top of bank associated with JC-8 where it flows along the property line between the Subject Lands and the lands to the west.

5.5.2 Regulatory Flood Plain – Interim and Ultimate Conditions

In 2006 and 2007, several analyses were submitted to update the existing conditions flood plain of Joshua's Creek, located in Subcatchments JC9A and JC9B. These analyses were subsequently reviewed and approved by CH in August 2007. The analyses included updates to the Town's HEC-2 model based on more detailed topographic information (RPE field survey) and updates to the hydrology model with revised drainage areas for JC-7 and JC-8 and a subdivided JC-9 catchment to accurately reflect the drainage flow patterns in the area.

The flood plain limit for JC-7 is contained below the top-of-bank. However, this is not the case for JC-8, which is an unconfined system, so a description of flood plain characteristics and proposed alterations are provided below. Some grading changes in the existing conditions flood plain on the Subject Lands are proposed to manage the flood plain limit and limit of development. Please see **Drawing 12** for an illustration of the area to be graded within the flood plain of JC-8. The proposed grading involves filling of the flood plain on the east side of the stream reach for a depth up to 30 cm over an area of approximately 0.5 ha. The total volume of fill proposed within the existing flood plain is 1,124 m^3. To provide compensation, it is proposed to cut up to a depth of 45 cm for an area of approximately 1.41 ha. The total volume of flood plain compensation is 2,350 m^3.

To assess the potential impacts of the proposed grading activities along JC-8 the following key elements have been evaluated: impacts on existing vegetation, and impacts on flood plain hydraulics and riparian storage.

5.5.2.1 JC-8 Existing Conditions Vegetation

The majority of the area that will be directly impacted by the cut and fill within the flood plain of JC-8 is in active row-crop agricultural production. There is a small hedgerow, containing a mixture of grasses, herbaceous vegetation, tall

shrubs and scattered trees, that also partially occurs within the flood plain. A separate hedgerow occurs along the western boundary of the Subject Lands and runs the length of the property.

No species at risk vegetation species were identified within the JC-8 flood plain area.

5.5.2.2 Impacts of Grading on Existing Vegetation

Grading will have no impact on existing vegetation within the active row-crop agricultural lands. Grading will remove a portion of the hedgerow on the Subject Lands; this feature is not providing important ecological functions on the landscape, and the majority of this feature will be removed to support the proposed development. The removal of the minor component on the Subject Lands will only result in minor loss of trees and shrubs which will be replaced as a component of any compensation plantings within the buffers to Core 10 or the Linkage Preserve Area.

As existing grades will be retained at the property limit, it is expected that the majority of vegetation within the hedgerow community will not be directly impacted, and the minimal changes in grade in proximity to the property limit are not anticipated to have significant impacts on vegetation in this location. As with the hedgerow on the Subject Lands, this feature is not providing important ecological function, and should any loss of individual trees or shrubs occur, there will be no measurable impact to form or ecological function within this feature.

5.5.2.3 Hydraulic Analysis of Proposed Grading in Stream Reach JC-8

The proposed modifications within the flood plain of Reach JC-8 have been included in the proposed conditions hydraulic model. The changes to the flood plain geometry at HECRAS cross sections 1050 to 12.017 in the proposed conditions model have been revised to reflect the flood plain modifications described above and illustrated on **Drawing 12**. The proposed conditions HECRAS model with modified grading was then compared to existing conditions HECRAS model to understand impacts to flood plain limits and riparian storage.

5.5.2.4 Riparian Storage Comparison

The riparian storage for existing and proposed conditions in Reach JC-8 has been compared in the memo included in **Appendix F-3C**. A brief summary of the modeling methodology and results is presented in this section of the report.

Table 5-18 Riparian Comparison - Stream Reach JC-8

Event	Riparian Storage Volume (m^3)		Difference (m^3) (Post-Pre)
	Pre-Development	Post-Development	
Regional	64,820	65,880	1,060
100-Year	21,210	22,700	1,490
50-Year	20,370	21,900	1,530
20-Year	18,160	19,630	1,470
10-Year	13,990	15,300	1,310
5-Year	11,990	13,170	1,180
2-Year	8,050	8,850	800

As outlined in **Table 5-18**, the riparian storage calculation results in the proposed post-development conditions riparian storage for Reach JC-8 exceeding pre-development riparian storage volumes under the 2yr through Regional storm event.

5.5.2.5 Floodplain Limit Comparison

The post-development HECRAS model has been run to determine the water surface elevations in Reach JC-8. As the flows have not changed, the updates to the HECRAS model are the channel geometry between HECRAS cross

sections 1050 to 12.017. As requested by Conservation Halton staff, these cross sections have been updated with detailed topographic information, where possible.

The pre-development and post-development flood plain modeling is provided in **Appendix F-3C**. The pre-development and post-development flood lines along Reach JC-8 are compared on **Drawing 12**. The Regional flood elevations remain unchanged between pre-development and post-development as shown in **Table 5-19** below.

Table 5-19 Regional Flood Elevations - Stream Reach JC-8

River Station	Regional Flood Elevation (m)		Difference (m)
	Pre-Development*	Post-Development	
1050	178.32	178.32	0
1025	178.32	178.32	0
1010	178.31	178.31	0
1004	178.31	178.31	0
1000	178.31	178.31	0
979	178.31	178.31	0
955	178.31	178.31	0
929	178.31	178.31	0
866	178.31	178.31	0
756	178.31	178.31	0
12.5	178.30	178.30	0

* Pre-Development floodplain based on update to existing culvert

After review of the detailed topographic information, it was discovered that an existing 400mm culvert was previously installed within JC-7a (on the Rampen lands) to facilitate a road crossing. The 400mm culvert restricts flows and creates a backwater effect, raising the floodplain elevation on the Coscorp, and Capobianco, lands compared to existing conditions. Prior to development of the Coscorp lands it is proposed that the existing 400mm culvert be replaced to remove the restriction and restore the floodplain to existing conditions. The existing culvert is proposed to be replaced by a 7m x 1.6m box culvert. The culvert replacement has been reflected in the updated pre-development and post-development HECRAS model. Details of the proposed culvert replacement are provided in **Section 10**.

The flood lines under post-development conditions are incorporated in the development limits as reflected in the Draft Plan. As shown, the Limit of Development is governed by the Regional flood plain and associated 7.5m lot line setback along the western boundary of the Subject Lands.

5.5.2.6 Flood Plain Impacts Summary

Based on the proposed grading within the Regional flood plain at Reach JC-8, no negative impacts are expected to the vegetation within the existing flood plain or to riparian flood plain storage.

5.5.3 Meander Belt

Most watercourses in southern Ontario have a natural tendency to develop and maintain a meandering planform, provided there are no spatial constraints. A meander belt width assessment estimates the lateral extent that a meandering channel has historically occupied and will likely occupy in the future. This assessment is therefore useful for determining the potential limit of development for proposed activities in the vicinity of a stream.

When defining the meander belt width for a creek system, the TRCA (2004) protocol treats unconfined and confined systems differently. Unconfined systems are those with poorly defined valleys or slopes well-outside where the channel could realistically migrate. In unconfined systems, the meander belt boundaries centre along the general valley orientation and are defined as parallel lines drawn tangentially to the outside bends of the most laterally extreme meanders within the reach (TRCA, 2004). Georeferenced historic aerial imagery can be used to examine past positions and configurations of the channel planform and to delineate the channel centreline, and its central tendency (i.e.

meander belt axis). Confined systems are those where the watercourse is contained within a defined valley, where valley wall contact is possible. When a channel is confined, erosion of the valley wall needs to be considered. This is usually addressed with an erosion setback based on a geotechnically stable top of slope.

As noted in **Section 5.4**, a meander belt width was delineated for a portion of Reach JC-7 as part of the *JCT EIR/FSS*. Although several reaches within adjacent lands were characterized as confined or partially confined, all reaches in that study were treated as unconfined as this provides a more conservative estimate of the hazard. In accordance with the NOCSS (TSH et al., 2006), the meander belt widths were determined using a combination of historical aerial photographs and empirical models. The largest meander amplitude measured for Reach JC-7 over the period of record (1954, 1978, and 2016) was 15.1 m. This measurement included the bankfull width of the channel. A 20% factor of safety was then applied.

Meander belt widths were also calculated using a modified Williams (1986) model, which is based on the largest channel bankfull measurement. The most conservative documented estimate of bankfull width (3.6 m) was used for the model based on values provided by Stonybrook Consulting Inc. et al. (2019). The empirical relation is outlined below:

$$B_w = 4.3{W_b}^{1.12} + W_b \qquad \text{[Eq. 1]}$$

where Bw is meander belt width (m) and Wb is bankfull channel width (m). An additional 20% buffer, or factor of safety, was applied to the computed belt width. The two approaches were compared and the largest or most conservative was chosen for the proposed meander belt width. For the portion of Reach JC-7, a meander belt width of 26 m was delineated.

Because Reach JC-7 has been further divided into subreaches (JC-7a and JC-7b) as part of this Addendum, refinement of the meander belt width is required for Reach JC-7a within the Subject Lands. As this reach was previously modified, the empirical approach consistent with that used for lands to the east was employed. The bankfull width measured for Reach JC-7a was 0.6 m, resulting in a nominal meander belt width of 4 m. Therefore, as a conservative approach, the maximum bankfull width (1.55 m) measured within the Subject Lands along the downstream section of Reach JC-7 was used. Following Eq.1 above, this results in a meander belt width of 10 m (**Appendix E-4**). It should be noted that due to the high degree of channel stability observed in the field and intermittent flow conditions, there is limited potential for channel migration and an erosion hazard along Reach JC-7a.

A portion of Reach JC-8 located on adjacent lands abuts the western property boundary of the Subject Lands. Due to site access, JC-8 was not assessed in the field. However, the proposed draft plan for the Subject Lands accommodates the required 100 m wide LPA associated with this feature. Based on a desktop review and available reporting, Reach JC-8 consists of a poorly defined swale flowing through an agricultural field and as such has limited migration potential. The 100 m wide LPA and proposed draft plan of subdivision for the Subject Lands can easily accommodate any erosion hazard associated with Reach JC-8. The meander belt width for Reach JC-8 on adjacent lands to the west can be further evaluated as part of any future studies required in support of development. This requirement has been added to **Section 13.1**.

5.5.4 Fisheries Setback Requirements

All of Joshua's Creek and its tributaries require a 15m fisheries buffer on both sides of the creek, as measured from the frequent flow channel (Section 6.3.4.2 and Table 6.3.4a of NOCSS). This 15m setback is contained entirely within the JC-7 valley as shown on **Figure 3.1.** As with the meander belt, the 15m fisheries setback on JC-8 along the western property line, is contained within the 100 m LPA.

5.6 OVERALL STREAM CORRIDOR DELINEATION

The stream corridor extent for JC-7 and JC-8 is based on the greater of the above constraints as well as the 100m LPA, as shown on **Figure 3.1**.

6.0 LAND USE

Section 6 has been updated to provide land use and trail information for the Subject Lands that was not included in the *JCT EIR/FSS*. **Figures 6.1 – 6.4** have been updated to reflect the Subject Land limits as well as the proposed draft plan, where applicable. **Figure 6.5** and **Drawings 7A-7I** remain unchanged and reference should be made to the *JCT EIR/FSS* for that figure and drawings.

The Subject Lands are proposed to be developed for a range of residential uses consistent with the NOESP. The following describes the draft plan of subdivision associated with the Subject Lands and how the proposed development conforms to the Secondary Plan policies. **Figure 6.1** illustrates the Town's Master Plan for the Subject Lands and adjacent properties.

The EIR Subcatchment Area for this Addendum extends beyond the extent of the Coscorp draft plan of subdivision for the Subject Lands. As such, for the purpose of demonstrating logical coordination with lands extending beyond the draft plan limits, planning details in those areas have been prescribed in accordance with either (a) an existing draft plan of subdivision and/or concept plan or (b) where a draft plan does not yet exist, that of the Secondary Plan Master Plan and include:

- Land Use Designations;
- Natural Heritage System;
- Major Roads;
- Major Services;
- SWM Blocks; and,
- Trails.

The *JCT EIR/FSS* did not include a trail impact assessment for the trails within the Subject Lands. As such, changes have been made to **Section 6.2** to include the trail impact assessment associated with the trail adjacent to Core 10; the remainder of **Section 6.2** of the *JCT EIR/FSS* remains unchanged. In addition, the majority of the figures in this section remain unchanged with the exception of **Figure 6.2A** (Coscorp Draft Plan of Subdivision) and **Drawings 7J and 7K** (Trails Plan).

6.1 GENERAL DESCRIPTION OF DRAFT PLAN

The North Oakville East Master Plan forms the basis for Coscorp draft plan. The draft plan has been prepared to be consistent with the NOESP Master Plan and OMB Minutes of Settlement. The draft plan is provided as **Figure 6.2A**.

The street network proposed in the draft plan provides the framework for the urban form and is integral for ensuring efficient multi-modal traffic flow. The road pattern, a modified grid, is generally consistent with that illustrated in the Master Plan street network and has been coordinated with adjacent lands.

The Draft Plan (**Figure 6.2A**) proposes residential uses that consist of 129 singled detached dwellings and 52 street townhouse units. The lands associated with the Draft Plan are primarily designated as General Urban Areas in the NOESP and intended for predominantly residential uses although live/work opportunities are available in the General Urban designation in accordance with the NOESP.

Due to the retained lands along Burnhamthorpe Road, primary access to the Draft Plan will be provided by Mattamy's draft plan to the east of the Coscorp lands. Ultimately, when the lands to the west of the Subject Lands advance for development, Street A will continue northerly to Burnhamthorpe Road, as per the NOESP Master Plan.

As outlined in **Section 3.0**, a portion of the NHS Core 10 is contained within the Coscorp Draft Plan. Lands adjacent to the northern boundary of Core 10 are designated as General Urban Area generally consistent with the NOESP. The NHS is made accessible to the community through the use of a walkway to a trail along the north limit of Core 10.

In addition to Core 10, a portion of the LPA between Core 10 and Core 11 is located primarily on the retained lands.

Table 6-1 Coscorp Draft Plan Preliminary Development Yields

	Area (ha)	Units	Density (uph)
Natural Heritage System	6.75		
General Urban Area	1.38	149	108
Sub Urban Area	6.86	295	43
Residential Reserve	0.323		
0.3m Reserves	0.003		
Total	**15.315**	**444**	53.9

6.1.1 CONFORMANCES / VARIANCES FROM SECONDARY PLAN

The Coscorp Draft Plan, as described above, is consistent with the designation and policies specified in the NOESP. The only minor variations from the Secondary Plan are associated with the Natural Heritage System boundary. In particular**:**

- The Core 10 boundary reflects the outcome of a site walk with the agencies to stake/survey the core boundary, OMB Minutes of Settlement, the NOESP, NOCSS and coordination with the Core 10 staking that was completed by the landowner to the east (Mattamy).
- The LPA is reflective of a modified version of the NOESP OLPA boundary shown on the Master Plan and consistent with OPA 272 policies for Linkage Preserve Areas.
- The Medium Constraint Stream (JC-7) is not planned for realignment and is intended to remain in-situ. The Medium Constraint Stream (JC-8) along the western property limit, is also not planned for realignment as part of the Coscorp Draft Plan however, the draft plan has been designed so as to not constrain the ability to realign JC-8 should the landowner to the west advance development in the future.

Road networks, land uses, and densities are consistent with the policies of OPA 272. **Table 7.2** below compares the land uses and densities permitted in the Secondary Plan with those proposed in the draft plan.

Table 6-2 Land Use and Density Conformity Coscorp Draft Plan

General Urban Area	Secondary Plan	Draft Plan
Land Use	Low and Medium density residential uses and home occupation and home business uses.	Low and Medium density residential uses and home occupation and home business uses
Minimum density	25 units per net hectare	53.9
Maximum density	75 units per net hectare	
Maximum Height	3 Storeys	3

6.2 TRAIL PLANNING - COSCORP

Policy 7.4.7.3 of OPA 272 notes that one of the potential permitted uses in the NHS is:

iv) Trails, interpretive displays or signage or other similar passive recreation uses consistent with the purpose of the applicable designation and provided that:

- *For lands in the Linkage Preserve Area designation Figure NOE3, such uses shall generally be located in the Linkage Preserve Area, but adjacent to the boundary of the linkage;*
- *Trails shall be permitted within the setback from the edge of the Sixteen Mile Creek Valley, and may be permitted within the Valley subject to the review of their impact on any environmentally sensitive features;*
- *Trails in stream corridors other than the Sixteen Mile Creek shall be permitted adjacent to the valley in the buffer; and,*
- *Trails in the Natural Heritage System Area designation be designed and located to minimize any impact on the natural environment.*

Section 6.3.5.2 of the NOCSS states that:

Recreational trails for pedestrian and bicycle use will require special consideration and evaluation when planning their location within the NHS. A designated trail system associated with the NHS will be the best strategy to discourage informal trail creation (i.e., trail blazing) for the public wishing to gain access to the NHS.

The following should be considered when planning the location of future trail systems:

- *Trails should cross the NHS (cores, linkages and stream corridors) with existing and proposed road crossings;*
- *Locations where roads are flanking core areas, trails should be substituted for sidewalks provided winter maintenance is feasible;*
- *Where trail systems are proposed to cross the NHS at locations other than where a road crossing is proposed, an impact assessment will be required to ensure no negative impacts to the NHS (i.e., species migration, impacts to drainage);*
- *Trail systems requiring winter maintenance will need to be located outside the NHS to minimize disturbance (i.e., plowing, sand and salt); and,*
- *Trail systems are not permitted in stream valleys.*

The NOCSS further notes that the MNRF and CH will need to be consulted as part of the evaluation of placement of trails within the NHS.

Overall trail planning for North Oakville East is established through the North Oakville Trails Plan (May 2013). That document outlines the proposed trail locations within the NOESP area. The location of trails, within the Master Plan, is consistent with the OPA 272 Transportation Plan (Figure NOE4). In May 2013 a revised EIR/FSS ToR document was issued to provide direction for study requirements related to trails. This Addendum addresses all trail requirements as per the ToR.

The Core 10 trail within the Coscorp Draft Plan complies with the principles established in the approved North Oakville Trails Plan (May 2013) which indicates that the trails plan network should:

- provide connections between neighbourhoods and different land uses and provide links to schools and parks;
- support connections to major transit stations and transportation hubs;
- be suitable for a variety of users;
- encourage alternative modes of transportation; and,
- should limit the impacts to the NHS.

The locations of trails within the Subject Lands, as proposed by the Master Plan, are shown on **Figure 6.3** (Figure 1 from the Trails Master Plan). Within the Subject Lands, the Master Plan identifies a Major Trail along the north side of Core 10 and along the south side of the Optional Linkage Preserve Area. Based on discussions with Town of Oakville Parks Department staff, subsequent to the first submission of this Addendum, a trail is no longer proposed along the western limits of the draft plan but rather, a connection has been made to the trail on the Mattamy lands to the east, to

connect the trail along the south side of JC-7 on the Mattamy lands into the Coscorp lands. Descriptions of these two trail sections are provided below.

6.2.1 Core 10 Trail

The trail proposed along the northern limit of Core 10 is identified as a Major Trail (Type A) in the North Oakville Trails Plan. Major Trails (Type A) have the following design criteria:

- passive use only, not part of active transportation plan;
- similar to trails south of Dundas Street;
- generally located on outer edges of NHS or within top of bank setback;
- soft surface treatment (screenings) with natural edge treatment if required;
- boardwalks, bridges or hard surfaces where required only;
- width range 2.1 to 2.4m, with 0.5m adjacent clearances;
- seasonal use only, no lights, no winter maintenance;
- detail locations and design subject to Watershed and EIR studies and approvals prior to installation, with re-vegetation plantings;
- accessibility where possible; and,
- funded by development.

The proposed trail along the northern limit of Core 10 within the Coscorp Draft Plan will be a continuation of the trail that is proposed within the Mattamy Draft Plan to the east. Ultimately, when the lands to the west of Coscorp develop, this trail will continue westerly along the outer limit of Core 10. A walkway block has been provided at the westerly limit of the Coscorp lands to connect the Core 10 trail into the community.

The trail location shown on **Drawing 7K** reflects that shown in the North Oakville Trails Plan (May 2013) (**Figure 6.3**) and is consistent with general requirements for recreational trails discussed in the NOCSS, Section 6.3.5.2 and the requirements of Policy 7.4.7.3 of OPA 272. The proposed trail on the Coscorp Draft Plan is presented in more detail on **Drawing 7K** and shows a Major Trail (off-road) along the northern limit of Core 10. The Trail Design Guidelines of the North Oakville Trails Plan and direction from the Town will be followed when designing the trail. **Drawing 8C** illustrates a typical cross-section of the trail within the Core 10 buffer.

The proposed trail is within an area that is entirely in agricultural production and, as a result, no impacts to the NHS are anticipated and no natural vegetation removal is required to construct the trail. Small portions of the trail are within the outer limit of the 30m buffer to PSWs 33 and 31a. The trail is also within the 10m woodland dripline buffer at Coscorp's eastern property limit. Preliminary grading and drainage information to accommodate trail design is provided in **Section 6.3 and Appendix N-1**. The implementation of the trails will be achieved through the subdivision review process.

The EIR/FSS Terms of Reference Section 3.7.1 states that "*Trail sections that are exclusively located within buffers that are active agricultural lands (row crops) must undertake Species at Risk (SAR) screening and complete appropriate seasonal field surveys*." The trail alignment was assessed for habitat conditions that may be conducive to supporting SAR based on habitat descriptions identified by MECP (MECP, 2019) and no suitable SAR habitats or individuals were found to be present. In addition, Section 3.7.1 identifies that as part of the trail design/construction that all hazard trees within striking distance of the proposed trail must be identified and felled. At this time the assessment of potential hazard trees along the trail has not been undertaken however, the only potential location of conflict would be at the eastern limit of the woodland dripline buffer associated with Core 10. Otherwise, the trail is located a significant distance from treed areas. The hazard tree assessment will be required during detailed design. This future requirement has been listed in **Section 13.2**. It is noted that hazard tree removals are to be undertaken outside of the bird breeding season for woodland birds (generally April through July) and outside of the bat active period (generally April through October).

6.2.2 JC-7 LPA Trail

The North Oakville Trails Plan also identifies a Major Trail along the southern limit of the OLPA through the Subject Lands (**Figure 6.3**). Given that the landowners opted to maintain Joshua's Creek in its current location on the Subject Lands, it is assumed that this trail would then shift to the southern limit of the LPA associated with the Joshua's Creek tributary (JC-7). The proposed trail along the southern limit of JC-7 within the Coscorp Draft Plan will be a continuation of the trail that is proposed within the Mattamy Draft Plan to the east. A walkway block connection has been provided in the northeast corner of the Coscorp plan to provide pedestrian connectivity to the sidewalk network within the subdivision.

The trail location shown on **Drawing 7J** reflects that shown in the North Oakville Trails Plan (May 2013) (**Figure 6.3**) and is consistent with general requirements for recreational trails discussed in the NOCSS, Section 6.3.5.2 and the requirements of Policy 7.4.7.3 of OPA 272. The Trail Design Guidelines of the North Oakville Trails Plan and direction from the Town will be followed when designing the trail. The trail is generally located within the LPA limits outside of the 7.5m top of bank buffer associated with JC-7.

A temporary trail connection was previously proposed within the 7.5m setback to the Regional Storm flood plain on the Coscorp lands, however through discussion with Town staff on February 16, 2022 it was decided that a trail in this location would not be required and, as such, is no longer proposed.

6.3 LOCATION OF TRAILS IN THE NHS

Major Trails along Reaches of Joshua's Creek

The Trail section (refer to **Drawing 7J**) associated with stream reach JC-7 on the Subject Lands, including the general locational characteristics, is presented in **Table 6-3**. Further details are provided in amended **Appendix N-1, Addendum 1**.

Table 6-3 Summary of Trail Sections Associated with Reach JC-7

Trail Section(s)	Location	Comment
COSCORP LANDS		
TR11	• Located along the south side of Reach JC-7, inside NHS boundary defined by the LPA	• Trail extends onto the Coscorp lands from the proposed trail on Mattamy's property to the east • Along the entire alignment, opportunities exist for the trail to meander away from the lot line, to be determined at detailed design through consultation with Town Parks staff. • The trail is proposed within the LPA, outside of the 7.5m setback from the top of bank

Core 10 Major Trail

The Trail sections (refer to **Drawing 7K**) associated with Core 10 on the Subject Lands, including their general locational characteristics, are presented in **Table 6-6**. Further details are provided in amended **Appendix N-1**.

Table 6-6 Summary of Trail Sections Associated with Core 10

Trail Section(s)	Location	Comment
COSCORP LANDS		
TR33, TR34, TR35, TR36	• Located just inside northern portions of the boundary of Core 10, defined by 30m buffer from PSWs 33 and 31A or NOCSS connection points.	• Slope and drainage is from the Core to the southeast • Drainage will be addressed to ensure wetlands are not flooded and to avoid nuisance flooding of the trail. • Where the trail is situated within the 30m wetland buffer, opportunities exist for the trail to meander away from the lot lines, to be determined at detailed design through discussions with Town Parks staff and in consultation with CH. Where the trail is within CH's regulated area (i.e., within 30m wetland buffer) a Permit will be required from that agency pursuant to Ontario Regulation 162/06.

The proposed trail alignment through the Subject Lands is located just inside the Core boundary and connects to the trail system to the east on the Mattamy Phase 3 lands.

7.0 GRADING, DRAINAGE AND STORMWATER MANAGEMENT

Section 7.0 of the *JCT EIR/FSS* addresses SWM requirements including discussion on OPA 272 and NOCSS recommendations, updated subcatchment boundaries, pre-development flows at Dundas Street, unit target flow rates, storm drainage criteria, drainage area modifications, management of external drainage, proposed SWM pond locations and designs, major/minor system designs, drainage to/from PSWs and preliminary grading plans.

The Subject Lands are located within portions of subcatchments JC9 and JC17 that drain to the main branch of Joshua's Creek (Stream Reach JC-7 and JC-8), and subcatchment JC17 which drains to the western tributary of Joshua's Creek (Stream Reaches JC-36 and JC-27A). Portions of Core 10 on the Subject Lands lie within subcatchment JC17. Runoff from the Subject Lands drains southerly towards Stream Reach JC-36 and westerly towards Stream Reach JC-8.

The following recommendations, from the *JCT EIR/FSS,* were utilized to confirm the SWM requirements for the Subject Lands:

a) The *JCT EIR/FSS* Sections 7.2 and 7.3 address refined subcatchment boundaries and unit target flows for SWM pond designs. That report updated all Joshua's Creek subcatchment boundaries south of Burnhamthorpe Road based upon LiDAR mapping, compared them to NOCSS drainage area boundaries and concluded that the resulting change in EIR/FSS boundaries is small and that the NOCSS target unit flow rates for Joshua's Creek subcatchments are valid for SWM pond design. This work remains valid and no changes are required to Sections 7.2 and 7.3 in this Addendum;

b) The *JCT EIR/FSS* Sections 7.4 and 7.5 discuss the SWM plan selection process and downstream Regional Storm controls. This work remains valid and no changes are required to Sections 7.4 and 7.5 in this Addendum;

c) The *JCT EIR/FSS* Section 7.6 discusses erosion control analyses major and minor system design. This work remains valid and no changes are required to Section 7.6 in this Addendum;

d) The *JCT EIR/FSS* Section 7.7 discusses SWM Pond requirements. It identified seven SWM ponds to service development within the Joshua's Creek subcatchments south of Burnhamthorpe Road. In accordance with the *JCT EIR/FSS,* surface runoff from the Subject Lands will drain to Pond 54 located on the adjacent Argo (Joshua's Creek) lands, and Pond 56 located on the Draft Plan approved Bressa lands. This work remains valid and no changes are required to Section 7.7 of this Addendum;

e) The *JCT EIR/FSS* Section 7.8 discusses major and minor system design. **Section 7.8** herein addresses major/minor system design on the Subject Lands;

f) The *JCT EIR/FSS* Section 7.9 discusses drainage area modifications. Updated **Section 7.8** noted above, concludes that the Coscorp Draft Plan of Subdivision design generally conforms to the major/minor system design presented in the *JCT EIR/FSS.* Based on this conclusion, there are no substantive changes to the drainage area modifications presented in Section 7.9 of the *JCT EIR/FSS*. As a result, Section 7.9 remains valid and no changes are required in this Addendum;

g) The *JCT EIR/FSS* Section 7.10 addresses drainage into and out of adjacent PSWs. PSWs 31, 31a, 32, 33, and 60 lay within Core 10 on the Subject Lands. Section 7.10 of the *JCT EIR/FSS* identified drainage conditions into these PSWs and noted specific drainage measures to accommodate flows out of these PSWs.

This Addendum will refine the drainage conditions into and out of the PSWs on the Subject Lands. The development of the Subject Lands does not affect any other PSWs;

h) The *JCT EIR/FSS* Section 7.11 includes discussion and drawings presenting preliminary grading. This Addendum adds **Drawings 7J** and **7K** to provide preliminary grading information for the Subject Lands based on the proposed Coscorp Draft Plan of Subdivision; and,

i) The *JCT EIR/FSS* Section 7.12 discusses SWM Pond Operating Characteristics for seven SWM facilities, two of which will service the Subject Lands (Ponds 54 and 56). Information presented in support of the design of Pond 54 design has been refined since the completion of the *JCT EIR/FSS* by the Pond 54 design presented in the *Argo (Joshua's Creek) EIR/FSS (December 2019)*. Information presented in support of the design of Pond 56 has been refined since the completion of the *JCT EIR/FSS* by the detailed design of Pond 56 (April 2020). Detailed design of these SWM ponds should incorporate the major/minor system designs presented in this Addendum and any refinements made at the detailed subdivision design stage. The work presented in these addendums remains valid and is not replicated in Section 7.12.

Based on the summary provided above, below are the sections of the JCT EIR/FSS that require revision/updates within this Addendum.

7.8 MINOR AND MAJOR SYSTEM DESIGNS

The FSS Study Area will be serviced by a conventional storm sewer system designed in accordance with the Town's standards. Conceptual storm servicing is presented on **Figure 7.1**. The storm sewers will be sized utilizing a 5-year return frequency and Town IDF curves. The ultimate conditions conceptual storm servicing scheme is illustrated in **Figure 7.1**. As shown, surface runoff from these lands will drain through adjacent lands to SWM Ponds 54 and 56 on the Argo (Joshua's Creek) and Bressa lands respectively.

Runoff from the majority of rear lots abutting the NHS will be captured in rear yard catchbasins and directed to SWM ponds. Despite the rear lot elevations frequently being lower than the centre line of the road elevations, the catchbasins are able to drain to the storm sewers within the right-of-ways. The notable exception is lots on the south limit of the plan backing onto Core 10. Runoff from these lots will be directed to Core 10 to feed PSWs 31 and 31A. This is discussed further in **Section 7.10**.

Continuous overland flow routes are included in the grading design of the Subject Lands to safely convey major system flows in excess of the minor system up to the 100-year event. The excess flows will be contained within either the right-of-way or by other lands in the Town's ownership. For all classes of roads, the product of depth of water (m) at the gutter times the velocity of flow (m/s) shall not exceed $0.65 m^2/s$. Should the major system flow exceed the conveyance capacity of any given road, the storm sewer will be sized to accommodate the excess flows such that the road capacity is not exceeded.

The major and minor system designs involved coordination of grading and overland flow routes with the Mattamy Phase 3 lands to the east to direct flows to Pond 54 and 56. Overland flow from external areas to the west is included in the major/minor system.

There are no substantive changes to drainage areas to Ponds 54 and 56.

As shown in **Table 7-8B,** the drainage areas to Ponds 54 and 56 from the Subject Lands compare well to the latest drainage areas for Ponds 54 and 56, presented in the *JCT EIR/FSS* and/or Pond 54/56 detailed design. Minor changes in drainage area result from more detailed site grading and servicing analyses completed as part of this EIR/FSS Addendum and the detailed designs of SWM Ponds 54/56.

Table 7-8B Pond Drainage Areas

Area	Drainage Area to Pond 54 and Pond 56 (ha)				
	Final Joshua's Creek EIR/FSS	Argo (Joshua's Creek) EIR/FSS Addendum	Detailed Design (Pond 56)	Detailed Design (Pond 54)	Rampen Holdings Inc (Coscorp) EIR/FSS Addendum
To Pond 54	54.1	54.0	N/A	54.1	54.1
To Pond 56	51.2	53.9	51.1	N/A	51.2

7.8.3 External Drainage

As required by NOCSS, SWM requirements for areas external/adjacent to the FSS Study Area, within the EIR Subcatchment Area, have been investigated to ensure that they have been addressed and that the proposed SWM Plan does not negatively affect future development potential of these areas from a SWM perspective.

The *JCT EIR/FSS* identifies drainage requirements/assumptions for numerous drainage areas external to the FSS Study Area. **Figure 7.2** illustrates contributing drainage areas to each proposed SWM Pond that includes drainage from the Subject Lands and some external areas. Brief descriptions of each external area, labelled on **Figure 7.1**, are provided in the *JCT EIR/FSS*. Since this EIR/FSS Addendum now includes the Coscorp lands in the Subject Lands, this report modifies the discussion regarding External Areas 3 and 4 as follows:

External Area 3 has been modified and now only includes areas external to the Subject Lands as defined in this Addendum. This area includes the potential future road connection to Burnhamthorpe Road, which has been accounted for in the design of SWM Pond 56.

The actual alignment and drainage area for this road should be confirmed as part of a future addendum. The alignment shown in the Coscorp Draft Plan shows the connection to a high point on Burnhamthorpe Road, to allow the greatest flexibility for the future storm servicing strategy. **Drawing 7J** shows preliminary grades for this road. Based on the preliminary grading there will be a high-point on the future road at the culvert crossing of JC-7. Drainage from north of the high-point to Burnhamthorpe Road (approximately 0.2 ha) will need to be captured and treated in a storm system. There are a number of options for this drainage including:

- Direct Runoff to Burnhamthorpe Road
    - Drainage from north of the high point could be directed to Burnhamthorpe Road, where it could be captured and conveyed in the Burnhamthorpe Road storm sewer system
    - A future investigation would be required to confirm capacity in the Burnhamthorpe Road storm sewer system The existing Burnhampthorpe Road topography indicates drainage from this road connection would spill westerly and be conveyed via road side ditch. Regardless of existing topography, SWM Pond 56 has been conservatively sized to accommodate this area
- Runoff Directed to Future SWM Pond to the West
    - The NOCSS identified a SWM pond for the lands immediately to the west, discharging to JC-7. Refer to NOCSS Figure 7.4.6 for the Approximate Stormwater Facility Locations
    - Runoff from this section of road could be capture and directed to the SWM Pond to the west, discharging to JC-7
- Runoff Directed to the Creek
    - Runoff could be captured at the low point, on the south side of the intersection with Burnhamthorpe Road

- Runoff could then be directed to an OGS unit to provide quality control before discharging to JC-7 to the south
- This would be in keeping with pre-development drainage conditions, as this area currently drains to stream reach JC-7

External Area 4 is refined from the *JCT EIR/FSS*. This area has been updated to reflect the anticipated future development to the west.

External Area 5 has been added. A portion of the future development to the west would be tributary to Pond 56. This area has been separated from External Area 4 to highlight the fact that these areas will drain to different SWM ponds.

7.10 PSW DRAINAGE

Specific design consideration has been given during the preparation of the SWM plan for drainage into and out of PSWs. **Figure 7.8A** illustrates the location, contributing surface drainage areas, and defined outlets for each of the five PSWs located within the Study Area. Table 7-10 from the *JCT EIR/FSS* has been updated to account for PSW 31a, which was identified by MNRF subsequent to the finalization of that EIR/FSS. Modified **Table 7-10** below identifies the wetland features within the Addendum Study Area (i.e., PSWs 31, 31a, 32, 33 and 60), summarizes their drainage condition, and describes where the SWM plan must address drainage into, or out of, these wetlands.

Table 7-10 Conveyance of Minor System Flows in Vicinity of Wetlands

PSW #	Wetland Area (ha)	Description of Wetland Drainage Patterns
31	**0.6**	• Existing contributing drainage area to PSW 31 = 5.84ha (inclusive of drainage areas to 31a, 32 and 33) • No changes have been made to the pre-development drainage area delineations presented in the *JCT EIR/FSS* • Drainage area to PSW 31 is largely contained in Core 10, approximately 18% (1.06 ha) is located on developable lands north of the Core • Flows from PSWs drain easterly through future development on Mattamy lands; drainage to be addressed through design of Mattamy subdivision.
31a	**0.05**	• Existing contributing drainage area to PSW 31a = 0.68 ha • Drainage area to PSW 31A is largely contained in Core 10, approximately 25% (0.17 ha) is located on developable lands north of the Core • Flows from PSW drain southerly to PSW 31
32	**0.04**	• Existing contributing drainage area to PSW 32 = 0.22ha • Drainage area to PSW 32 is entirely contained in Core 10 • Flows from PSW drain easterly to PSW 31
33	**0.12**	• Existing contributing drainage area to PSW 33 = 0.45ha • Drainage area to PSW 33 is entirely contained in Core 10 • Flows from PSW drain easterly to PSW 31
60	**0.03**	• Existing contributing drainage area to PSW 60 = 0.23 ha • Drainage area is entirely contained in Core 10 • Flows from PSW drain southerly to Core 10, eventually being picked up by the development on the Mattamy Phase 3 lands

7.10.1 Drainage out of PSWs

The *JCT EIR/FSS* notes that, "Localized swales and headwalls or equivalent will be utilized to intercept and capture overland flows draining out of Core 10 and 11 and onto the developable lands at points indicated on Drawing 6 and Drawings 7A to 7I."

Consistent with this requirement, storm sewer outlets and dedicated clean water pipes are proposed to convey drainage from wetlands to ponds or streams. Drainage out of PSW 31 and 60 located on the Subject Lands will discharge to the east through the Dunoak lands in a dedicated clean water pipe and outlet to Stream Reach JC-36/27A.

7.10.2 Drainage into PSWs

As noted in **Table 7.10**, no development is proposed on the Subject Lands within the catchments of PSWs 32, 33, or 60. A small portion of the Subject Lands are being developed in the catchment of PSW 31 and PSW 31a. The *JCT EIR/FSS* noted that 1.1 ha of pre-development drainage from External Area 4 is anticipated to be directed into Core 10 to maintain the form and function of the PSW. As part of this Addendum this drainage area to the wetland has been refined, and PSW 31A has also been included for discussion.

Figure 7.8A shows the developable area within the PSW 31a catchment is 0.17 ha. The hydrological regime of PSW 31a is expected to be supported through surface water flows to the wetland. Monitoring completed by R.J. Burnside within nearby PSW 32 confirmed that the wetland was recharging groundwater and therefore, was surface water fed. PSW 31a is similar in that the wetland exists within a local depression. To maintain drainage, it is proposed to send an equivalent of 0.0425 AxC (0.17 ha x 0.25 RC) to the PSW. This will be achieved by sending approximately 0.13 ha of runoff from lots (roughly 2-3 lots) at 0.60 runoff coefficient (AxC =0.08) to the PSW. **Figure 7.8B** shows the proposed post-development area to be directed to PSW 31a. The lots on the southeast corner will sheet flow to the south, overtop of the trail, to the NHS and PSW 31a. Typically a swale or culvert would be provided to prevent sheet flow overtop of the trail, however in this situation it is the Study Team's opinion that sheet drainage from 2-3 lots would not negatively impact the trail and would eliminate the need for disturbance in the wetland buffer for a culvert or swale outlet.

Figure 7.8A shows the developable area within the PSW 31 catchment is 1.23 ha (note that since PSW 31a flows into PSW 31, pre-development area tributary to PSW 31a also drains into PSW 31). As with PSW 31a, PSW 31 exists within a local depression and is expected to be supported by surface water flows to the wetland. To maintain drainage, it is proposed to send an equivalent of 0.31 AxC (1.23 ha x 0.25 RC) to the PSW. To maintain the form and function of the wetland it is proposed to send runoff from 0.66 ha of lots at 0.60 runoff coefficient (AxC = 0.40) to offset the drainage. Drainage sent to PSW 31 is from a combination of 0.42 ha from the Coscorp lands and 0.24 ha from Mattamy Phase 3. **Figure 7.8B** shows the proposed post-development area to be directed to PSW 31a. As noted above, 0.13 ha of runoff from lots will sheet flow to PSW 31a and subsequently to PSW 31. Runoff from 0.42 ha of lots will be collected in RLCBs and discharged through a culvert, underneath the trail, to the NHS. The eastern RLCB will discharge to a swale that will convey drainage within the NHS to PSW 31, by-passing PSW 31A (to avoid sending too much flow to PSW 31A). The culvert and swale grading will be located outside the 30m wetland buffer. Further detail on the proposed swale and culvert grading is provided in **Section 7.11**.

7.10.3 Water Balance to Provincially Significant Wetlands

There are two PSWs (31 and 31a) located within the Joshua's Creek EIR Subcatchment Area that have been studied to address potential impacts of changes to runoff volumes resulting from development in their surface water catchments. The characteristics of these PSWs are described in **Section 7.10**.

A detailed analysis was undertaken to determine existing and proposed water balances for these PSWs. A SWMHYMO model was selected to complete the water balance analyses. The water balance analysis included 44 years of continuous hydrologic modeling of rainfall data to generate average annual and monthly runoff volumes to each PSW. The model was simulated for existing and proposed conditions to determine differences in runoff volume to the wetlands, potential mitigation strategies, and the implications to stormwater management design.

7.10.3.1 PSW Existing Drainage Areas

The location of PSWs 31 and 31a are shown on **Figure 7.8A and Figure 7.8B** along with their size and boundaries of their individual surface water subcatchments. The size and outlet conditions of these PSWs is discussed in **Section 7.10** and summarized below.

Table 7-11 PSW Pre-Development Drainage Area

PSW #	Wetland Area (ha)	Contributing Drainage Area (ha)
31a	0.05	0.68
31	0.6	5.84

7.10.3.2 Post-Development Water Balance Requirements for PSWs

A variety of general habitat conditions are represented by the wetlands which dictate the target criteria related to the water balance assessment for these wetlands, which should generally be in the range of the following:

- PSW 31a is a XXXXX wetland, DESCRIBE WETLAND
  - Average Annual: ± 5%
  - Spring-Summer Seasons (March-May; June-September): ± XX
  - Fall-Winter Seasons (October-November; December-February): ± XX
- PSW 31 is a XXXXX wetland, DESCRIBE WETLAND
  - Average Annual: ± 5%
  - Spring-Summer Seasons (March-May; June-September): ± XX
  - Fall-Winter Seasons (October-November; December-February): ± XX

7.10.3.3 Servicing Strategy North and East of Core 10

Under proposed conditions, imperviousness conditions and drainage systems within the PSW subcatchment boundaries (outside of Core 10) will be modified to accommodate residential development of lands adjacent to Core 10. Within Core 10, PSW subcatchment areas will remain largely unchanged.

As shown on **Figure 7.8A**, under existing conditions, drainage from PSW31a eventually flows through PSW 31 located in the northeast corner of Core 10.

The Core 10 area and developing areas north and east of Core 10, within the Joshua's Creek subwatershed, was simulated with a continuous hydrologic model to evaluate surface runoff input to the two wetlands under existing and proposed conditions.

Figure 7.8B illustrates the post development drainage strategy that will generally maintain the targets outlined in **Section 7.10.3.2**, to the extent possible. The following summarizes the proposed strategy for each wetland. All drainage that is directed to PSWs will be either 'clean' drainage in the form of backyard and rooftop runoff or will be directed from within the Core itself.

PSW 31a – As illustrated in **Figure 7.8B**, a portion of the lots on the southeast corner of the Coscorp lands will sheet flow to the south, overtop of the trail, to the NHS and PSW 31a. The total drainage area proposed to be directed to PSW 31a is 0.13 ha at a runoff coefficient of 0.60. Typically, a swale or culvert would be provided to prevent sheet flow overtop of the trail, however in this situation it is the Study Team's opinion that sheet drainage from 2-3 lots would not negatively impact the trail and would eliminate the need for disturbance in the wetland buffer for a culvert or swale outlet.

PSW 31 – As illustrated in **Figure 7.8B,** runoff from lots to the north of the Core, on the Coscorp lands, and lots to the east of the Core, on the Mattamy lands, will be directed to PSW 31. Runoff from 0.42 ha of lots (0.6 RC) on the Coscorp

lands will be collected in RLCBs and discharged through a culvert, underneath the trail, to the NHS. The eastern RLCB will discharge to a swale that will convey drainage within the NHS to PSW 31, by-passing PSW 31A (to avoid sending too much flow to PSW 31A). The culvert and swale grading will be located outside the 30m wetland buffer.

Runoff from 0.24 ha of lots (0.6 RC) on the Mattamy lands will be collected in RLCBs and discharged through a culvert, underneath the trail, to Core 10. The proposed swale along the northeastern limit of Core 10 will be graded to direct an additional 0.21 ha of Core drainage to PSW 31. The culvert and swale grading will be located at a minimum 1m away from the staked dripline and 10m from the staked wetland limits.

Table 7-12 PSW Post-Development Drainage Area

PSW #	Contributing Drainage from Core Area (ha)	Contributing Drainage from Developed Area (ha)	Total Contributing Drainage Area (ha)
31*	4.99	0.79	5.78
31a	0.51	0.13	0.64

*Drainage area to PSW 31 includes area directed to PSW 31a since PSW 31a flows into 31.

7.10.3.4 Water Balance Results

PSW water balance analyses were completed for both pre-development and post development conditions as described above. Average annual runoff volumes changes to the PSWs are summarized in **Table 7-13 and 7-14.** Calculations and modeling files for these water balances are provided in **Appendix F-4**.

Table 7-13
Summary of Average Annual and Seasonal Runoff Volumes to PSW 31a
Under Existing and Proposed Conditions

Time Period	Average Volume (m^3)		Difference from Pre-Dev (%)
	Pre-Dev Conditions	Post-Dev Conditions	
Annual	870	875	0.6
Winter	181	161	-10.9
Spring	177	183	3.1
Summer	353	333	-5.8
Fall	348	310	-11.0

As illustrated in **Table 7-13**, annual and seasonal water balance targets are generally being met, as a result it is believed that the future proposed seasonal volume will not result in negative impacts to the features or functions of the PSW's.

Table 7-14
Summary of Average Annual and Seasonal Runoff Volumes to PSW 31
Under Existing and Proposed Conditions

Time Period	Average Volume (m^3)		Difference from Pre-Dev (%)
	Pre-Dev Conditions	Post-Dev Conditions	
Annual	7593	7555	-0.5

Winter	1511	1333	-11.8
Spring	1536	1529	-0.5
Summer	3064	2893	-5.6
Fall	2944	2704	-8.2

As illustrated in **Table 7-14**, annual and seasonal water balance targets are generally being met, as a result it is believed that the future proposed seasonal volume will not result in negative impacts to the features or functions of the PSW's.

7.11 PRELIMINARY GRADING PLANS

A Preliminary Grading Plan, prepared for the FSS Study Area, has been coordinated with grading of adjacent Mattamy Phase 3 lands to the east and has been prepared with consideration for engineering constraints such as the NHS, SWM pond locations and outlet elevations, watercourse configurations and proposed road patterns. The conceptual grading is illustrated on **Drawings 7J and 7K**. Cross sections are presented on **Drawing 8A**.

Grading details are consistent with the Town's standards and compatible with the NOCSS recommendations for grading adjacent to the NHS. In this regard, preliminary grading of most of the lots, adjacent to Cores, match existing grades at the proposed lot line. Where this is not possible, the grading difference is shared between the development and NHS buffer in accordance with NOCSS.

The majority of grading within the NHS is associated with the trail system, as illustrated on **Drawings 7J, 7K and 8A**. For a detailed explanation of the trail grading, refer to **Section 6.3** and **Appendix N**. The trail grading respects the grading rules within the NHS; grading is permitted within the outer 20m of the 30m buffer to PSWs, with vertical differences shared between private property and NHS. As noted in **Section 7.10.2** a swale is required to direct drainage from the culvert outlet to direct drainage to PSW 31. The swale will be cut approximately 0.15m deep and will be located within the Core, outside the 30m wetland buffer.

7.12 SWM POND OPERATING CHARACTERISTICS

No changes are required to this section. Please refer to the *JCT EIR/FSS* for details.

8.0 GROUNDWATER IMPACT ASSESSMENT

A water balance assessment was prepared as part of the *JCT EIR/FSS* to understand potential land development impacts on the groundwater conditions within the EIR Subcatchment Area. The water balance analysis determined the pre-development recharge volumes for the EIR Subcatchment Area (based on existing land use conditions) and the post-development recharge volumes that would be expected based on the proposed land use plan. Much of Section 8.0 from the *JCT EIR/FSS* remains valid however, the entire section has been included within this Addendum for ease of reference with updates to text and tables where necessary to reflect the Addendum Study Area.

8.1 COMPONENTS OF A WATER BALANCE

A water balance is an accounting of the water resources within a given area. As a concept, the water balance is relatively simple and may be estimated from the following equation:

	P	=	S + R + I + ET
where	P	=	precipitation
	S	=	change in groundwater storage
	R	=	surface water runoff
	I	=	infiltration
	ET	=	evapotranspiration/evaporation

The components of the water balance vary in space and time and depend on climatic conditions as well as the soil and land cover conditions (e.g., rainfall intensity, land sloe, soil hydraulic conductivity and vegetation). Runoff, for example, occurs particularly during periods of snowmelt when the ground is frozen, or during intense rainfall events. Precise measurement of some of the water balance components is difficult and as such, approximations and simplifications are made to characterize the water balance of a study area. Field observations of the drainage conditions, land cover and soil types, groundwater levels and local climatic records are important input considerations for the water balance calculations.

The water balance components are discussed below:

Precipitation (P): The long-term average annual precipitation for the area is 897 mm based on data from the Hamilton RBG climate station (Station 6153300 – 43°16.8'N, 79°52.8'W, elevation 102.1 masl) for the period between 1981 and 2010. The monthly precipitation data are summarized in **Table C-7-1, Appendix C-7.**

Storage (S): Although there are groundwater storage gains and losses on a short-term basis, the net change in groundwater storage on a long-term basis is assumed to be zero so this term is dropped from the equation.

Evapotranspiration (ET): Evapotranspiration varies based on the land surface cover (e.g., type of vegetation, soil moisture conditions, impervious surfaces, etc.). Potential evapotranspiration (PET) refers to the water loss from a vegetated surface to the atmosphere under conditions of an unlimited water supply. The actual rate of evapotranspiration (AET) is generally less than the PET under dry conditions (e.g., during the summer when there is a soil moisture deficit). The mean AET has been calculated for this study using a monthly soil-moisture balance approach considering the local climate conditions.

Water Surplus (R + I): The difference between the mean annual P and the mean annual ET is referred to as the water surplus. Part of the water surplus travels across the surface of the soil as surface or overland runoff (R) and the remainder infiltrates the surficial soil (I). Infiltration is comprised of two components: shallow infiltration that migrates laterally through the topsoil profile and discharges to surface at some short time following cessation of precipitation and a deeper infiltration that reaches the water table and recharges the groundwater flow system. The shallow infiltration component may be referred to as interflow or throughflow and the deeper component may be referred to as percolation, deep infiltration or net recharge. The interflow moves relatively quickly and often re-emerges locally as

seepage at the ground surface. Typically, the horizontal hydraulic conductivity of the soil profiles tends to be higher than the vertical hydraulic conductivity, aiding the lateral interflow movement. Weathering and fracture patterns in the relatively low hydraulic conductivity till that blankets the EIR Subcatchment Area may also affect the vertical and lateral water movement.

Interflow is more closely associated with runoff (because of its relatively short residence time) than with baseflow which is fed by groundwater recharge. As such, the interflow is considered an 'indirect' component of runoff, as opposed to the 'direct' component of surface runoff (overland flow) that occurs across the ground surface during precipitation or snowmelt events. The ability to precisely separate interflow from direct runoff or baseflow is not a simple task. Because of this, there has been a lack of adoption of a standard separation or partitioning method. This is related to the complexity of subsurface geological and hydrogeological environments. Since it is generally very difficult to distinguish between interflow and direct surface (overland) flow, they are often considered together as the total runoff component that contributes water to surface water features.

8.2 APPROACH AND METHOD

The analytical approach to calculate a water balance for the EIR Subcatchment Areas involved monthly soil-moisture balance calculations (based on the Thornthwaite and Mather methodology) to determine the evapotranspiration and the corresponding water surplus components using a spreadsheet model. A soil-moisture balance approach assumes that soils do not release water as 'potential recharge' while a soil moisture deficit exists. During wetter periods, any excess of precipitation over evapotranspiration first goes to restore soil moisture. Once the soil moisture deficit is overcome, any further excess water can then pass through the soil as infiltration and either become interflow (indirect runoff) or recharge (deeper infiltration).

A soil moisture storage capacity of 100mm was utilized to represent the predominantly short-rooted vegetation in the open fields with clayey soils and a soil moisture capacity of 200mm as used to represent the more moderately deeply-rooted shrub and wooded areas with clayey soils within the subcatchments. **Tables C-7-1 and Table C-7-2 in Appendix C-7** detail the monthly potential evapotranspiration calculations accounting for local latitude and climate, and then calculate the actual evapotranspiration and water surplus components of the water balance based on the monthly precipitation and soil moisture conditions. The SWMP Design Manual (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used and a corresponding runoff component was calculated for both pre- and post development conditions.

As noted in **Section 8.1**, the infiltration component will divide into shallow interflow and deeper groundwater recharge components. Although there is no widely-accepted standard methodology for calculating this division of flow, reasonable estimates can be made based on the nature of the surficial soils. For example, for soils underlain by very permeable sand, it is considered that the interflow component would likely approach 0% with most of the infiltrating water recharging downwards to the water table. For soils underlain by very low hydraulic conductivity sediments, the interflow component would likely approach 100%, with most of the water infiltrating into the topsoil just seeping laterally along the topsoil/till contact to re-emerge locally at surface.

Although the topsoil is underlain by low hydraulic conductivity till sediments, weathering and fracturing of the shallow soils may improve the recharge capabilities. In the water balance analyses completed for the North Oakville East Subwatersheds Study (NOMI, 2004), an interflow component value of 50% was utilized in the soil moisture balance calculations and this was found to correlate very well with numerical modelling results of the regional groundwater flow conditions, as well as the study findings of the NOCSS (2006) and other regional modeling completed by the Region (1995). This estimate has been used in this study also to calculate the direct and indirect runoff components of the water balance (**Tables C-7-1 and Table C-7-2, Appendix C-7**).

Using the calculated water balance components, the total annual infiltration and runoff water volumes for the EIR Subcatchment Areas were then calculated for the pre-development conditions (based on the existing land use characteristics) and post development conditions (based on the Composite Development Plan). The post development

water balance scenario is calculated assuming no LID measures for SWM and infiltration to represent a 'worst-case scenario' of the potential impacts of development on the existing water balance. The post development land uses for each subcatchment have been broken down into land use categories and assigned an average percentage of imperviousness for the water balance calculations as summarized in Table 8-1 (note that the values have been rounded accounting for the minor variances in additions). The detailed infiltration and runoff volume calculations are presented for each subcatchment area in **Tables C-7-14 through Table C-7-15 in Appendix C-7**.

Table 8-1 Water Balance Land Use Categories

Land Use Category	Imperviousness (%) (Assumed)	Total Area in Subcatchments (ha)	
		JC-9A	JC-17
Residential (Singles)	0.66	2.8	1.9
Residential (Townhouses)	0.79	1.1	0.0
NHS	0.00	2.9	3.5
Park	0.29	0.1	0.1
Roads	0.81	2.2	0.8
Future Lots	0.00	0.0	0.0
Wooded Area	0.00	0.0	0.0
TOTAL		9.1	6.3

8.3 COMPONENT VALUES

The detailed monthly calculations of the water balance components provided on **Table C-7-1 and Table C-7-2** in **Appendix C-7** indicate that a water surplus is generally available from November to May. The monthly water balance calculations illustrate how infiltration occurs during periods when there is sufficient water available to overcome the soil moisture storage requirements. In winter, frozen climate conditions may affect when the actual runoff and infiltration will occur; however, the monthly balance calculations indicate the potential volumes available for these water balance components.

The monthly calculations are summed to provide estimates of the annual water balance component values (**Tables C-7-1 and C-7-2**, **Appendix C-7**). A summary of these values is provided in **Table 8-2** (note that the values from the table in **Appendix C-7** have been rounded accounting for the minor variances in balance additions).

Table 8-2 Water Balance Component Values

Water Balance Component	Agricultural/Open Space (short-rooted vegetation)	Shrub/Wooded Areas (longer-rooted vegetation)
Average Precipitation	897	897
Actual Evapotranspiration	591	626
Water Surplus	306	271
Total Infiltration	107	122
Direct Runoff	199	149
Recharge (deep infiltration)	54	61
Interflow (indirect runoff)	54	61
Total Runoff (direct and indirect components)	252	210

It is acknowledged that the infiltration, recharge and runoff values presented in **Table 8-2** are estimates. These values are utilized for the water balance calculations, but it is important to understand that infiltration rates are directly dependent upon the hydraulic conductivity of the surficial soils and this may vary over several orders of magnitude. As such, the margins of error for calculated infiltration and recharge rates are large. The margins of error are recognized, but for the purposes of this assessment, the numbers used in the water balance calculations are all considered reasonable estimates based on the site-specific conditions and anticipated post development conditions. It is noted further that the estimates for groundwater recharge are consistent with the previous subwatershed studies completed

for the area, including the NOCSS (2006) and NOMI (2004) studies, and a comprehensive hydrogeological study of aquifers throughout the Region that included regional groundwater flow modeling by Holysh (1995).

8.4 PRE-DEVELOPMENT RECHARGE (EXISTING CONDITIONS)

The pre-development water balance calculations for the EIR Subcatchment Areas focused on the development areas within the draft plan and are presented in **Tables C-7-14 through C-7-15 in Appendix C-7**. The total pre-development groundwater recharge volume for each subcatchment is summarized below in **Table 8-3**. It is noted that the numerical values presented in the tables are based on estimated average annual water balance component values and assumed consistent soil and drainage conditions across the subcatchment areas. The calculated recharge volumes are considered as reasonable representations of the magnitude of the recharge volume, not the precise water volume that occurs.

Table 8-3 Pre-Development Groundwater Recharge Volume by Subcatchment

Subcatchment	Total Area (ha)	Total Pre-Development Recharge Volume* (m^3/year)
JC-9A	9.1	4,900
JC-17	6.2	3,500
TOTAL	15.3	8,400

*It is acknowledged that recharge rates are directly dependent upon the hydraulic conductivity of soils that may naturally vary over several orders of magnitude. Recognizing the wide margins of error associated with this analysis, the recharge volumes presented above are considered simply as reasonable estimates for comparison purposes.

8.5 POTENTIAL DEVELOPMENT IMPACTS TO WATER BALANCE

Development of an area affects the natural water balance. The most significant difference is the addition of impervious surfaces as a type of surface cover (e.g., roads, parking lots, driveways, and rooftops). Impervious surfaces prevent infiltration of water into the soils and the removal of the vegetation removes the evapotranspiration component of the natural water balance. There is still an evaporation component from impervious surfaces as well as some losses of water through cracks in pavements, etc.; however, this is a relatively minor volume (estimated to be 10% to 20% of precipitation) compared to the evapotranspiration component that occurs with vegetation in this area (about 65% of precipitation). The net effect of the construction of impervious surfaces is that most of the precipitation that falls onto impervious surfaces becomes surplus water and direct runoff.

A calculation of the potential water surplus for impervious areas is provided at the bottom of **Table C-7-1** in **Appendix C-7**. Assuming a maximum evaporation loss from impervious surfaces of up to 20% of the precipitation of 897 mm/year (i.e., 179 mm/year), there is a potential water surplus (runoff) from the impervious areas of 718 mm/year.

8.6 POST-DEVELOPMENT RECHARGE

As described in **Section 8.2**, the EIR Subcatchment Areas have been broken down into proposed land use areas and each land use has been assigned an average percentage of imperviousness as summarized in **Table 8-1**. These data have been applied to calculate the potential post-development recharge volumes assuming no mitigation or LID measures are in place (**Tables C-7-14 and C-7-15, Appendix C-7**). The total post development groundwater recharge volume for each subcatchment is summarized below in **Table 8-4**.

Table 8-4 Potential Post-Development Recharge Volumes with No SWM/LID

Subcatchment	Total Post-Development Recharge Volume* (m^3/year)	% Reduction in Recharge	Potential Recharge Deficit (m^3/year)
JC-9A	2,460	50	2,450

JC-17	1,700	52	1,800
TOTAL	**4,160**	**51**	**4,250**

*****It is acknowledged that recharge rates are directly dependent upon the hydraulic conductivity of soils that may naturally vary over several orders of magnitude. Recognizing the wide margins of error associated with this analysis, the recharge volumes presented above are considered simply as reasonable estimates for comparison purposes. Note that values have been rounded accounting for minor differences in additional totals.

8.7 WATER BALANCE IMPACT ASSESSMENT

8.7.1 Water Quantity

The increases in surface water runoff that will occur with urban development are typically addressed through the use of appropriate SWM techniques and best management practices to control the runoff volumes. Details of the proposed SWM plans for the FSS Study Area are provided in **Section 7**.

The predicted decreases in recharge that will occur due to the nature of the proposed development suggests that, without mitigation, recharge throughout the developed EIR Subcatchment Areas potentially would range from about 30% to 50% of the current amount of average annual recharge (refer to **Table 8-4**). These reductions in recharge that may occur with land development are not expected to result in any significant impacts to the local groundwater flow patterns (the flow directions are related to the overall regional topography), however, there is potential to lower the local water table.

Monitoring has indicated that discharge conditions occur in specific areas along the Joshua's Creek watercourses in areas where the high water table intersects the ground surface. Although the groundwater discharge volumes are minor because of the low hydraulic conductivity soils and insufficient to support baseflow, it is important to maintain the local high water table conditions along the watercourse valleys such that the existing groundwater conditions and any related discharge can be maintained. Therefore, it is recommended to minimize potential changes to the recharge volumes, where possible, through the incorporation of LID measures to promote infiltration and recharge into the development design. LID measures are discussed in **Section 8.8**.

In addition to the loss of direct recharge, the construction of buried services below the water table has the potential to capture and redirect groundwater flow through more permeable fill materials typically placed in the base of excavated trenches. Shallow groundwater may also infiltrate into joints in storm sewers and manholes. Over the long term, these impacts can lower the local groundwater table. Mitigation strategies to prevent this lowering are discussed in **Section 11.1**.

8.7.2 Water Quality

Depending on land use, runoff from urban developments may contain a variety of dilute contaminants such as suspended solids, chloride from road salt, oil and grease, metals, pesticide residues, bacteria and viruses. For the surface water, the SWM ponds will be designed to meet Enhanced Level quality controls (refer to **Section 7**). For groundwater, generally, with the exception of the dissolved constituents such as nitrogen and salt, most contaminants are attenuated by filtration during groundwater transport through the soils. The potential for effects on local groundwater quality from infiltration in the urban areas is therefore expected to be limited. Any potential changes to the groundwater quality are not expected to influence conditions in surface water features given the limited discharge conditions.

LID measures recommended for the promotion of infiltration will involve the direction of roof runoff to pervious areas within the development and no impact to local groundwater quality would be anticipated.

8.7.3 Private Services

The proposed development, within the FSS Study Area, will be serviced by municipal water supply and wastewater services. Therefore, there will be no impact on the water balance and local groundwater or surface water quantity and

quality conditions related to any on-site groundwater supply pumping or disposal of septic effluent. There may be some existing groundwater supply wells and septic systems within the EIR Subcatchment Areas; however, it is recommended that all of these systems will be decommissioned or removed during the development process. Further discussion on interim monitoring and decommissioning of any active private wells is provided in **Sections 11.5 and 11.6**. For existing groundwater supply wells that are not decommissioned it is recommended that municipal supply be provided to these residences as part of the overall development. Municipally supplied water is expected to be of superior quality and reliability to the current water supply wells.

8.8 WATER BALANCE MITIGATION MEASURES

Where feasible, LID measures for SWM will be incorporated into the development design to minimize development impacts on the natural water balance and control runoff. The basic premise for LID is to manage stormwater to minimize the runoff of rainfall and increase the potential for infiltration through the use of various design techniques.

As outlined in the SWMP Design Manual (2003) and Low Impact Development Stormwater Management Planning and Design Guide published by the CVC and TRCA (2010), there are a suite of LID techniques that can be considered to increase the potential for post-development infiltration and mitigate the reductions in recharge that may occur with urban land development.

Techniques to maximize the water availability in pervious areas such as designing grades to direct roof runoff towards open space areas throughout the development, where possible (e.g., yards, boulevards, landscaped areas, swales, green space in parking lots, etc.), can increase recharge in the developed area. Where possible, increasing topsoil depths in the pervious areas to retain more water in storage can also assist to reduce runoff volumes and increase the potential for infiltration. Other LID measures include use of permeable pavements, rain gardens, bioswales, subsurface infiltration trenches, galleries and pervious pipe systems, etc. Incorporating such SWM techniques into development design can assist to minimize development impacts to the water balance by reducing the post development groundwater recharge deficit. It is noted, however, that subsurface infiltration methods can only be considered in areas where there is sufficient soil permeability and depth to water table to accommodate the systems within the unsaturated zone.

Due to the relatively low hydraulic conductivity of the surficial till and shale materials and locally high water table conditions, there are no significant enhancement opportunities for infiltration in the EIR Subcatchment Areas. The use of large engineered facilities and constructed subsurface infiltration measures such as trenches and pervious storm pipe systems are generally not considered suitable for the development.

For the Subject Lands, LID techniques to be implemented are consistent with those outlined in Section 7.4 of the *JCT EIR/FSS*. This includes designing grades to direct roof runoff towards pervious areas (e.g., lawns, side and rear yard swales) throughout the development, where possible, as well as construction of tree pits along all roads where technically feasible (refer to **Figure 7.6** for recommended LID locations).

Quantification of surficial LID techniques is challenging and there are no widely accepted quantification standards. The Low Impact Development Stormwater Management Planning and Design Guide published by the CVC and TRCA (2010) suggests that a conservative estimate for the reduction in runoff due to roof leader disconnection is 25% for clayey soils such as those found on the Subject Lands. It is also possible to illustrate the potential effectiveness of directing roof runoff to grass on infiltration by recalculating the water balance components (**Table C-7-8, Appendix C-7**). These pervious areas would receive precipitation (897mm/year) as well as extra water from roof runoff. The volume of extra water from the roof has been conservatively estimated by assuming that 20% of the precipitation might evaporate, and that during really high rainfall events (about 30% of the precipitation), everything would quickly runoff. The remainder of the roof runoff would add extra water to the pervious areas; i.e., the lawns would receive an extra 450mm/year from roof tops. Under the condition of such increased water supply, evapotranspiration can occur at the maximum potential rate. The recharge that may occur under these conditions of increased water supply is calculated to be 160 mm/year (**Table C-7-8, Appendix C-7**). The pre-development recharge was calculated to be about 54

mm/year (**Table C-7-1, Appendix C-7**); therefore, the recharge in pervious areas receiving extra roof water could theoretically be about 3 times higher than natural conditions. This calculation demonstrates how directing roof runoff to pervious areas may assist to minimize development impacts to the water balance by promoting infiltration. The NOCSS (2006) identified examples of LID measures that may be implemented in North Oakville including bioretention areas, rain gardens, green roofs, use of rain barrels and cisterns, vegetated buffer strips and permeable pavements (refer to Section 7.4 of the *JCT EIR/FSS*). The Town also has advocated for the use of tree pits in boulevards.

As noted in **Section 7.1**, NOCSS recognized the hydrogeological conditions in North Oakville make infiltration targets difficult to meet, however, best efforts have been made to promote recharge where feasible (refer to Section 7.4 of the *JCT EIR/FSS*). Conservation Halton has requested that the effectiveness of the final LID measures selected for specific development areas be assessed at detailed design. Water balance calculations for the development areas with the selected LID were completed and the results indicate that the post-development recharge can be increased by approximately 7,300 m^3/year. The details of the post-development recharge analysis are included in the "Joshua's Creek Coscorp Water Balance LID Update" letter in **Appendix C-7** and the breakdown of LID impacts by catchment are provided in **Tables C-7-14.1 and C-7-15.1** in **Appendix C-7**. As noted in the "Joshua's Creek Coscorp Water Balance LID Update" the volume of additional recharge is sufficient to overcome the projected post-development deficit.
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9.0 WATER AND WASTEWATER SERVICING

The *JCT EIR/FSS* addresses wastewater and water servicing requirements in the FSS Study Area. From a wastewater perspective, it identified wastewater design criteria, external wastewater requirements, existing infrastructure and future servicing requirements. Water supply design criteria, pressure zone boundaries, external water requirements and existing/proposed water infrastructure are also addressed. The proposed water and wastewater servicing strategies, outlined in the *JCT EIR/FSS,* were prepared in accordance with the strategies put forth in the ASP and comments received from the Region on the proposed water and wastewater servicing in North Oakville.

Wastewater and water servicing requirements for the Subject Lands are generally consistent with the overall servicing requirements presented in the *JCT EIR/FSS*. Infrastructure to service the Subject Lands includes:

- Wastewater – As shown on **Figure 9.2**, the Subject Lands will be serviced by two separate sanitary connections from the Mattamy Phase 3 lands. A sanitary connection stub is also provided at the west limit of Street 'C' to service future development lands to the west. Wastewater flows from the Subject Lands are ultimately conveyed to the existing sanitary pump station located on the south side of SWM Pond 55 and on the north side of Dundas Street. Wastewater flows will be conveyed via the proposed minor and major trunk sewers through *JCT EIR/FSS* proposed road network. The pump station discharges to an existing 675mm diameter wastewater main located on the north side of Dundas Street at Prince Michael Drive via a twin 400mm forcemain. In accordance with the Master Plan, this existing 675mm diameter trunk is proposed to function as the outlet for the majority of the lands located within the *JCT EIR/FSS* Study Limits.

- Water – As shown on **Figure 9.4**, the Subject Lands will be serviced by a network of new local watermains designed in accordance with the Region's design criteria and MOE's guidelines. A 300mm trunk watermain will also extend north from Dundas Street through the adjacent Joshua's Creek lands to service the Subject Lands.

These servicing solutions rely on connections and servicing through the adjacent Mattamy Phase 3 lands. The development of the Mattamy Phase 3 lands will proceed prior to or concurrently with the Subject Lands, hence external services for these lands are expected to be available at the time Coscorp proceeds with construction activities.

10.0 ROADS

Section 10 of the *JCT EIR/FSS* discussed policy direction, road creek crossing requirements, recommended crossing sizing and preliminary design of road crossings of Stream Reaches JC-6 and JC-27A located on the Bressa and Argo (Joshua's Creek) lands, respectively. No changes to **Figures 10.1 through 10.6A/B** are proposed as part of this Addendum and the reader should refer to the *JCT EIR/FSS* for those figures.

Future Road Extension to the West

The road network has been designed to allow for a future road connection for the neighbouring property to the west. Should the non-participating landowner to the west wish to develop, the road could be extended west into the property.

Existing Rampen Lands Culvert Upgrades

As discussed in **Section 5.5.2**, the existing 400mm culvert located within JC-7a on the Rampen lands is proposed to be upsized to a 7m by 1.6m box culvert. An open bottom, clear span culvert with sizes noted above and in **Table 10-1** is recommended for the crossing. Although the crossing is located within the JC-7a reach, the proposed culvert width has been conservatively sized to provide 3x the bankfull channel width based on the maximum bankfull channel width measured along Reach JC-7.

Table 10-1: Design Recommendations for Existing Rampen Lands Culvert (JC-7a) Upgrades

Creek Crossing	Width (m)	Height (m)	Length (m)	Downstream Invert (m)*	Upstream Invert (m)*	Top of Road Elevation (m)
Road crossing, JC-7a	7.0	1.6	40	176.64	176.56	178.44

Hydraulic analysis, and presentation of water levels confirming adequate sizing of the proposed 7m by 1.6m box culvert are provided in **Appendix F-4.**

Connection to Burnhamthorpe Road

The Town of Oakville's Master Plan (**Figure 6.1**) identified a future road extension from the Subject Lands north, through the property to the west, to Burnhamthorpe Road. The future road would connect the Joshua's Creek lands to Burnhamthorpe Road East. A potential future road alignment has been shown on the Draft Plan and conceptual grades for this road extension have been shown on **Drawing 7J**. Grading and stormwater management for this road have been discussed further in **Section 7.8.3**. This road connection would involve the crossing of Stream Reach JC-7 immediately upstream of the Subject Lands.

TRCA (2015) and CVC (2015) have developed crossing guidelines to address natural hazards and the maintenance of channel form and function. The following crossing recommendations are provided from a geomorphological perspective and are subject to refinement as part of future studies and site-specific field work on adjacent lands.

TRCA recommends that crossing structures span the meander belt width, where feasible, or, at minimum, the 100-year erosion limit to avoid the migration of the channel into the crossing structure within the next 100 years. The TRCA guidelines also allow smaller crossing structures that accommodate relatively small, stable watercourses provided that they consider physical channel characteristics (e.g., alignment, width and depth) and fluvial processes (e.g., erosion and scour).

CVC (2015) highlights several recommendations from a geomorphological perspective:

- Where possible, the crossing structure design should avoid the need for channel armouring or adjustment
- Where feasible, the crossing structure should have a span that accommodates the channel's 100-year erosion limit or a lesser planning horizon determined through consultation with CVC
- The crossing should be at minimum three times the bankfull channel width for channels less than 4 m wide.
- The crossing should ensure that sediment transport processes and flow velocities are not impacted during frequent storm events

The following additional recommendations are provided based on existing conditions, TRCA (2015) and CVC (2015) crossing guidelines, CH guidelines and standard best management practices:

- The inclusion of a low-flow channel is recommended to maintain or enhance flow characteristics and sediment conveyance through the culvert
- The proposed crossing structure design should minimize the degree and duration of inwater works to the extent possible
- CH recommends that the crossing structure be an open-bottom culvert and consider the 100 year erosion limit
- Natural substrate (e.g., riverstone) should be used to reconstruct the bed, where feasible
- Any inwater works should be conducted in the dry during the appropriate inwater timing window

The above recommendations do not consider minimum culvert flow conveyance requirements to address upstream flooding or road overtopping concerns. A hydraulic analysis should be completed to confirm the appropriate culvert sizing. Further details of this proposed road crossing are not presented in this Addendum and will need to be investigated and updated as necessary as part of a future addendum to the *JCT EIR/FSS*. This has been added to **Section 13.1**.

11.0 CONSTRUCTION PRACTICES

Section 11 in the *JCT EIR/FSS* provides information related to Key Geotechnical Findings, Erosion and Sediment Control, Construction Phasing, Dewatering Requirements, Construction Below Water Table, Private Wells, Well Decommissioning and Topsoil Management. This information remains valid for the Subject Lands. A geotechnical report providing additional recommendations will be required prior to detailed design. Please refer to the *JCT EIR/FSS* for **Section 11**.

12.0 MONITORING PROGRAM

Section 12.0 in the *JCT EIR/FSS* outlines the OPA 272 Monitoring Requirements, the NOCSS Monitoring Requirements and the Proposed Monitoring. The information related to the OPA 272 and NOCSS monitoring requirements remain unchanged. Refer to the *JCT EIR/FSS* for Sections 12.1 and 12.2 for this information. With respect to the proposed monitoring, outlined in Section 12.3, a new section has been added (Section 12.3.5) to reflect the proposed monitoring with two of the Core 10 wetlands.

12.1 OPA 272 MONITORING REQUIREMENTS

Please refer to the *JCT EIR/FSS* for these details.

12.2 NOCSS MONITORING REQUIREMENTS

Please refer to the *JCT EIR/FSS* for these details.

12.3 PROPOSED MONITORING

The majority of the monitoring program has not changed since issuance of the *JCT EIR/FSS*. This includes the monitoring requirements for Erosion and Sediment Control (Section 12.3.1), SWM Facilities (Section 12.3.2), Monitoring of Modified Streams (Section 12.3.3), and Monitoring in relation to municipal services and trails installed by an owner within the NHS (Section 12.3.4). Refer to the *JCT EIR/FSS* for these sections. A new **Section 12.3.5** has been provided below.

12.3.5 Wetland Monitoring

Given the proposed changes to drainage inputs into PSW 31 and PSW 31a, monitoring will be completed to assess any impacts the wetland units.

Prior to construction, baseline conditions will be established for the wetlands through the creation of permanent monitoring plots and transects. Monitoring plots will be 10 x 10 m in size, within which species presence, relative cover abundance, vegetation layer (tree, shrub, herb) cover, and the number of species will be recorded. Transects will also be delineated within the wetlands along the general moisture catena to record vegetation layer height and species presence at 1 or 2 metre intervals, depending on the length of transect.

One plot and transect will be established within PSW 31a, and three plots and transects will be established within PSW 31. Photographs of the plots and transects will be taken to visually record changes in vegetation from permanent vantage points.

Following completion of construction, wetland vegetation monitoring is to be completed once a year during the height of plant seasonal development. The timing of post-construction surveys will be aligned with the timing of the baseline surveys. The plots and transects will be surveyed for 5 years post-construction to monitor for changes.

13.0 SUMMARY OF RECOMMENDATIONS

This Addendum identifies and characterizes the natural heritage features and functions within the Subject Lands and recommends measures to mitigate any potential impacts of the proposed Coscorp development application and associated servicing requirements on the NHS within the EIR Subcatchment Area. It also identifies servicing requirements related to roads, water and sanitary services, stormwater management, and site grading. The Addendum provides a link between the *JCT EIR/FSS* as well as the Town's NOCSS Management and Implementation Report, the North Oakville East Secondary Plan and the required planning approvals for the FSS lands.

Table 13-1 from the *JCT EIR/FSS* has been updated to include a summary of the main report findings and recommendations from this Addendum and notes Section(s) of this Addendum that can be referenced for more details.

Sections 13.1 and **13.2** list the recommendations contained in this Addendum regarding study requirements and design direction for future Addendums as well as detailed design considerations for the Subject Lands.

13.1 DIRECTION TO FUTURE EIR/FSS ADDENDUMS

This Addendum, in combination with the *JCT EIR/FSS* has addressed the required environmental and engineering matters set out in the EIR/FSS ToR for the Subject Lands (Coscorp). Given that there are non-participating landowners within the EIR/FSS catchment areas, the following information will need to be provided and/or refined as part of a future Addendum to this EIR/FSS. The following list is not meant to be exhaustive and consultation with the Town, CH and the Region is strongly recommended prior to advancing any of the fieldwork associated with the future Addendums:

a) If the retained lands at 1086 Burnhamthorpe Road advance for development:

- If the retained lands at 1086 Burnhamthorpe Road advance for development, confirmation as to whether a top of bank exists west of the existing house;
- Ecological fieldwork on the lands to be retained at 1086 Burnhamthorpe Road to include, but not be limited to, surveys for snapping turtles and breeding birds;
- Trail determination along the southern limit of the LPA

b) When the lands at 1030 and 1054 Burnhamthorpe Road advance for development:

- Additional details pertaining to the culvert size and location for the crossing of JC-7 that is necessary to connect Street A to Burnhamthorpe Road;
- All required fieldwork as outlined in the approved EIR/FSS including staking of the Core 10 limits;
- The final determination of the LPA location. The eastern half of the 100m LPA has been accommodated in the Coscorp Draft Plan;
- Potential flood plain modifications to further refine the Regional Storm flood plain;
- Potential meander belt width refinement for JC-8 and confirmation of meander belt width along the upstream extent of Reach JC-7a;
- Trail location and design along outer limit of Core 10. Consideration for eliminating interim trail on Coscorp lands;
- Stormwater management requirements for the north portion of the road connecting to Burnhamthorpe Road (Street A extension) should be determined.

13.2 DETAILED DESIGN REQUIREMENTS

The following items should be provided at detailed design:

- Hazard tree assessment for that portion of the trail that is in proximity to trees within Core 10 (primarily at the eastern property limit);
- Finalization of trail locations within the outer limit of Core 10;
- Proposed grading plans will be finalized at detailed design;
- A Permit will be required from Conservation Halton, pursuant to Ontario Regulation 162/06, to reconfigure the flood plain and to construct a trail within 30m of a PSW;
- Prior to construction, all groundwater monitoring wells and standpipes installed for this Addendum and not maintained during construction for monitoring, must be decommissioned in accordance with Provincial regulations prior to or during the site development;
- An ESC strategy will be prepared and implemented in accordance with the Town and CH's *Erosion and Sediment Control Guideline for Urban Construction* prior to any earthworks or grading activities on the Subject Lands. This strategy should employ a multi-barrier approach where appropriate to prevent soil erosion and sedimentation. The plan must be reviewed and approved by the Town prior to any clearing and grading;
- Areas within the development requiring sump pumps will be determined at the detailed design stage;
- In the event that Regional wastewater projects are not completed at the time of development, interim wastewater servicing alternatives will be investigated to meet the servicing requirements for the Subject Lands;
- Final watermain sizing for watermains less than the minimum 300mm diameter mains, modeled in the ASP, will be completed at the detailed design stage based on the actual development characteristics. Water modeling is required to confirm watermain sizing and address phasing and dead end watermains;
- Confirmation should be provided that the post-development drainage area to PSW 31 and PSW 31a meets the requirements set out in **Section 7.10** of this EIR/FSS addendum, supported by detailed grading plans;
- flow spreaders for drainage to the NHS in the vicinity of TR35 should be included at detailed design; and,
- In the event that Regional water projects are not completed at the time of development, interim water servicing alternatives will be investigated to meet the servicing requirements for the Subject Lands.

Table 13-1 has been updated to include information pertaining to this Addendum. For ease of reference, the table continues to include the text that was provided in the *JCT EIR/FSS*. The text from Table 13-1 in the *JCT EIR/FSS* is shown in *italics*. If there has been no change, only the original text in italics is presented.

Table 13-1 Summary of EIR/FSS Addendum Recommendations and Mitigative Measures

Topic	Recommendations	Report Section for Further Details
Areas Studied	In accordance with OPA 272 requirements, Subcatchment Areas JC9A and JC17 have been studied as part of this Addendum. The FSS Study Area encompasses all of Coscorp's lands and has been integrated with the FSS prepared for the Mattamy lands to the east. *In accordance with OPA 272 requirements, Joshua's Creek Subcatchment Areas JC6, JC9A, JC12, JC16 and JC17 have been studied as part of this EIR/FSS. The FSS Study Area encompasses all of the Mattamy lands and the Argo lands within these subcatchments.*	1.2 *1.2*
Subcatchment Drainage Boundaries	*As required by NOCSS, the subcatchment drainage boundaries have been confirmed through the review of additional more detailed topographic work and field investigations Using the LiDAR mapping and DEM, the culvert inventory and review of the engineering drawings along major roads, existing subcatchment drainage boundaries were delineated and compared to the NOCSS drainage area boundary for the EIR Subcatchment Area. Refinements were made to reflect the conclusions of the Final North Oakville East Drainage Area Exchange Report (DAE Report, January 2017). The total EIR/FSS Subcatchment Area based on*	*5.2 and 7.2*

Topic	Recommendations	Report Section for Further Details
	LiDAR mapping is 301.1 ha compares well to the 308.56 ha drainage area from NOCSS. *For the purposes of flood plain mapping, the total Joshua's Creek drainage areas to Dundas Street were identified. The EIR/FSS drainage area of 1117.6 ha compares well with the NOCSS drainage area of 1074.5 ha.*	
Draft Plan of Subdivision	The Coscorp draft plan has been added to the Composite Development Plan that was prepared for the JCT EIR/FSS (**Figure 6.2**). **Figure 6.2A** illustrates the proposed draft plan including residential uses consisting of single detached and street townhouses. In addition to the residential uses, NHS lands have been identified. See further discussion below. *The Composite Development Plan including two Draft Plans of Subdivision for the southern portion of the Bressa lands and Dunoak lands (Figure 6.2) illustrates the proposed residential development on the Subject Lands. Proposed residential uses consist of detached and townhouse dwellings, live-work units and multiple dwellings. Outside the current Draft Plans, for the remainder of the Subject Lands, the anchors of the development, comprising some roads, open space, SWM facilities, schools and park blocks, are shown but details of the remainder of the residential development is indicated by blocks only, as those areas will be developed in later phases. Outside the Subject Lands, the Town's Master Plan development layout is shown.*	6.1 Figures 6.2 and 6.2A *6.1*
NHS Framework and Associated Components	Components of the NHS framework, as outlined in NOCSS, within the Study Area are identified on **Figure 2.1** and include: • Portions of Core Preserve Area 10 • Four PSWs (31, 32, 33 and 60) • One Medium Constraint Stream (JC-7) • One 100m Optional Linkage Preserve Area, which will not be implemented in the Study Area in favour of aligning the 100m LPA along the existing JC-7 watercourse corridor • Three Topographical Depressions/Ponds within the JC-7 watercourse corridor • Regional Storm flood plain *Components of the NHS framework in the Study Area are identified on Figure 2.1. They include:* • *Portions of Core Preserve Areas 10 and 11* • *Nine High Constraint Streams, one of which, Reach JC-6, is categorized as a 'red-hatched' or 'high constraint stream with rehabilitation opportunities';* • *Four Medium Constraint Stream Reaches* • *Six Low Constraint Stream Reaches* • *Two Linkage Preserve Areas* • *One Optional LPA, which will not be implemented in the Study Areas;* • *Four Hydrologic Features A, two on Reach JC-27A, one on JC-13, and one on JC-7 and JC-8 where their centrelines form the subcatchment limit* • *Ten Hydrologic Features B* • *Eleven PSWs located in Core 10, eight of which are within the EIR Subcatchment Areas (Table 3.5), and*	2.0 Figure 2.1 *2.1, 3.2, 3.3*

Topic	Recommendations	Report Section for Further Details
	• *Nine PSWs in Core 11 or partially within Core 11, three of which are within the EIR Subcatchment Areas; one of these three extends north of Core 11 along Stream Reach JC-13 (Table 3.7)*	
NHS Boundaries	The northern boundary of Core 10 on the Subject Lands has been staked in the field with agencies (MNRF, CH and Region) and survey plans delineating the Core boundary has been prepared. The Core boundary is the greater of 10m from the woodland dripline and 30m from the wetland limits with a diagonal line drawn in a northwesterly direction from the eastern property boundary to the western property boundary. The extension of the Core 10 boundary, west of the Subject Lands, will be staked and surveyed through future EIR/FSSs by others. The 100m LPA limits have been plotted on the Subject Lands (Figure 3.1) and capture, at a minimum, the greater of the following constraints: • Top of bank plus 7.5m • Regional Storm flood plain plus 7.5m • Meander belt plus 7.5m • Bankfull channel plus 15m (fisheries) CH confirmed that a stable top of bank assessment is not required for JC-7 given the extent of the LPA in relation to the physical top of bank. A cut and fill has been proposed to reconfigure the Regional Storm flood plain associated with JC-8. Additional flood plain reconfiguration and meander belt refinement may take place as part of future EIR/FSSs when the lands to the west of the Subject Lands advance for development. *Boundaries of Cores 10 and 11 features on the Subject Lands have been staked in field with Agencies and survey plans prepared delineating core and linkage boundaries.* *A Reference Plan illustrating the final NHS boundaries on the Subject Lands will be prepared on a draft plan by draft plan basis and will be submitted to the Town and CH.* *The boundary of the western portion of Core 10 and the eastern portion of Core 11, located on non-participating lands within the EIR Subcatchment Areas, will be staked and surveyed through future EIR/FSSs prepared by others.* *The location of the 100m Linkage width of NHS associated with the upstream end of Reach JC-7 will be coordinated through discussions with the adjacent landowner. Stream Corridor boundaries were established based on the review and assessment of fluvial geomorphological requirements, stable slope, top of bank, regulatory floodplains, fish and fish habitat protection requirements, preservation of hydrogeologic functions, Hydrologic Features A, NOCSS direction and setback and buffer requirements.*	3.1.1, 3.1.2, 5.5, 13.1 Figures 2.1, 3.1 *3.0, 13.2, 5.5*
Joshua's Creek Low Constraint Reaches	There are no low constraint reaches on the Subject Lands. *Consistent with OPA 272 policies and NOCSS recommendations, six Low Constraint Stream Reaches (green streams) of Joshua's Creek will be incorporated into the development plan. No further site visits or analyses were required in thee areas.*	n/a *5.4.1*

Topic	Recommendations	Report Section for Further Details
Joshua's Creek Medium Constraint Reaches	There is one Medium Constraint stream (JC-7) on the Subject Lands. JC-7 will remain in-situ as the watercourse and associated valleyland are entirely located within the lands to be retained at 1086 Burnhamthorpe Road and do not form part of the draft plan. Only a small area of LPA associated with Reach JC-7 is incorporated into the northeast corner of the proposed draft plan. JC-8, another Medium Constraint stream flows immediately adjacent to the western property line of the Subject Lands however, details pertaining to JC-8 will be provided in future EIR/FSSs when those lands advance for development. *The existing and proposed limits of the three Medium Constraint Streams (blue streams) of Joshua's Creek within the FSS Study Area are provided on Drawings Joshua's Creek NHS-4, Joshua's Creek NHS-8, Joshua's Creek NHS-7 and Drawing 5. Reach JC-7 will be retained as-is, with no modifications proposed as part of this EIR/FSS. Reach JC-27A has been realigned by the Region employing natural channel design, addressing natural features restoration and fisheries compensation. Reach JC-31 is proposed to be realigned, employing natural channel design, addressing natural features restoration and fisheries compensation. Design analysis determined the areal replication of the existing HYDFD (Depression 102) and defined the geomorphic channel limits of the active channel below the replicated wetland. The proposed design will mimic existing details by providing a permanent wetland pool in the upper wetland block that is centred in and surrounded by a marsh environment that will transition to side slopes around the block .Downstream of the wetland block, a small run-type channel will be required to accommodate runoff from the wetland block. Design analysis for the run channel block, downstream of the wetland block, confirmed the stable cross-section, plan form and profile characteristics for the central run typology. Detailed restoration plans would be prepared at the detailed design stage.* *The new wetland covers an area of 0.525 ha; the total new corridor width is 30.5m which includes tableland, side slopes and 11.3m wide corridor bottom. The corridor bottom will include a central bankfull channel and numerous wetland features of variable surface area and depth. Targets for fish habitat, riparian storage, natural heritage features, and geomorphic stability are met or exceeded by the design.* *The location of the existing and proposed stream realignment on the Argo and Bressa lands will influence development timing on both properties. Cooperation between these owners is required to construct the realigned Stream Reach JC-31 and its associated HYDFB. To date, the Argo lands are non-participants in the EIR/FSS. Until they proceed with development, some portions of the Subject Lands cannot proceed without the realigned channel in place. Figure 9.5 illustrates portions of the Bressa lands that require the new JC-31 stream to be constructed. A holding provision will be put on these areas until the Argo lands develop unless access permission is provided to the Argo lands to construct the realigned JC-31.*	5.4 *5.4.2, 5.5.2, 5.4.2.1, 5.4.2.3, 5.4.2.4, 5.5.3*

Topic	Recommendations	Report Section for Further Details
Joshua's Creek High Constraint Reaches	There are no high constraint reaches on the Subject Lands. *The existing and proposed limits of the nine High Constraint Streams (Red Streams) of Joshua's Creek within the FSS Study Area are shown on Drawings Joshua's Creek NHS-1, Joshua's Creek NHS-5, Joshua's Creek Core-11-NHS-2, Joshua's Creek Core 11-NHS-3 and Joshua's Creek NHS-8 (Dunoak). One of these streams, Reach JC-6 is a 'high constraint stream with rehabilitation opportunities'. The OMB Settlement established that any NHS enhancement measures would be the responsibility of CH and/or the Town and not the landowners. These streams will be retained as-is, with no modifications to their corridors, except in the location where a new road crossing is proposed across Stream Reach JC-6.*	n/a *5.4.3, 5.5.2*
Trail System	A Major Trail system has been shown on Drawings 7J and 7K in keeping with the North Oakville East Trails Plan. A trail is proposed along the outer limit of the Core 10 NHS limit and within the LPA associated with JC-7. Since the OLPA was not implemented, and the vast majority of the LPA is contained with the retained lands at 1086 Burnhamthorpe Road, a trail along the entire southern limit of the LPA cannot be provided until/if those lands advance for development. In lieu of this east-west connection through the entire southern limit of the LPA, a connection has been made to the trail to the east (on the Mattamy lands) with a connection into the Coscorp draft plan. *A Major Trail system has been sited for the Subject Lands, in accordance with OPA 272 NOE4 and the North Oakville East Trails Plan.*	6.2.1, 6.2.2 Drawings 7J and 7K *6.2, 6.3* *Drawings 7A to 7I*
Target Flows	There are no SWM ponds on the Subject Lands. *NOCSS target peak flows are appropriate for SWM design and were applied to determine target outflow rates for the proposed SWM facilities for the 2 year to 100 year events and the Regional Storm event. Target unit rates are shown in Tables 7.4 and 7.12 to 7.19.*	n/a *7.3.1, 7.12*
Erosion Threshold Analysis	There are no SWM ponds on the Subject Lands. *Erosion threshold analysis and continuous hydrology modelling were utilized to confirm SWM pond sizing for erosion control purposes. This assessment included field surveys of sensitive creek locations, determination of in-stream erosion threshold levels, and analysis of flow duration and flow exceedance between thresholds and bankfull conditions, under comparative existing and proposed conditions. Extended detention was used to meet targets on a system wide basis to ensure that erosion potential does not adversely increase under future development. It was determined through continuous hydrology modeling that variable storage and detention time requirements are proposed depending upon pond location. Analyses and results are outlined in Section7.6 and Appendices E-3 and H-2.*	n/a *7.6*
SWM Facilities	There are no SWM ponds on the Subject Lands. *Six SWM ponds are identified for incorporation into development design within the FSS Study Area, consistent with the requirements from NOCSS – Ponds 48, 50, 52, 54, 55 and 56. There is potential for an additional SWM Facility (Pond 53) and/or BMPs to service the Dundas Urban Core on the Argo lands.*	n/a *7.7* *Table 13-1*

Topic	Recommendations	Report Section for Further Details
	Additional details pertaining to Ponds 48, 50, 52, 54, 55, 56 and 53 can be found in Table 13-1 of the JCT EIR/FSS.	
LID Measures	LID options have been evaluated. Large scale infiltration measures are not feasible due to the urban form of the proposed development and surficial soil characteristics; however, other LID measures have been recommended including techniques such as designing grades to direct roof runoff towards lawns, side and rear yard swales, tree pits as per Town standards, increased topsoil depth and directing some rooftop drainage to Core 10 PSWs to sustain their surface flow inputs. *LID options have been evaluated. Large scale infiltration measures are not feasible due to the urban form of the proposed development and surficial soil characteristics; however, other LID measures have been recommended including techniques such as designing grades to direct roof runoff towards lawns, side and rear yard swales, boulevards, parks and other open space areas throughout the development, as well as increased topsoil depths to improve the potential for water storage and infiltration. Additionally, approximately 1300m of swales associated with trail design will function as vegetated conveyance swales that will provide some infiltration and evapotranspiration.*	8.8 *7.4, 8.8*
Grading in Buffers	A grading plan for the Subject Lands is illustrated on **Drawings 7J and 7K.** In general, the proposed grading design will match the existing ground elevations at the NHS boundary and will not require grading within the buffer with the exception of some localized areas where grading is required to facilitate trail design and clean water inputs to the NHS. Where grading is required in the buffers, it will be undertaken in accordance with the NOCSS recommendations. *A grading plan for the Subject Lands is illustrated on Drawings 7A to 7I. In general, the proposed grading design will match the existing ground elevations at the NHS boundary and will not require grading within the buffer (where available) with the exception of some localized areas where grading is required for road crossings and trail design. Where grading is required in the buffers, it will be undertaken in accordance with the NOCSS recommendations. Retaining walls, where required, except for a road crossings, will be located outside the NHS buffers.*	7.11 *7.11*
Sanitary Servicing	The Subject Lands will be serviced by two separate sanitary connections from the Mattamy Phase 3 lands. A sanitary connection stub is also provided at the west limit of Street 'F' to service future development lands to the west. *Two sub-trunk sanitary sewers, extending north from Dundas Street, are required to service the Subject Lands. The west sub-trunk, from Dundas Street/Prince Michael Drive northwards, will service the west portion of the Subject Lands by gravity. The east sub-trunk will drain by gravity to a new Regional pumping station immediately north of Dundas Street and adjacent to Pond 55, where it will be pumped westerly to the gravity sewer on Dundas Street. Figure 9.2 illustrates conceptual wastewater servicing.*	9.0 Figure 9.2 *9.2*
Water Servicing	The Subject Lands will be serviced by a network of new local watermains designed in accordance with the Region's design criteria and MOE's guidelines. A 300mm trunk watermain will also extend north from Dundas Street through the adjacent Joshua's Creek lands to service the Subject Lands.	9.0 Figure 9.4

Topic	Recommendations	Report Section for Further Details
	Extensions of external supply and transmission watermains from Eighth Line and Dundas Street are required to service the Study Area. Figure 9.5 illustrates conceptual water servicing.	*9.3*
Road Crossings	No road crossings are proposed within the Subject Lands however, in the future, Street A is planned to connect to Burnhamthorpe Road, as per the Town's Master Plan. A preliminary design for this crossing has been provided in this Addendum however, as part of a future Addendum by others, the ultimate size and location will need to be determined. *These roads have been sited, addressing their locations and horizontal and vertical alignments, to minimize impacts to natural heritage features. Requirements for sizing included fluvial geomorphology, wildlife connectivity and hydraulic considerations. Table 10.1 lists crossing sizing. Figures 10.1 and 10.2 show crossing locations. Section 10.2 provides direction for the items that need to be considered in the assessment of the designs and locations of the crossings.*	10.0 *10.0*
Erosion and Sediment Controls	Controls are to be implemented prior to construction and remain in working condition for the duration of construction activity. Erosion and Sediment Control plans are to be submitted and approved by the Town and CH. CH recommends that ESC plans should be prepared by qualified professionals (i.e., CISEC, CPESC or an approved equivalent). *Controls are to be implemented prior to construction and remain in working condition for the duration of construction activity. Erosion and Sediment Control plans are to be submitted and approved by the Town and CH.*	11.0 *11.2*
Construction Below Water Table	Services below the water table will be constructed to prevent lowering and redirection of groundwater flow. *Same as above.*	8.7.3, 11.0 *11.1*
Well Decommissioning	Prior to construction, all inactive wells (including both water supply and monitoring wells) within the development footprint are to be decommissioned in accordance with Ontario Regulation 903. *Same as above.*	13.1 *11.6*
Baseline SWM Pond Monitoring	There are no SWM ponds on the Subject Lands. *The Water Quality and Temperature Monitoring Work Plan, provided in Appendix O, outlines specific monitoring activities and locations upstream and downstream of proposed SWM pond locations to characterize baseline conditions.*	n/a *12.3.2*
Post Construction SWM Pond Monitoring	There are no SWM pond on the Subject Lands. *The monitoring program will include performance assessments of SWM facilities and erosion and sediment control measures. A detailed monitoring program will be provided for each pond at the time of detailed design.*	n/a *12.3.2*
Channel Design Monitoring	There are no proposals to realign JC-7. *Post-construction channel design monitoring for Joshua's Creek Reach JC-31 will include geomorphic surveys, photo inventory, restoration planting surveys, and field observations to summarize channel stability, fish habitat and overall corridor function.*	n/a *12.3.3*
Future EIR/FSS Study Recommendations	This Addendum addresses environmental and servicing requirements for the Coscorp Subject Lands and builds upon the findings and recommendations within the *JCT EIR/FSS*. Throughout this Addendum	13.1, 13.2

Topic	Recommendations	Report Section for Further Details
	there are references to design work required as part of future Addendums for lands to the west and north of the Subject Lands as well as detailed design requirements. *This EIR/FSS addresses environmental and servicing requirements of the Joshua's Creek Tributaries and the Mattamy Lands EIR/FSS. Throughout this EIR/FSS, there are references to design work required at the detailed design stage. A summary of the detailed design work requirements for these lands is presented in Section 13.2. As well, Section 13.1 outlines future work that should be undertaken when lands outside the current Draft Plan applications proceed to development.*	*13.1, 13.2*