ENVIRONMENTAL IMPLEMENTATION REPORT AND FUNCTIONAL SERVICING STUDY ADDENDUM

FOR

GREEN GINGER PHASE 2

EAST MORRISON CREEK – MAIN BRANCH
NORTH OAKVILLE EAST

PROJECT NO. 15-797

APRIL 2024

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1.0 INTRODUCTION

1.1 STUDY PURPOSE AND CONNECTION TO NOCSS

The purpose of this report is to provide an update to the relevant information pertaining to Green Ginger Phase 2 lands as previously described in the EIR/FSS for North Oakville East Morrison Creek prepared by Sernas Associates et. al., dated December 2013 as amended July 2015 (EM1 EIR/FSS), and the EM1 Addendum by Stonybrook Consulting et. al. dated November 2015 as amended July 2017 (EM1 Addendum). This report will herein be referenced as the Green Ginger Phase 2 Addendum report.

The Green Ginger Phase 2 Addendum report is prepared with consideration for the realignment of MOC-2 channel realignment from the EM4 catchment and assumes the drainage area exchange (DAE) with the Star Oak lands. It should be noted that the development of the Green Ginger Phase 2 lands as presented in this report are not impacted by the proposed DAE proceeding and are relatively self-contained from a drainage perspective.

This Green Ginger Phase 2 Addendum addresses EIR/FSS requirements in support of the Green Ginger Phase 2 Draft Plan of Subdivision not already presented in the aforementioned EM1 Reports. Additional work, including addendums to the EM1 EIR/FSS, EM1 Addendum, or this Green Ginger Phase 2 Addendum will be required for any current non-participating landowners within the EM1/ EM4 subcatchments.

The Green Ginger Phase 2 Addendum will serve as an update to the EM1 EIR/FSS, and EM1 Addendum and should be read in conjunction with those reports. The following sections require only minor updates to provide additional information on the latest Green Ginger Phase 2 Draft Plan as described below:

1.0 Introduction

5.0 Stream Systems, Fish Habitat and Fish Communities

6.1 General Description of Draft Plans

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The following sections have been **re-written or are new**, and are presented in this Green Ginger Phase 2 Addendum report specifically for the subject property:

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- Appendix T Watermain Analysis
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Additionally, figures throughout the EM1 EIR/FSS and EM1 Addendum have been updated to include the new alignment of stream reach MOC-2 within the Lower East Morrison as it affects Green Ginger Phase 2 lands. For **Section 1.0**, this includes **Figure 1.2** from the EM1 EIR/FSS (2013). For all other **Section 1.0** figures refer to the EM1 EIR/FSS (December 2013 as amended July 2015) and EM1 Addendum (November 2015 as amended July 2017).

1.2 STUDY AREAS AND PROPOSED DRAFT PLANS

The EIR Subcatchment Area for the EM1 EIR/FSS included the entire EM1 subcatchment regardless of the land ownership. The focus of the EM1 EIR/FSS was on the proposed Green Ginger Phase 1 development (refer to **Figure 1.2** from the EIR/FSS), which also demonstrated servicing feasibility for other lands in the Subcatchment Area in accordance with the Terms of Reference for the EIR/FSS. The EM1 Addendum focused on the Draft Plan of Subdivision for Mattamy Petgor Phase 2, the EMGO lands, as well as a portion of the Star Oak Developments lands that lie to the north of Burnhamthorpe Road. This Green Ginger Phase 2 Addendum focuses on the Green Ginger Phase 2 lands as illustrated on **Figure 1.2**. The Green Ginger Phase 2 Draft Plan area is approximately 39.44 ha.

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. The requirements of the NOESP are detailed in the EM1 EIR/FSS (December 2013 as amended July 2015). There are no changes to **Section 1.4** as a result of the updated Draft Plan for Green Ginger Phase 2. For details related to the North Oakville East Secondary Plan refer to the EM1 EIR/FSS (December 2013 as amended July 2015).

1.5 PREVIOUS STUDIES, REPORTS AND PLANNING DOCUMENTS

The following studies/guidelines/documents were reviewed during the preparation of this Green Ginger Phase 2 Addendum:

- Environmental Implementation Report and Functional Servicing Study North Oakville Main-East Morrison Creek, Sernas Associates et. al., December 2013 as amended July 2015 (EM1 EIR/FSS);
- EM1 EIR/FSS Addendum, GHD, March 2015;
- EM1 EIR/FSS Addendum, Stonybrook Consulting. Et al, November 2015 as amended July 2017;
- Final Environmental Implementation Report and Functional Servicing Study, East Morrison Subcatchment EM4, Dundas-Trafalgar Inc. and Shieldbay Developments Inc., North Oakville, Stonybrook Consulting Inc. et al, February 2015 (DTI/SBI Final EIR/FSS)
- North Oakville East Drainage Area Drainage Area Exchange Report, January 2015
- North Oakville East Drainage Area Drainage Area Exchange Mapping and Response to Agency Drainage Area Comments, Stonybrook Consulting Inc. et al, July 31, 2015
- North Oakville East Drainage Area Exchange Response Document #2, Stonybrook Consulting Inc. et al, October 6, 2015.
- Upper West Morrison Creek UWM1, EIR/FSS, Star Oak Developments, North Oakville, Stonybrook Consulting Inc. et al, September 2013;
- Upper West Morrison Creek UWM1, EIR/FSS Response Document, Star Oak Developments, North Oakville, Stonybrook Consulting Inc. et al, December 2014;
- Upper West Morrison Creek UWM1, EIR/FSS Response Document #2, Star Oak Developments, North Oakville, Stonybrook Consulting Inc. et al, October 9, 2015;
- Sixteen Mile Creek SM1, EIR/FSS, Star Oak Developments Limited, North Oakville, Stonybrook Consulting Inc. et al, September 2013;
- Sixteen Mile Creek SM1, EIR/FSS Response Document, Star Oak Developments Limited, North Oakville, Stonybrook Consulting Inc. et al, November 2014;
- Sixteen Mile Creek SM1, EIR/FSS Response Document, Star Oak Developments Limited, North Oakville, Stonybrook Consulting Inc. et al, July 20, 2015;
- East Branch of East Morrison Creek Upper Subcatchment EM4, Scoped EIR/SWM Report Stonybrook Consulting Inc. et al, June 2017 (Upper EM4 EIR/FSS);
- East Branch of East Morrison Creek Upper Subcatchment EM4, Scoped EIR/SWM Report Response Document, North Oakville, Stonybrook Consulting Inc. et al, February 2015 (Upper EM4 EIR/FSS); and,
- Town of Oakville Master Trails Plan, May 2013.
- MNRF Correspondence, Redside Dace Absence & East Morrison Creek, September 2016
- MECP Correspondence, Redside Dace Absence & East Morrison Creek, July 2023

Those studies/guidelines/documents reviewed initially as part of the EM1 EIR/FSS are listed below:

- 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 (August 2007);
- North Oakville Environmental Implementation Report and Functional Servicing Study Terms of Reference, August 2, 2013;

- Green Ginger Property, North Oakville Natural Heritage Assessment, Beacon Environmental, 2006;
- North Oakville – Milton East Wetland Complex, MNR, 2006;
- Redside Dace Habitat Monitoring and Assessment Program, Gartner Lee Limited 2005;
- Ecological Assessment, Green Ginger Developments Inc., Gartner Lee Limited 2002;
- North Oakville Natural Heritage Inventory and Analysis, LGL Limited, 2000;
- 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);
- Area Servicing Plan prepared by MMM Group for North Oakville Community Builders Inc. (NOCBI), April 2011; and,
- MNRF Thermal Mitigation Checklist for Stormwater Management Ponds Discharging into Redside Dace Habitat, July 2015.

1.6 EIR/FSS ADDENDUM 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 remains the same format as that which was presented in the EM1 EIR/FSS (December 2013 as amended July 2015) and EM1 Addendum (November 2015 as amended July 2017.

2.0 NATURAL HERITAGE SYSTEM FRAMEWORK

OPA 272, the Town of Oakville North Oakville Creeks Subwatershed Study (NOCSS) and the North Oakville Creeks Subwatershed Study Addendum (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 the undertaking of the EIR/FSS and 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 specific development plans.

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, the MNRF/ MECP and DFO.

The information related to the Natural Heritage System Framework, as presented in the EM1 EIR/FSS, remains valid and has not changed. Please refer to the EM1 EIR/FSS (December 2013 as amended July 2015) for the Natural Heritage System characterization.

3.0 CORE 9 – TRAFALGAR WOODLOT AND LINKAGE

The Core 9 - Trafalgar woodlot and linkage are discussed in detail in the EM1 EIR/FSS. The information related to these items has not changed. All figures associated with **Section 3.0** remain unchanged from the EIR/FSS with the exception of **Sections 3.1** and **3.2.2** which were updated as a part of the EM1 Addendum (November 2015 as amended July 2017). Refer to the EM1 EIR/FSS (December 2013 as amended July 2015) and the EM1 Addendum (November 2015 as amended July 2017) for details related to Core 9. Additional trails information located within the Linkage has been provided in **Section 6.0.**

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 EM1 EIR/FSS. All figures associated with **Section 4.0** remain unchanged from the EIR/FSS. A preliminary geotechnical report and hydrogeological report have been prepared by Soil Engineers Ltd. to discuss the subsoil and groundwater conditions on the site and associated updates are noted below in **Section 4.6** and **Section 4.8.**

4.6 HYDROGEOLOGY

A groundwater investigation was completed as part of the EM1 EIR/FSS. An updated hydrogeological study has been completed by Soil Engineers (July 2023) for the Green Ginger Phase 2 lands.

As part of the hydrogeological investigation, a series of 13 monitoring wells were installed across the property to investigate the groundwater conditions within the site. The groundwater levels within the monitoring wells were measured manually to record the stabilized groundwater levels beneath the subject site. All of the boreholes and monitoring wells underwent development and single well response testing (SWRTs) to estimate the hydraulic conductivity (K) for saturated aquifer subsoils at the depths of the monitoring well screens. The results suggest that the hydraulic conductivities vary from low to moderate, with correspondingly low to moderate anticipated groundwater seepage rates in open excavations below the prevailing groundwater table. Temporary dewatering may be required during sewer and/ or building construction as discussed in **Appendix J**. Construction dewatering details, including the need for a Permit to Take Water (PTTW) or Environmental Activity and Sector Registry (EASR), will be provided during the site alteration application. The findings and resulting recommendations are presented in the hydrogeological report provided in **Appendix J**.

4.6.1 LONG-TERM GROUNDWATER DISCHARGE

At the time of this EIR/FSS Addendum, the Town of Oakville has issued new draft engineering standards that include management of long-term groundwater discharge. The proposed draft standards note that continuous long-term groundwater discharge to existing infrastructure (pipes/ponds/ditches) may lead to cumulative impacts such as capacity concerns, diversion of flows between watersheds, loss of cooling water and drawdown of groundwater. The Town standards note that foundation drainage must be accounted for in the storm sewer and/or downstream infrastructure design (e.g., SWM pond). In particular, the Town of Oakville has noted concerns over groundwater discharge from large areas of Urban Core blocks to municipal storm sewers and SWM ponds.

The Green Ginger Phase 2 draft plan includes 9.24 Ha of Trafalgar Urban Core (TUC). While details of these development blocks are unclear at this time, it is assumed that the blocks will include high-density residential buildings with underground parking garages. The hydrogeological study estimated long-term foundation drainage rates for these blocks as summarized below:

TABLE 4.6 – ESTIMATED LONG-TERM GROUNDWATER DISCHARGE

Borehole ID	Estimated Groundwater Discharge (L/day)	Estimated Groundwater Discharge - Safety Factor [1] (L/day)	Notes
119	417	1,251	4 levels of U/G Parking
121	2,976	8,928	4 levels of U/G Parking
123	6,879	20,637	4 levels of U/G Parking
124	4,963	14,889	4 levels of U/G Parking
112	13,429	40,287	3 levels of U/G Parking
114	713	2,139	3 levels of U/G Parking
116	1,560	4,680	3 levels of U/G Parking
105	136	408	3 levels of U/G Parking
Total	31,073	93,219	

[1] Safety Factor of 3 used to calculate estimated groundwater discharge

The total groundwater discharge from the TUC blocks is estimated to be 93,219 L/day, or 1.08 L/s. This estimated groundwater discharge includes a safety factor of 3 applied to the calculated discharge rate. Although the estimated groundwater flows are orders of magnitude lower than surface water runoff, it is understood that the Town of Oakville strongly prefers groundwater flows not to be directed to the storm sewers and/ or SWM ponds. That being said, the proposed storm sewers and SWM Pond have been adequately sized to account for the 1.08 L/s groundwater flows.

There are several alternatives to manage long-term groundwater flows such as groundwater re-use, bathtubbing, and foundation drain collector systems. The priority at the EIR/FSS stage is to provide the site with the most flexibility for the design and construction of the TUC blocks in the future. Groundwater re-use may rely on minimum groundwater volumes for operation and may not be suitable for all blocks. “Bathtubbing” (i.e. fully waterproof foundations) can be expensive to construct, limit the availability of “green” or alternate energy sources such as geothermal heating, and relies on the waterproofing system to perform indefinitely into the future.

As such, a foundation drain collector (FDC) system has been designed to collect groundwater from the TUC blocks and discharge to East Morrison Creek, per the Town of Oakville draft standard 3.7.10. The FDC system has been designed such that groundwater flows can be captured via subdrains and/or weeping tiles within the TUC blocks and pumped to the FDC pipe within the road. The FDC pipe has been sized to 300mm to accommodate the estimated groundwater flows (1.08 L/s), plus a factor of safety. The 24m ROW Cross Section (Street ‘A’ and Wheat Boom Drive), shown on **Figure 11.4**, has been designed to accommodate the FDC pipe within the right-of-way. The alignment of the FDC pipe is shown on **Figure 7.1A**. The FDC system will outlet into the proposed culvert at Wheat Boom Drive to minimize disturbance within the NHS and to allow for groundwater flows to be discharged directly to East Morrison Creek. As noted above, the FDC system

has been designed to provide flexibility for future development of the TUC and as such, the FDC may not be required. The potential for an FDC can be further investigated at detailed design.

4.8 GEOTECHNICAL INVESTIGATIONS

A number of geotechnical investigations have been completed in the Study Area to determine the engineering properties of the soils for residential subdivision construction.

In July 2023, Soil Engineers Limited completed a soil investigation of the 'Green Ginger Phase 2' lands. A series of 25 boreholes were drilled across the property to investigate the subsurface conditions. The findings and resulting geotechnical recommendations are presented in the geotechnical report provided in **Appendix J**.

5.0 STREAM SYSTEMS, FISH HABITAT AND FISH COMMUNITIES

The Stream Systems, Fish Habitat and Fish Communities were assessed and evaluated in detail in EM1 EIR/FSS and the EM1 Addendum. **Section 5.2.1** was modified to address the current fisheries status of East Morrison Creek. Refer to the EM1 Addendum for the remainder of **Section 5.0.**

5.2.1 REDSIDE DACE

The Ministry of Natural Resources and Forestry (MNRF) conducted eDNA testing in East Morrison Creek in the summer of 2015. The testing came back positive for Redside Dace and it is understood that the MNRF continued conducting additional field surveys in the area.

In February 2016, MNRF advised that they found eDNA evidence of Redside Dace in East Morrison Creek downstream of Dundas Street. As a result, they completed electrofishing of the creek downstream of Dundas Street in the summer of 2016. No Redside dace were found at that time. To complete their assessment of East Morrison Creek, MNRF planned to conduct electrofishing again in 2017. In the meantime, MNRF advised that East Morrison Creek was not regulated habitat for Redside Dace and they would not be involved in any development application reviews or approvals at that time (see **Appendix A** for email dated September 22, 2016 from MNRF).

In July 2023, the Ministry of Environment, Conservation & Parks confirmed that East Morrison Creek is still considered to be historical habitat and is not protected as habitat for Redside Dace (see **Appendix A** for email dated July 19, 2023 from MECP).

Notwithstanding the MECP's findings, the pond *has* been designed in compliance with the MNRF *Draft Thermal Mitigation Checklist for Stormwater Management Ponds Discharging into Redside Dace Habitat*, similar to SWM Pond 31 in Green Ginger Phase 1. Please refer to **Section 7.13** for the pond design.

5.6.1 ONLINE FARM POND REPLACEMENT AND PERCHED CULVERT REMOVAL

As part of the Minutes of Settlement that resulted from the Ontario Municipal Board Mediation it was agreed that the existing online farm pond north of Dundas Street would be removed, "subject to the approval of MNR and CH, and the associated fish barriers that impede seasonal fish passage into MOC-4 will also be removed and replaced with a natural channel design feature."

In addition, it was agreed that the "perched culvert above the online farm pond that impedes fish passage will be removed or rectified allowing fish movement throughout the system." This element will be undertaken during construction.

6.0 LAND USE

The Green Ginger Phase 2 lands (Subject Lands) are proposed to be developed for residential and open space uses consistent with the North Oakville East Secondary Plan (NOESP). The following sections describe the draft plan of subdivision associated with this Addendum Study, and how the proposed draft plan follows or varies from the Secondary Plan policies. The draft plan is illustrated on **Figure 6.2.**

The EIR Subcatchment Area for this Addendum Study is consistent with the EM1 Addendum and extends beyond the Subject Lands draft plan. 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 that of the Secondary Plan Master Plan and include:

- Land use designations;
- Natural Heritage System;
- Major Roads;
- Major Services;
- SWM Blocks; and,
- Trails

The proposed draft plan for the Green Ginger Phase 2 lands differs from the road layout that was shown in the EM1 EIR/FSS. The draft plan is generally in keeping with the same principle layout in the aforementioned EIR/FSS report and Master Plan with the exception of a few modifications:

- A road crossing through the NHS has been eliminated, which is consistent with the draft plans submitted as part of the EM1 Addendum. It should also be noted that the crossing was not illustrated on the EM1 Addendum figures or included in the hydraulic modeling.
- There are fewer intersections with Trafalgar Road than were illustrated on the Master Plan
- **Section 6.1** has been revised to include a detailed description of the Green Ginger Phase 2 draft plan; all other draft plans are described in the EM1 Addendum
- **Section 6.2.1** has been updated to discuss pedestrian connectivity between Green Ginger Phase 2 and Petgor Phase 2 to the west; and a tree inventory for the trail system located within Green Ginger Phase 2 lands to address updated requirements of the EIR/FSS Terms of Reference (May 2013).

The remainder of **Section 6.2** of the EM1 EIR/FSS remains unchanged. In addition, the majority of the figures in this section remain unchanged with the exception of **Figures 6.2** (Green Ginger Draft Plan) and **Drawing 6.6A** (Trails Plan). Refer to the EM1 EIR/FSS for **Figures 6.5 – 6.9** and the EM1 Addendum for **Figure 6.1**.

6.1 GENERAL DESCRIPTION OF DRAFT PLAN

The North Oakville East Master Plan forms the basis for the Green Ginger Developments Inc. Phase 2 draft plan.

This draft plan proposes to develop the Subject Lands for uses consistent with the NOESP, Master Plan, and OMB Minutes of Settlement. This draft plan is provided in **Figure 6.2**.

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 with the exception of the removal of one road crossing of the NHS and fewer local road intersections with Trafalgar Road.

The lands associated with the Green Ginger draft plan are designated as Trafalgar Road Urban Core which permits medium and high density residential uses and associated public uses, as well as a full range of employment, commercial, institutional, cultural, health/medical, and entertainment uses. In accordance with the NOESP and OPA 272, the Green Ginger draft plan proposes freehold townhouse units and three Trafalgar Urban Core blocks located within the interior of the Subject Lands with four medium-to-high density blocks adjacent to Trafalgar Road that are able to accommodate higher density development. The development details of the Trafalgar Urban Core blocks will be provided with the site plan application stage.

Access to the Draft Plan will be provided by two right-of-way intersections with Trafalgar Road. Access will also be available via two road crossings of the NHS from the Green Ginger Phase 1 lands. Two access points are provided to the future development north of the Subject Lands.

The Stormwater Management facility block located at the southern edge of the Subject Lands is consistent with the SWM pond location identified in the NOESP Figure NOE 3.

Table 6.1 below has been updated to include the change in land uses defined within the Green Ginger Draft Plan.

TABLE 6.1: GREEN GINGER DEVELOPMENT DRAFT PLAN PRELIMINARY DEVELOPMENT YIELDS (PHASE 2)

	Area (ha)	Units
Street Townhouses (min. 5.5m)	6.19	376
Rear Access Townhouses (min. 6.7m)	0.56	23
Rear Access Townhouses (min. 6.1m)	1.32	92
Trafalgar Road Urban Core	9.24	
Secondary School	0.69	
Urban Squares	0.97	
Storm Water Management Facility	2.25	
Natural Heritage System	9.01	
Road Widening	0.38	
Public Accessible Walkway	0.12	
8.0m Servicing Block	0.02	
Walkway	0.02	
0.3m Reserves	0.01	
Roadways	8.66	
	39.44	**491**

6.2.1.1 IMPACT ASSESSMENT OF TRAIL SYSTEM – GREEN GINGER PHASE 2

The trail impact assessment is discussed in detail in the EM1 EIR/FSS. A revised terms of reference for trail impact assessment has been updated since the EM1 EIR/FSS, and as a result a tree inventory has been undertaken to comply with the new terms of reference and is included in this EIR/FSS Addendum. The tree inventory report has been prepared for the trail within the Green Ginger Phase 2 draft plan limits. This report has been included in **Appendix Q**.

A trail is proposed along the western boundary of the subject lands, within the NHS, from Marvin Avenue to Wheat Boom Drive. There is currently a pedestrian trail on the west side of the channel block (along the outer edge of Pond 27) that will connect to the proposed trail on the east side of the channel block at Threshing Mill Drive, through the adjacent sidewalks, to provide pedestrian crossing of the MOC-5A channel. These pedestrian trails are consistent with the North Oakville Trails Master Plan. This has been depicted in the modified **Figure 6.6A**.

A description of the Green Ginger Phase 2 trail system is outlined in **Section 6.2** and **Section 6.2.1** of the EM1 EIR/FSS and is described as Sector 1 to Sector 3. As such, no additional impact assessment has been carried out for the pedestrian crossing as its intended location will be part of the roadway.

7.0 GRADING, DRAINAGE AND STORMWATER MANAGEMENT

With the exception of **Sections 7.8, 7.9, 7.11** and **7.13**, all other Sections remain unchanged. Refer to the EM1 EIR/FSS and the EM1 Addendum reports dated December 2013 and November 2015 respectively for remainder of Section 7.0. **Figures 7.1, 7.6** and **Drawing 7.7** have been revised as a result of the latest Green Ginger Phase 2 draft plan and have been included in this report.

7.8. CONVEYANCE OF MINOR STORM FLOWS

The Subject Lands will be serviced by a conventional storm sewer system designed in accordance with Town of Oakville standards. The storm sewers will be sized using a 5-year return frequency and Town of Oakville IDF curves. **Figure 7.1** which shows the post development drainage areas for the FSS Study Area updated with the latest Draft Plan. The storm servicing shown in **Figure 7.1A** reflects the proposed direction of minor system flows. Conceptual storm design sheets have also been updated and provided in **Appendix G**.

As illustrated on **Figure 7.1**, the runoff from the rear lots is generally captured in rear-yard catch basins and will be directed to SWM Pond 30. There is a 0.77 Ha area of rear roofs and rear lots that will be directed to the channel. Given that the rear roof and rear yard runoff is from townhouses the runoff coefficient is assumed to be 0.75, for a total AxC to the channel of 0.58. This area and imperviousness have been accounted for in the overall watershed modeling discussed in **Section 9**.

7.9. CONVEYANCE OF MAJOR STORM FLOWS

All storm flows greater than the minor system, up to the 100yr storm event will be conveyed along the public roads to SWM Pond 30. **Figure 7.1** reflects the overland flow paths with the revised grading which has been coordinated with adjacent lands grading.

7.11 PRELIMINARY GRADING PLANS

A Preliminary Grading Plan, **Drawing 7.7**, prepared for the FSS Study Area and updated with the EM1 Addendum, has been revised based on the latest Draft Plan. This plan took into consideration the requirements for major and minor storm drainage; wastewater sewers; grading associated with the NHS Lands; trail grading; and the Town's grading standards (i.e. road grades at a minimum of 0.5% slope). The preliminary grading plan also takes into consideration the proposed grading of the adjacent lands outside the FSS Study Area where plans have been coordinated with adjacent land owners, in order to demonstrate that the proposed grading does not compromise the future developability of these adjacent lands. The grading design will be refined at detailed design, and may reduce cut and fill requirements.

7.13 SWM FACILITY OPERATING CHARACTERISTICS

Pond 30 is proposed within the Subject Lands. The location of the pond is illustrated in **Figure 7.1**. Although the pond location has not changed since the EM1 EIR/FSS, **Figure 7.6** has been updated with the Draft Plan.

The stormwater management pond has been designed in accordance with directions of the NOCSS and the MOE SWM Design Manual, and includes the following features:

Sediment Forebay	to improve pollutant removal
Permanent Pool and	to provide water quality control; to satisfy Enhanced Level of protection requirements (i.e. 80% TSS removal)
Extended Detention Storage	to attenuate post development flows from the 25mm rainfall event for a period of 7 days for erosion control
Quantity Control Storage	to attenuate post development flows to the unit flow release rates as per the NOCSS for the 2 year through 100 year storms and the Regional event

The drainage area for Pond 30 is generally consistent with that defined in the EM1 EIR/FSS. A summary of Pond 30 characteristics is presented in **Tables 7.15**. The target release rates (outflow) are presented in **Table 7.17A** along with the Pond 30 inflow/volume characteristics. It should also be noted that no additional drainage from Trafalgar Road has been accounted for in Pond 30, as confirmed by the Region of Halton's 60% Trafalgar Road design (January 2022).

TABLE 7.15 - SUMMARY OF STORMWATER MANAGEMENT FACILITY 30 CHARACTERISTICS[1]

Pond	Pond Type	Drainage Area (ha)	Imp. Coverage (%)	Required Permanent Pool Volume (m^3)	Provided Permanent Pool Volume (m^3)	Required Erosion Control Volume (m^3)	Provided Erosion Control Volume (m^3)	Provided Regional Flood Volume (m^3)	SWM Pond Block Area (ha)
Pond 30	Wet Pond	34.39	86	7,279	13,397	7,004	7,592	49,500	2.25

[1] Refer to **Appendix H-2**

Based on the post-development drainage area for the proposed SWM facility, the storage volumes required to control post-development flows to the target release rates (using NOCSS target release rates) were determined using SWMHYMO for the 2 through 100 year and Regional Storm events. Storage – discharge relationships for Pond 30 were determined through conceptual pond control structure sizing in SWMHYMO. The Pond 30 outlet structure conceptual design has been verified in SWMHYMO to meet NOCSS targets as outlined in **Table 7.17A and 7.17B**. The Pond 30 stage-storage-discharge relationship is included in **Appendix H-2**; with SWMHYMO model files in **Appendix H-3**. The SWM pond design, and impacts to Flooding, Erosion, and Wetlands, is discussed further in **Section 9.0**.

TABLE 7.17A - POND 30 INFLOW/VOLUME CHARACTERISTICS (FREE OUTALL)

Return Period (Yr)	Area (ha)	Imp.[1] (%)	Peak Inflow (m^3/s)	Target Outflow (m^3/s)	Outflow[2] (m^3/s)	Water Level (m)	Storage Provided (m^3)
2	34.39	86%	4.309	0.172	0.118	168.10	10,480
5	34.39	86%	6.492	0.275	0.257	168.25	13,090
10	34.39	86%	8.007	0.344	0.318	168.40	15,250
25	34.39	86%	10.021	0.447	0.384	168.60	18,120
50	34.39	86%	11.633	0.516	0.443	168.75	20,030
100	34.39	86%	13.109	0.550	0.540	168.85	21,930
Regional	34.39	86%	4.813	1.513	1.447	170.50	48,480

[1] Imperviousness value used to size Pond 30 is the average imperviousness calculated from runoff coefficients on Figure 7.3.
[2] Outflow from Pond 30 provided in Table 7.17 based on SWMHYMO model results.

TABLE 7.17B - POND 30 INFLOW/VOLUME CHARACTERISTICS (RESTRICTIVE DOWNSTREAM)

Return Period (Yr)	Area (ha)	Imp.[1] (%)	Peak Inflow (m^3/s)	Target Outflow (m^3/s)	Outflow[2] (m^3/s)	Water Level (m)	Storage Provided (m^3)
2	34.39	86%	4.309	0.172	0.087	168.15	11,500
5	34.39	86%	6.492	0.275	0.208	168.30	13,580
10	34.39	86%	8.007	0.344	0.277	168.45	15,660
25	34.39	86%	10.021	0.447	0.349	168.65	18,490
50	34.39	86%	11.633	0.516	0.418	168.75	20,350
100	34.39	86%	13.109	0.550	0.520	168.90	22,220
Regional	34.39	86%	4.813	1.513	1.447	170.55	49,500

[1] Imperviousness value used to size Pond 30 is the average imperviousness calculated from runoff coefficients on Figure 7.3.
[2] Outflow from Pond 30 provided in Table 7.17 based on SWMHYMO model results.

Storm Stacking

Conventional wet storm facilities are generally designed with a 24 hour to 48 hour extended detention drawdown for the 25mm storm event, as required from the MOECC SWMP Design Manual, to provide adequate water quality based on the Enhanced protection level.

SWM Pond 30 is designed to release the 25mm storm event over 7 days, which increases the risk of storm-stacking as the extended detention volumes persist ~5 days longer than a conventional pond. So, the pond has been designed to accommodate storm stacking by adding the Region storm storage volume under restrictive conditions (e.g. 49,500 m^3) to the remaining 2 yr storage volume after 2 days of drawdown under free flow conditions (e.g. 6,245 m^3 of volume), per Conservation Halton guidelines. The resulting water level from the stacked storm is 170.88 m at a total volume of 55,745 m^3. The emergency spillway elevation is set

above the water level of the stacked storm (e.g. 170.90 m). The pond berm is set 0.2m above the water level of the emergency spillway. (e.g. 171.10m). Please see **Appendix H-2** for the SWM Pond 30 drawdown table.

7.13.1 POND DESIGN ELEMENTS

Sediment Forebay

The revised conceptual design of Pond 30 includes one inlet and one sediment forebay to improve the pollutant removal by trapping larger particles near the inlet of the pond. The forebay has been designed with a minimum length to width ratio of approximately 2:1 and do not exceed one third of the permanent pool surface area for wet ponds, as required in the *MOE SWMP Design Manual*.

Permanent Pool

The permanent pool is approximately 3 m deep in accordance with the *MNRF Thermal Mitigation Checklist for Stormwater Management Ponds Discharging into Redside Dace Habitat.* Permanent pool sizing is based on *MOE SWMP Design Manual*. Additionally, the permanent pool provides the required equivalent volume of the 10mm storm event stored 1.5 m below the permanent pool surface in keeping with the *MNRF Thermal Mitigation Checklist*.

It should be noted that the Ministry of Environment, Conservation & Parks confirmed that East Morrison Creek is not protected as habitat for Redside Dace.

The permanent pool has been sized to provide Enhanced Level protection in accordance with the *MOE SWMP Design Manual*. Based on impervious coverage of the contributing drainage area for the wet ponds, the required and provided permanent pool volumes are summarized in the **Table 7.19.**

TABLE 7.19 - SUMMARY OF PERMANENT POOL VOLUMES

Pond I.D.	Imp. (%)	Drainage Area (ha)	Unit Volume[1] (m^3/ha)	Volume Required (m^3)	Volume Provided (m^3)
Pond 30[1]	86	34.39	216	7,279	13,397

[1] Unit Volume SWMP Manual Table 3.2 for wet ponds

For three metres (horizontally), slopes of 7:1 (H:V) will be provided on either side of the permanent pool wetted perimeter. Below this level, slopes will be graded at 4:1 (H:V). The main cell of the pond has been designed with a minimum length to width ratio of approximately 3:1.

Extended Detention Storage

The 25 mm extended detention storage requirement, released over a 7-day drawdown time, was previously determined through the EM1 EIR/FSS. The 25mm extended detention storage and 7-day drawdown time have been provided in Pond 30. The SWM pond design and impacts to erosion is discussed further in **Section 9.0**.

Flood Control Storage

The quantity control requirements for the 2-year through to 100-year events will be achieved with active storage depths less the 2.0 m depth recommended by the *MOE SWMP Design Manual* for 100-year flood control storage. The Regional Storm flood control storage will be achieved through the use of ponding depths up to 3.35m above permanent pool. The SWM pond design and impacts to flooding is discussed further in **Section 9.0**.

The depth is summarised in **Table 7.20** below for Pond 30 SWM facility.

TABLE 7.20 - SWM FACILITY EXTENDED DETENTION / REGIONAL FLOOD CONTROL DESIGN STORAGE DEPTHS

Pond	Design Storage Depths (m)	
	Extended Detention	Regional Flood Control
30	0.65	2.70 (3.35m total)

Table 7.22 summarizes the required and proposed stage / volume characteristics for Pond 30.

TABLE 7.22 - POND 30 STAGE / VOLUME SUMMARY[1]

Pond Component	Design Stage	Total Required Volume (m^3)	Total Provided Volume (m^3)
Permanent Pool	164.20 - 167.20	7,279	13,397
Extended Detention	167.20 - 167.85	7,004	7,592
Regional	167.85 - 170.55	N/A	49,500

[1] Refer to **Appendix H-2**. (Please note numbers are rounded)

Emergency Overflow Weir

The pond design includes an emergency overflow spillway set at a minimum of 0.1m above the predicted Regional Storm elevation. Pond 30 has a Regional Storm water level of approximately 170.55 m and the emergency overflow spillway is set at an elevation of 170.90 m as seen in Table 4 of **Appendix H-2**. The design of the emergency spillway is to be provided at detailed design and maintain the 0.1m freeboard from the Regional Storm water level. The pond berm is set at 171.10, which is 0.55m above the Regional Storm water level.

Thermal Mitigation

Correspondence with the MECP stating that East Morrison Creek is not protected as habitat for Redside Dace provided in **Appendix A**. Nonetheless, this report has demonstrated in the conceptual design of Pond 30 that the *MNRF Thermal Mitigation Checklist* recommendations are met. These design features for Pond 30 include:

- Bottom draw outlet from a deep permanent pool at 3.0m deep
- The average permanent pool depth is 3.0m deep
- Equivalent storage of the 10mm design storm event runoff at a depth greater than 1.5m from permanent pool surface
- A 3.0m shelf around the perimeter of the pond at 0.3m depth for planting. The vegetation that is planted at the permanent pool edge, and below it, provide shading of the shallow water at the perimeter of the pond. The strategy of planting the pond perimeter with emergent aquatic vegetation is intended to shade water that is 0.3 m in depth or less to assist in mitigation of temperature increases of shallow water.

These combined measures will provide thermal mitigation. The Pond 30 design demonstrates these thermal mitigation measures can be provided in the proposed pond block size.

Slope Stability

A slope stability analysis will be completed at detailed design to ensure that the SWM pond berm has been designed adequately to resist uplift pressure from groundwater.

Pond Outfall

The Pond 30 outfall pipe has been designed to discharge to the newly realigned EM4 channel, immediately upstream of the confluence with EM1. The outfall pipe will discharge to the existing pocket wetland located at the toe of slope and a small swale will be installed downstream of the wetland to direct flows to a newly proposed pocket wetland within the creek. The proposed grading is shown on **Drawing 7.7**. This will allow flows from the outfall pipe to fill the small wetland before spilling to the creek. The location of the outfall eliminates disturbance to the main valley, allowing for the outfall pipe to be installed via open-cut within the newly realigned channel. The proposed design also allows for further enhancement of the channel by proposing additional wetland features within the channel. The outfall design and construction details within the channel will be subject to a permit by Conservation Halton.

7.13.2 OPERATIONS AND MAINTENANCE

A detailed operations and maintenance manual for the SWM ponds and related infrastructure will be submitted at the time of detailed design. The operations and maintenance manual will be prepared in conformance with the *Town of Oakville Stormwater Monitoring Program for Ponds located in North Oakville*, and the *MOE SWMP Design Manual*.

The typical operations and maintenance activities for the SWM features and the respective costs are set out in the SWMP Design Manual. Refer to **Sections 6.0** of the SWMP Design Manual, Operation, Maintenance and Monitoring, and **Section 7.0**, Capital and Operational Costs for additional details.

8.0 WATER BALANCE

A water balance assessment was prepared as part of the EM1 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.

The EM1 Addendum updated **Section 8.7.1** to further discuss the use of LIDs. Portions of **Section 8.7.1** have been reproduced and/ or revised below to speak to LID measures within the Green Ginger Phase 2 lands.

8.7.1 WATER QUANTITY

The basic premise of LID measures is to try to manage stormwater to minimize the runoff of rainfall and increase the potential for infiltration through the use of various techniques. Constructed subsurface infiltration facilities such as trenches, basins and galleries, as well as surface features such as rain gardens and depressions have been evaluated for the proposed development, however, due to the low infiltration capacity of the soils in this area, these storage and infiltration methods are not able to significantly reduce the volume of runoff. In general, the MOECC suggests a minimum infiltration rate guideline for constructed infiltration facilities of 15 mm/hour, and the vertical infiltration rate into the till soils and shale in the EM1 area is likely less than about 4 mm/hour based on the hydraulic conductivity of these geological materials. Fractures within the till and fractures and bedding planes in the shale, particularly along the top of the bedrock where the shale is weathered, may locally increase both the vertical and lateral hydraulic conductivity however, the results of the in-situ hydraulic conductivity tests found values in the order of 10-7 cm/sec.

There are, however, several other surficial LID techniques that can be used to reduce runoff and increase the potential for post-development infiltration within the Green Ginger Phase 2 lands. The NOCSS identified examples of LID measures including green roofs, use of rain barrels and cisterns, and permeable pavements that could be implemented within the Trafalgar Urban Core blocks. Further investigation of these LID measures should be undertaken during the site plan process for these blocks. Techniques to maximize the water available for infiltration in the subdivision lands include increasing topsoil depths to improve the potential for water storage and designing grades to direct roof runoff towards lawns and gardens, side and rear yard swales, boulevards, parks, and other open space areas throughout the development where feasible. These techniques promote natural infiltration by providing additional water volumes in pervious areas and are recommended for use in the proposed development. Tree pits and swales were also recommended as part of the EM1 EIR/FSS. These tree pits provide for water retention as well as interception, evapotranspiration and some infiltration.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES

Section 9.0 of the EM1 EIR/FSS discusses the assessment of potential impacts of the proposed draft plan on the features and function of Core Area 9 and the Linkage. **Sections 9.1** through **9.4** remain valid and unchanged. **Section 9.5** has been updated based on the latest concept plan and SWM pond design for the Green Ginger Phase 2 lands.

9.5.1 DRAINAGE AREA EXCHANGE

The Drainage Area Exchange Report (Final DAE Report, January 2017) and EM1 Addendum (July 2017) presented a proposed drainage area exchange which increased the drainage area to East Morrison Creek. The reports investigated the impacts on flooding, erosion, and PSW water balance. These impacts have been re-assessed as part of this addendum given the refined concept plan and SWM pond design for Green Ginger Phase 2. It should be noted that the proposed drainage exchange was approved by the agencies and has generally been completed. As such, the text below has been updated to reflect the proposed Green Ginger Phase 2 design, and to incorporate the latest as-built information for the Emgo, Petgor, StarOak, Green Ginger (Phase 1), DTI and Shieldbay developments.

9.5.1 IMPACTS ON FLOODING

The Drainage Area Exchange Report (Final DAE Report, January 2017) and EM1 Addendum (July 2017) evaluated the proposed drainage area exchange and the impacts to flooding within East Morrison Creek, upstream and downstream of Dundas Street. This analysis was also updated as part of *the EM1/ EM4 EIR/FSS Addendum* prepared for Distrikt Development (October 2020).

Pre-Development Flows

Modeling completed through the NOCSS established target unit peak flows for the 2 year to 100 year events and the Regional Storm using GAWSER. Pre-development flow rates at Dundas Street were then established through the EM1 EIR/FSS using LiDAR mapping to confirm the catchment areas to EM1/ EM4. These drainage areas were further refined and confirmed through the EM1 Addendum and EM1/ EM4 EIR/FSS Addendum. The total pre-development flows at Dundas Street are summarized in **Table 9.5**.

TABLE 9.5 – PRE-DEVLOPMENT TARGET RELEASE RATES

Catchment	Drainage Area (Ha)	2 yr (m^3/s)	5 yr (m^3/s)	10 yr (m^3/s)	25 yr (m^3/s)	50 yr (m^3/s)	100 yr (m^3/s)	Regional (m^3/s)
	Flow Rate/ Area (m3/s/ha)	*0.005*	*0.008*	*0.010*	*0.013*	*0.015*	*0.016*	*0.044*
ME-D2 (EM1/ EM4)	310.10	1.55	2.48	3.10	4.03	4.65	4.96	13.64

Post-Development Flows

Post-Development flows were modeled using the latest design information for SWM Pond 30, SWM Pond 29 (Star-Oak) and Trafalgar Road, as well as the as-built information for the Emgo, Petgor, StarOak, Green Ginger (Phase 1), DTI and Shieldbay developments. The as-built information includes drainage areas, imperviousness, and SWM pond designs.

The post-development flows at Dundas Street have been analysed using GAWSER to provide an accurate comparison to the pre-development flows. It should be noted that SWM Ponds 27, 31, and 30 (subject of this report) were designed and optimized using SWMHYMO. As presented in **Table 7.17A**, SWM Pond 30 has been confirmed to meet NOCSS target release rates based on the SWMHYMO model. The purpose of the post-development GASWER model is not for SWM Pond design but to confirm that the overall watershed targets are met at Dundas Street. This approach is consistent with the as-built design submission that was approved for SWM Pond 27 as part of the Petgor Phase 2 subdivision, provided in **Appendix H-4**.

The post-development GAWSER model was also updated to reflect the latest information for the NHS areas. The *East Morrison Creek Interim Condition GAWER Model Results Analysis,* provided in **Appendix H-4**, presents findings that discretizing NHS catchments in post-development models increase the modelled flows from these undeveloped catchments. Given that the existing conditions GAWSER model did not further discretize NHS catchments, a similar approach was taken for the Core and NHS area within EM1. The NHS is input as a singular catchment while SWM Ponds and other post-development flows are input as direct catchments into the model. This approach was discussed and agreed to with agencies at a meeting in May 2023.

TABLE 9.6 – POST-DEVLOPMENT FLOWS

Catchment	Drainage Area (Ha)	2 yr (m^3/s)	5 yr (m^3/s)	10 yr (m^3/s)	25 yr (m^3/s)	50 yr (m^3/s)	100 yr (m^3/s)	Regional (m^3/s)
ME-D2 (EM1/ EM4)	332.05	1.185	2.181	2.782	3.622	4.154	4.796	13.608

TABLE 9.7 – COMPARISON OF PRE- AND POST-DEVELOPMENT FLOWS

Development Scenario	Drainage Area (Ha)	2 yr (m^3/s)	5 yr (m^3/s)	10 yr (m^3/s)	25 yr (m^3/s)	50 yr (m^3/s)	100 yr (m^3/s)	Regional (m^3/s)
Pre-Development	310.10	1.55	2.48	3.10	4.03	4.65	4.96	13.64
Post-Development	332.05	1.19	2.18	2.78	3.62	4.15	4.80	13.61

This analysis shows that the post-development flows in East Morrison Creek are less than the pre-development flows calculated using the NOCSS unit release rates. As noted in **Section 4.6.1**, there is potential for a foundation drain collector pipe to discharge groundwater flows from the Trafalgar Urban Core Blocks directly to the creek. Based on the hydrogeological study, groundwater flows are estimated to be ~1 L/s. As such, the total groundwater flows (0.001 m^3/s) are expected to be within rounding error of the surface water flows (13.61 m^3/s) and should not impact the flooding analysis above. It should also be noted that the timing of peak groundwater flows would not typically align with the timing of peak surface water flows.

9.5.2 IMPACTS ON EROSION

The EM1 Addendum investigated the impact of the proposed drainage exchange on erosion. The same methodology has been used in this EIR/FSS to compare the impact on erosion. This analysis has been updated based on the as-built conditions for the surrounding developments and the latest design information for the Green Ginger Phase 2 lands. As directed by the Town of Oakville and Conservation Halton, land use assumptions for the Pond 29 catchment were updated to be consistent with the Green Ginger Phase 2. The primary update to the QUALHYMO modeling is the as-built parameters for the Emgo, Petgor, StarOak, Green Ginger (Phase 1), DTI and Shieldbay developments. As discussed in **Appendix S**, the approved QUALHYMO model provided as part of the EM1 Addendum had assumed directly connected impervious values that were roughly 60% of the total imperviousness. For example, the Pond 27 catchment was modeled at 38% directly connected imperviousness based on a total imperviousness of 61%. The directly connected imperviousness has been updated in the QUALHYMO model based on values that are more commonly used in North Oakville (roughly 85% of the total imperviousness). For example, the same Pond 27 catchment is modeled at 54% directly connected imperviousness. The total imperviousness for the Green Ginger Phase 2 lands has also increased compared to the original EM1 EIR/FSS (86% vs. 79%) because of the requirement for increased density within the Trafalgar Urban Core. The Green Ginger Phase 2 lands have been modelled assuming 5mm of stormwater retention will be provided on the TUC blocks, discharged over a minimum of 72 hours, providing additional attenuation to offset the increased imperviousness. The additional attenuation within the TUC blocks can be provided through a combination of approaches, including rooftop storage, LIDs, surface storage and/ or underground storage; details of which can be determined through the site plan process. At the request of Conservation Halton and the Town of Oakville, the same assumption has been made for lands tributary to SWM Pond 29. A future EIR/FSS Addendum for the lands tributary to Pond 29 can refine the relevant assumptions and erosion control strategy.

As outlined in the EM1 EIR/FSS, there are multiple parameters that need to be assessed when establishing potential erosion impacts including duration and frequency of exceedances above the erosion threshold and changes in Cumulative Effective Discharge (CED) and Cumulative Effective Work (CEW). For example, although the results at Point A show a 54% increase in the duration of exceedances above the erosion threshold, the frequency of exceedances has been reduced from existing conditions (-25%). The result is that the CED and CEW decreased by 31% and 28%, respectively. Typically, in North Oakville the critical index is the cumulative effective stream power. As such, it is recommended to attempt matching post- to pre-development cumulative effective work, and to an extent cumulative effective discharge. **Table 9.10** below shows the results of the erosion analysis at Dundas Street (Point A), Confluence with MOC-2A (Point B), and downstream of Pond 27 (Node F). The erosion analysis is also compared to the previously approved erosion analysis completed as part of the EM1 Addendum.

TABLE 9.10 – EROSION ANALYSIS RESULTS

Point of Analysis	Description	Erosion Indices	% Change from Pre-Development	
			Scenario B1 (2017 EM1 Addendum)	Updated Post-Development
A	D/S of Dundas	Duration	28%	54%
		Frequency	-34%	-25%
		CED	-38%	-31%
		CEW	-21%	-28%
B		Duration	92%	221%

	At Confluence with new Reach MOC-2a	Frequency	49%	75%
		CED	5%	31%
		CEW	22%	25%
F	D/S of Pond 27	Duration	0%	19%
		Frequency	-49%	-48%
		CED	-31%	-25%
		CEW	-26%	-20%

As shown in **Table 9.10** above, the results are generally consistent, and slightly higher, than those approved as part of the EM1 Addendum. The result is that the updated analysis shows a greater potential for erosion impacts at Point B than the EM1 Addendum, however this increase is offset by the closer to existing conditions results for CED and CEW at Points A and F. As noted in the approved EM1 Addendum, potential erosion impacts associated with the increases in CED and CEW at Point B will be limited to the short section of the watercourse between the proposed confluence of Reach MOC-2 and MOC-4 (Point B) and the existing confluence of Reach MOC-2 and Reach MOC-4 immediately north of Dundas Street. Increases in CED and CEW at Point B are preferred over a further decrease in the already low CED and CEW at Point F and Point A, which together account for a longer length of the watercourse. The EM1 Addendum also notes that if excessive bank erosion or planimetric form adjustments do result, mitigation measures may be necessary and that mitigation measures (i.e. stabilization planting) could be implemented.

As noted in **Section 9.5.1** above, there is a potential for an FDC system which conveys groundwater flows directly to the creek. The magnitude of the groundwater flows (~1 L/s) are much less than the erosion thresholds (>70 L/s) and do not impact the conclusions of the erosion results.

9.5.3 IMPACTS ON WETLANDS

Conservation Halton staff agreed on wetland impact assessment methods outlined in the *Proposed Approach for Wetland Water Balance Assessment* (Geo Morphix, May 2023) via email on June 1, 2023, and provided in **Appendix S**. Subsequent to the meeting, Conservation Halton staff approved the preferred approach of using the aggregated results as a daily-time hydrological simulation (i.e., QUALHYMO model) for the water balance assessment. It was determined that average monthly runoff volumes obtained from the results of the hydrological simulations would be sufficient to assess changes in the pre-and post-development streamflow to the subject wetlands. Like the erosion analysis, the QUALHYMO model used for the water has been updated based on the as-built conditions for the surrounding developments (including imperviousness) and the latest design information for the Green Ginger Phase 2 lands.

9.5.3.1 RUNOFF VOLUME ASSESSMENT RESULTS – PSW 17 and PSW 74

The EM1 Addendum assessed the changes in runoff volume to PSW 17 and PSW 74 for pre and post-development using two data sets; 6 years of climate data from the Toronto Bloor Street Station (1986-1991), and 30 years of rainfall data for the Royal Botanical Gardens Climate Station (1962-1992).

PSW 17

The updated water balance results for PSW 17 are presented below. The results show an average annual increase in volume of 75% compared to existing conditions. This is greater than the 41% increase presented in the EM1 Addendum, however it should be noted that the increase in volume under proposed conditions is a result of the updated catchment-wide directly connected imperviousness discussed in **Section 6.2.1**. This is evidenced by the fact that the Green Ginger Phase 2 lands represent less than 1% of the total catchment area to PSW 17.

TABLE 9.12 – PSW 17 WETLAND RUNOFF VOLUMES

Period	Initial Conditions (m3)	Proposed Conditions (m3)	% Change from Pre-Development	
			Scenario B1 (2017 EM1 Addendum)	Updated Post-Development
Annual	158,563	276,979	41%	75%
Winter	34,033	52,282	71%	54%
Spring	31,338	69,822	70%	123%
Summer	44,768	80,672	37%	80%
Fall	50,863	69,924	11%	37%
January	8,579	14,904	52%	74%
February	5,396	12,897	99%	139%
March	10,210	21,995	72%	115%
April	9,775	23,129	86%	137%
May	11,352	24,698	70%	118%
June	10,798	22,016	56%	104%
July	12,792	25,083	53%	96%
August	21,179	33,573	30%	59%
September	17,618	28,760	34%	63%
October	11,056	22,318	58%	102%
November	19,749	23,125	-6%	17%
December	20,058	24,481	3%	22%

As noted in the EM1 EIR/FSS, PSW 17 is a riparian wetland that is located within the annual floodplain of East Morrison Creek. Changes in flow volumes to these riparian wetlands typically do not impact existing wetland soil conditions, as the duration of standing water to allow soil moisture saturation is the critical factor, not the volume of water passing through the system. The impact on vegetation within PSW 17 was evaluated in the EM1 Addendum through the comparison of the 2-yr water levels along East Morrison Creek. The 2-yr water levels were modeled under pre- and post-development to demonstrate that water levels in PSW 17 were not significantly changed under post-development, and therefore the vegetation wouldn't be significantly altered. This comparison has been updated below in **Table 9.12A.**

TABLE 9.12A – PSW 17: 2- YEAR WATER LEVELS

PSW	HEC-RAS River Station	2-Year Flows (m3/s)			2-Year Water Level (m)		
		Existing	Scenario B1 (2017 EM1 Addendum)	Updated Post-Development	Existing	Scenario B1 (2017 EM1 Addendum)	Updated Post-Development
PSW 17	6025.1	0.43	0.27	0.36	169.25	169.23	169.24
	5974.5	0.43	0.27	0.36	168.72	168.66	168.69
	5865	0.43	0.27	0.36	168.06	168.01	168.04
	5854	0.43	0.28	0.36	168.02	167.97	167.97
	5821	0.43	0.28	0.36	167.70	167.69	167.70
	5789	0.43	0.28	0.36	167.53	167.47	167.50
	5670.3	0.43	0.28	0.36	167.08	167.07	167.07

As shown in the table above, the 2-yr flows and water levels are consistent, and closer to existing conditions, than those approved through the EM1 Addendum. The proposed 2-yr water levels are within 5cm of existing conditions while flows are within 0.07m^3/s of existing conditions. Based on the analysis provided in the EM1 Addendum, and updated in this addendum, it is not expected that the proposed flows will have a negative impact on the PSWs.

PSW 74

The updated water balance results for PSW 74 are presented below. These results show an average annual increase in volume of 262% compared to existing conditions. This is greater than the 180% increase presented in the EM1 Addendum. Like PSW 17, the increase in volume under proposed conditions is a result of updated directly connected imperviousness values modeled for the Emgo, Petgor, StarOak, Green Ginger (Phase 1), DTI and Shieldbay developments. The Green Ginger Phase 2 lands only represent 15% of the total catchment area PSW 74.

TABLE 9.13 – PSW 74 WETLAND RUNOFF VOLUMES

Period	Initial Conditions (m3)	Proposed Conditions (m3)	% Change from Pre-Development	
			Scenario B1 (2017 EM1 Addendum)	Updated Post-Development
Annual	158,563	573,369	180%	262%
Winter	34,033	106,234	240%	212%
Spring	31,338	145,323	242%	364%
Summer	44,768	168,245	171%	276%
Fall	50,863	144,232	122%	184%
January	8,579	30,105	200%	251%
February	5,396	26,247	294%	386%
March	10,210	45,442	244%	345%
April	9,775	48,187	270%	393%
May	11,352	51,695	241%	355%
June	10,798	46,645	217%	332%
July	12,792	52,459	205%	310%
August	21,179	69,140	156%	226%
September	17,618	59,217	166%	236%
October	11,056	46,531	214%	321%
November	19,749	47,819	88%	142%
December	20,058	49,882	73%	149%

Like PSW 17, PSW 74 is a riparian wetland that is located within the annual floodplain of East Morrison Creek and as such, changes in flow volumes typically do not impact existing wetland soil conditions. **Table 9.13A** below provides a comparison of the 2-yr water levels under pre- and post-development.

TABLE 9.13A – PSW 74: 2- YEAR WATER LEVELS

PSW	HEC-RAS River Station	2-Year Flows (m3/s)			2-Year Water Level (m)		
		Existing	Scenario B1 (2017 EM1 Addendum)	Updated Post-Development	Existing	Scenario B1 (2017 EM1 Addendum)	Updated Post-Development
PSW 74	5627.8	0.76	0.80	0.71	166.94	166.95	166.93
	5569.5	0.76	0.80	0.71	166.39	166.43	166.47
	5519.5	0.76	0.80	0.71	166.15	166.16	166.15

As shown in the table above, the 2-yr flows and water levels are consistent, and closer to existing conditions than those approved through the EM1 Addendum. The proposed 2-yr water levels are generally within 5cm of existing conditions while flows are within 0.05m^3/s of existing conditions. Based on the analysis provided in the EM1 Addendum, and updated in this addendum, it is not expected that the proposed flows will have a negative impact on the PSWs.

A sensitivity analysis was also completed to analyze the impacts of the potential foundation drain collector system on the PSWs. The sensitivity analysis determined that the increase in flows because of the foundation drain collector pipe would be negligible. The sensitivity analysis is provided in **Appendix S.**

10.0 WATER AND WASTEWATER SERVICING

Section 10.0 in the EM1 EIR/FSS provides information related to the Area Servicing Plan for North Oakville East, wastewater servicing, and water servicing for the FSS Study Area. The overall wastewater and water servicing figures have been updated from the EM1 EIR/FSS, as **Figure 10.1** and **10.5** respectively, to reflect the updated draft plan. The Green Ginger Phase 2 internal wastewater and water servicing has been depicted in **Figures 10.1** and **10.5**, respectively. The remainder of figures remain unchanged and reference should be made to the EM1 Addendum for these figures.

10.1 AERA SERVICING PLAN

In 2011, MMM group prepared an Area Servicing Plan (ASP) for the North Oakville East Secondary Plan Area on behalf of the NOCBI landowners. The ASP included a proposed servicing plan for the Sixth Line and Trafalgar Road trunk sewers, which discharge to Dundas Street through the Green Ginger Phase 1 subdivision. The ASP estimated a population of 8,230 persons from the Sixth Line Sewer (Node 3-G to 3-H) and a population of 24,673 persons from the Trafalgar Road Sewer (Node 3-D to 3-H – through the Green Ginger Phase 2 lands). The ASP accounted for a total population of 34,114 persons through the Green Ginger Phase 1 trunk sewer (Node 3-H to 3-I).

10.2 WASTEWATER SERVICING

10.2.1 WASTEWATER DESIGN CRITERIA

Wastewater infrastructure will generally be designed in accordance with the latest Region design standards and specifications. Through the detailed design of subdivisions and site plans in North Oakville, particularly Dundas Urban Core (DUC) blocks, it has been found that these medium and high-density blocks have generally been approved and constructed with populations in excess of the Region's Linear Design Manual density (285 person / hectare). Through draft plan feedback from the Town of Oakville our understanding is that developments are strongly encouraged to provide increased density within draft plans, and that there is potential for increasing high-rise developments along the Trafalgar Urban Core (TUC). As such a population density of 500 persons/ hectare has been assumed for the TUC blocks within the Green Ginger Phase 2 lands.

10.2.2 EXISTING WASTEWATER SERVICES

The existing wastewater sewers near the FSS study area include the sewers located within constructed subdivisions Green Ginger Phase 1, Petgor Phase 2 as well as sanitary sewers on Dundas Street. As noted in **Section 10.1**, the ASP was designed such that flows from the Trafalgar Road trunk Sewer (including the Green Ginger Phase 2 lands) would be conveyed through the Green Ginger Phase 1 lands to Dundas Street. The trunk sewer within the Green Ginger phase 1 lands was designed and approved in 2014 based on the applicable Region's standards using the latest draft plan information for Green Ginger Phase 1 and the latest available information for external lands. As such, the existing sanitary sewer within the Green Ginger Phase 1 lands is 675mm, discharging to the existing 900mm sanitary sewer on Dundas Street.

As a result of the potential increased density noted in **Section 10.2.1**, a preliminary sanitary capacity check was completed for the existing sanitary sewer system downstream of the Green Ginger Phase 2 lands (i.e. through Green Ginger Phase 1 to Dundas Street). The majority of the lands tributary to the Sixth Line sewer

have been constructed or are in the process of being constructed. Through draft plan approvals (by others) of these lands, the actual populations in the Sixth Line sewer (Node 3-G to 3-H) have increased by approximately 8,000 people. This has resulted in downstream sanitary sewer legs near 99% capacity (assuming lands tributary to the Trafalgar Road trunk sewer remain at ASP populations).

The impact of these potential increases in population to the Trafalgar Road trunk sewer are discussed further in **Section 10.2.5**.

10.2.3 EXTERNAL WASTEWATER REQUIREMENTS

As discussed in **Section 10.1**, the ASP envisioned a sanitary trunk sewer from Trafalgar Road, routed through Green Ginger Phase 1 subdivision, that discharges to the existing sanitary trunk on Dundas.

10.2.4 PROPOSED WASTEWATER SERVICING

Green Ginger Phase 2 (FSS study lands) will be serviced via a series of local sanitary sewers generally flowing from the north FSS study limits (Marvin Avenue) to the south FSS study limits (Wheatboom Drive).

10.2.5 SANITARY TRUNK SEWER (Trafalgar Road to Dundas Street)

As discussed in **Section 10.2.1** there is potential for a large population increase in the Trafalgar Urban Core (TUC) lands because of higher density requirements. Given that the existing sanitary trunk sewer is expected to reach 99% capacity *without* any increases to density, capacity concerns were raised to Region of Halton staff through the study team's review of the Region's Trafalgar Road design. This correspondence is provided in **Appendix I**.

The Region of Halton has advised that the servicing strategy for the Green Ginger Phase 2 lands, and Trafalgar Road trunk sewer, must follow the approved ASP. As a result, the sanitary sewer design has been updated to follow the ASP design. This includes a 600mm sanitary trunk sewer on Wheat Boom drive that will pick up flows from the Trafalgar Road trunk sewer and direct them to the existing 600mm sanitary trunk sewer within Green Ginger Phase 1.

The capacity of the downstream sanitary trunk sewer has been analyzed based on the proposed Green Ginger Phase 2 design, and the capacity in the downstream sewer is expected to remain at 99%. However, the analysis assumes that all external developments will follow population densities estimated in the ASP (which is unlikely given the Town's encouragement of higher-density blocks). It is understood that further discussions between the development community and the Region are ongoing to discuss this issue. The study team strongly recommends that the Region consider the density of the TUC blocks in the Trafalgar Road sanitary sewer design.

10.3 WATER SERVICING

10.3.1 WATER DESIGN CRITERIA

As shown on **Figure 10.5**, the Green Ginger Phase 2 lands will be serviced by a network of new local watermains designed in accordance with the Region of Halton's design criteria. Two separate watermain feeds from Trafalgar Road will service the subdivision; one located at Wheat Boom Drive and the other at Threshing Mill Boulevard.

The EM1 EIR/FSS had proposed to extend watermains from Petgor Phase 2 and Green Ginger Phase 1 across the NHS via the road connections. However, the watermain hydraulic analysis provided in **Appendix T** demonstrates that these connections are not required to meet the water demands of the Green Ginger Phase 2 subdivision.

11.0 ROADS

Roads were assessed and evaluated in detail in the EM1 EIR/FSS. The majority of the information in **Section 11.0** remains valid. **Sections 11.0** and **11.1** were modified in the EM1 to reflect removal of one road crossing of the NHS linkage. These sections have been replicated below, along with **Section 11.4** to discuss infrastructure crossing.

11.1 CREEK CROSSING DESIGN REQUIREMENTS

11.1.1 ROAD CROSSING LOCATIONS

Road crossing locations of East Morrison Creek are all shown on the Green Ginger Draft Plan (**Figure 6.2**). The locations shown generally follow the layout from the Master Plan, with the exception of one crossing location at Street A being removed as noted in **Section 11.0**. There are three crossings through the Linkage:

- Wheat Boom Drive is the first road crossing north of Dundas and is a minor arterial road over a high-constraint (Red) stream;
- Threshing Mill Boulevard is a collector road over a medium-constraint (Blue) stream where the existing channel has been re-aligned;
- Marvin Avenue is a collector road through the Linkage where the proposed re-aligned stream will terminate immediately to the south of the Street. This road crossing was approved and constructed as part of the Petgor Phase 2 subdivision.

11.1.2 RECOMMENDED CREEK CROSSING SIZING

The proposed crossings of East Morrison Creek at Wheat Boom Drive and Threshing Mill Boulevard have been designed in accordance with requirements of OPA 272 and NOCSS, including the assessment of fluvial geomorphologic, hydraulic and wildlife passage factors. The opening sizes for the crossings were governed by fluvial geomorphology. On this basis, the opening of crossings for Wheat Boom Drive and Threshing Mill Boulevard will have an opening width of 8.54 m, (three times bankfull width). Site grading will permit for a consistent 2.74 m height for these two crossings to facilitate wildlife passage. Recommended designs are summarized in **Table 11.1**.

TABLE 11.1: Design Recommendation for East Morrison Creek Street Crossings

Crossing	Width (m)	Height (m)	Length (m)	Downstream Invert (m)	Upstream Invert (m)	Top of Road Elevation (m)
Wheat Boom Drive	8.54	2.74	37	167.45	167.75	171.70
Threshing Mill Boulevard	8.54	2.74	32.5	170.41	170.48	174.70

The road crossing locations and sizes are shown on **Drawing 7.7**. The proposed culvert sizes are consistent with the sizes recommended in the EM1 EIR/FSS.

11.1.3 ROAD CROSSING FLUVIAL GEOMORPHOLOGY DESIGN REQUIREMENTS

Culvert crossings are proposed over an existing section of East Morrison Creek and over sections that will be reconstructed using principles of natural channel design. The Threshing Mill Boulevard crossing occurs over a section of channel that has been reconstructed using natural channel design principles. The Wheat Boom Drive crossing occurs over a section of existing channel.

The following recommendations were made as part of the EM1 EIR/FSS are made with respect to crossing location and size from a fluvial geomorphic perspective.

- The crossings should be over a straight section of channel, where possible.
- The crossings should be perpendicular to the channel, where possible.
- The channel designs associated with the crossings should assure that there are no large or sharp meander bends immediately upstream of the crossings.
- All crossings should be open bottomed. Open bottom crossings do not restrict sediment transport processes and natural adjustments to channel inverts. They also reduce development of scour pools which often form downstream of closed bottom culverts. Scour pools can lead to development of elevated culverts which block fish passage and fragment channel function.
- To accommodate limited adjustment of the channel, at a minimum, crossing width should be three times the bankfull channel width. This will account for some migration of the channel.
- A low flow channel should be defined through the crossing to maintain fish passage. Low flow channel banks in fine sediments are normally stabilized by vegetation. In long crossings there is potential for low light penetration limiting establishment of vegetation. Without this vegetation the channel will be unstable and flow will spread over the width of the culvert. In these cases, a constructed low flow channel may be required to maintain fish passage.

The recommended minimum crossing widths provided in the EM1 EIR/FSS are provided below.

- Wheat Boom Drive: Existing bankfull width is 1.75 m. Minimum crossing width: 1.75 m x 3 = 5.25 m
- Threshing Mill Boulevard: Designed channel bankfull width is 2.85 m. Minimum crossing width: 2.85 m x 3 = 8.55 m

11.1.4 ROAD CROSSING REQUIREMENTS FOR WILDLIFE

As identified in **Section 3.6** of the EM1 EIR/FSS, road design within the NHS should minimize impacts on ecopassage to the best extent possible. Passage functions that are addressed in design through the linkage are both terrestrial and aquatic. The Wheat Boom Drive and Threshing Mill Boulevard road design considered the movement and passage of fish associated with East Morrison Creek, as well as terrestrial wildlife, i.e. mammals..

For fish movement within the creek corridor, primary design consideration was a culvert width that spanned three times the bank full width while maintaining an open bottom culvert. These design considerations resulted in the need for an 8.54 m wide arch-culverts for Wheat Boom Drive and Threshing Mill Boulevard. The second consideration was the culvert length, with a shorter length design being preferred. For the design,

culvert length is primarily driven by other road design requirements; however to the extent possible culvert length was shortened by grading at the culvert location and design of the parapet wall and wing retaining walls. The final consideration was culvert height. Though culvert height is not directly critical for fish movement within a creek, culvert height can influence the length of culvert that is "day lighted". For the culvert design, culvert height was driven primarily by other design criteria; however, within these parameters a standard maximum culvert height of 2.74 m was identified for Wheat Boom Drive and Threshing Mill Boulevard. This relatively high arch-culvert design promotes the day lighting of a significant length of the upstream and downstream ends of the culvert. In addition, placement of substrate through the length of the culvert will be detailed in detailed design to promote fish passage.

For the passage of terrestrial wildlife at road crossings within the linkage, factors that were considered in the culvert and road design to meet wildlife requirements included:

- Passage through the linkage by urban tolerant large mammals (i.e. deer) at road crossings would occur over the road crossing;
- Passage by small urban tolerant small mammals (i.e. raccoon, skunk, voles etc.) through the linkage would be under the road crossing via culverts located at road creek crossings;
- Passage by amphibians and reptiles would be under the road crossing via culverts located at road creek crossings; and
- Town of Oakville road design standards are the primary factors to be addressed in the development of road design. For the passage of large mammals through the linkage over roads at the road crossings, primary road design features were developed included the following:
- The focus of passage within the linkage to occur in the creek floodplain at culvert crossings;
- Road side grading at culvert crossing to have a maximum slope of 3:1

For passage of small mammals, amphibians and reptiles under the road crossing via the culvert the primary design features were developed for promoting fish passage, i.e. culvert, length, width and height for Wheat Boom Drive and Threshing Mill Boulevard. For these crossings during low flow conditions, much of the culvert will be dry and thus provide a width of 2 m or more along the creek bank.

The 'Openness Index' for culverts planned for wildlife use is a general guide that can be used to determine if a culvert will provide some level of passage function. The formula is the width of culvert multiplied by the culvert height, with the product divided by the length of the culvert. Index values near the value of 1 are considered adequate for promoting passage by many mammal species. For Wheat Boom Drive and Threshing Mill Boulevard, the culverts have a length of 37 m to 32.5 m, width of 8.54 m and height of 2.74 m, resulting in an openness index of 0.63 and 0.72, respectively, and is therefore considered adequate for small species of mammals, snakes and amphibians that can be expected to cross the roads through the culverts.

Based on the above, to the extent possible, design mitigation features have been developed to mitigate impacts of the aquatic and terrestrial corridor function of the Linkage. Other features, such as post construction vegetation plans that will naturalize the areas where road crossings occur, will also mitigate the impacts to the corridor function of the linkage lands.

11.1.5 ROAD CROSSING HYDRAULIC DESIGN REQUIREMENTS

The proposed creek crossings were analyzed as part of the as-built channel design during construction of the Petgor Phase 2 subdivision. The memo analyzed the as-built function of the creek realignment and

confirmed that the proposed culvert sizes allow for acceptable floodplain storage within the creek and that the Regional water levels in the creek are 3.4 m and 3.7 m below the top of road for Wheat Boom Drive and Threshing Mill Boulevard, respectively. **Appendix D** includes the HEC-RAS model which incorporates the proposed road crossing size.

11.2 INFRASTRUCTURE CROSSING OF CREEKS

A wastewater crossing is required under East Morrison Creek to service the Subject Lands. As discussed in **Section 10.2**, a 600mm sanitary sewer will extend across the NHS from the Green Ginger Phase 2 lands to the Green Ginger Phase 1 lands via Wheat Boom Drive.

In order to minimize the impact on the creeks from future repair and replacement work, the services crossings will be located in the proposed road allowances. Specific requirements (i.e. open cut vs. trenchless) for the service installation will be determined during the permitting process. The sanitary trunk sewer is proposed to be installed at a depth between 4m to 8m, and the disturbance is expected to be contained within the grading limits associated with the future roadway. If the trunk sewer is installed via open-cut then the channel is to be restored to the satisfaction of Conservation Halton.

12.0 CONSTRUCTION PRACTICES

Section 12.0 in the EM1 EIR/FSS (December 2013 as amended July 2015) 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 Reuse. This information remains unchanged as a result of the revisions to the Green Ginger Phase 2 Draft Plan. Refer to the EM1 EIR/FSS (December 2013 as amended July 2015) for **Section 12.0**.

13.0 MONITORING PROGRAM

Section 13.0 in the EM1 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 as a result of the revised Green Ginger Phase 2 draft plan. Refer to the EM1 EIR/FSS for **Sections 13.1** and **13.2**. With respect to the proposed monitoring, outlined in **Section 13.3**, there were minor changes and adjustments to the proposed program as a part of the EM1 Addendum dated November 2015 as amended July 2017. Refer to the EM1 Addendum for the revised **Section 13.3**.