



**URBANTECH®**

TERTIARY PLAN – PHASE 1  
FUNCTIONAL SERVICING REPORT

**ALLOA CALEDON**

TOWN OF CALEDON  
REGION OF PEEL

PREPARED FOR  
**ALLOA LANDOWNERS GROUP INC.**

Urbantech File No.: 20-665

1<sup>ST</sup> SUBMISSION – SEPTEMBER 2024  
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## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>8</b>
<b>1.1.</b>	<b>PROJECT BACKGROUND .....</b>	<b>8</b>
<b>1.2.</b>	<b>STUDY AREA .....</b>	<b>8</b>
<b>1.3.</b>	<b>BACKGROUND DOCUMENTATION .....</b>	<b>9</b>
<b>1.4.</b>	<b>LAND USE AND POPULATION PROJECTIONS .....</b>	<b>9</b>
<b>2</b>	<b>DEVELOPMENT CONSTRAINTS &amp; PRELIMINARY GRADING .....</b>	<b>11</b>
<b>2.1.</b>	<b>TERTIARY PLAN PROPOSED GRADING .....</b>	<b>11</b>
<b>2.2.</b>	<b>CUT / FILL ANALYSIS .....</b>	<b>12</b>
<b>2.3.</b>	<b>BOUNDARY ROAD GRADES .....</b>	<b>12</b>
<b>2.4.</b>	<b>HIGHWAY 413 .....</b>	<b>13</b>
<b>3</b>	<b>STORMWATER MANAGEMENT STRATEGY .....</b>	<b>14</b>
<b>3.1.</b>	<b>BACKGROUND .....</b>	<b>14</b>
<b>3.2.</b>	<b>EXISTING CONDITIONS .....</b>	<b>14</b>
<b>3.3.</b>	<b>STORMWATER MANAGEMENT DESIGN CRITERIA .....</b>	<b>15</b>
3.3.1.	Quality Control Requirements .....	15
3.3.2.	Erosion Control Requirements .....	15
3.3.3.	Quantity Control Requirements .....	16
3.3.4.	Consolidated Linear Infrastructure ECA Requirements .....	19
3.3.5.	Thermal Mitigation Requirements .....	19
<b>3.4.</b>	<b>PROPOSED STORMWATER MANAGEMENT PLAN .....</b>	<b>20</b>
3.4.1.	Minor System .....	21
3.4.2.	Major System .....	21
<b>3.5.</b>	<b>SWM POND DESIGN .....</b>	<b>21</b>
3.5.1.	Imperviousness .....	21
3.5.2.	SWM Pond Design .....	22
3.5.3.	SWM Pond Stage-Storage-Discharge Characteristics .....	23
3.5.4.	Drawdown Time .....	27
3.5.5.	On-site Controls Stage-Storage-Discharge Characteristics .....	28
3.5.6.	Downstream Hydrologic Assessment .....	31
3.5.7.	SWM Pond Inlet and Outlet Design .....	31
3.5.8.	Pond Naturalization .....	32
3.5.9.	Downstream Erosion Assessment .....	33
3.5.10.	Thermal Mitigation Measures .....	33
<b>3.6.</b>	<b>SITE WATER BALANCE AND LOW IMPACT DEVELOPMENT .....</b>	<b>35</b>
3.6.1.	Site Water Balance .....	35
3.6.2.	Low Impact Development Alternatives .....	37
3.6.3.	Low Impact Development – Proposed Location and Size .....	39
3.6.4.	Feature Based Water Balance .....	39
<b>4</b>	<b>NATURAL CHANNEL DESIGN .....</b>	<b>42</b>

<b>4.1. EXISTING CONDITIONS.....</b>	<b>42</b>
4.1.1. Existing Conditions Floodplain Mapping .....	42
4.1.2. Existing Hydraulic Structure Inventory .....	44
4.1.3. Existing Riparian / Flood Storage.....	46
<b>4.2. PROPOSED CONDITIONS.....</b>	<b>48</b>
4.2.1. Proposed NHS and Channel Corridor .....	48
4.2.2. Proposed Hydrologic Model.....	48
4.2.3. Proposed Hydraulic Model.....	49
<b>4.3. NATURAL CHANNEL DESIGN - EXPECTATIONS AND IMPLEMENTATION .....</b>	<b>52</b>
4.3.1. Design Expectations.....	52
4.3.2. Recommendations for Design and Construction of the Channel .....	52
<b>4.4. TRAILS.....</b>	<b>53</b>
<b>5 SANITARY SERVICING.....</b>	<b>54</b>
<b>5.1. EXISTING SANITARY SERVICING AND REGIONAL SYSTEM CAPACITY .....</b>	<b>54</b>
<b>5.2. SANITARY DESIGN CRITERIA AND WASTEWATER GENERATION RATES .....</b>	<b>55</b>
<b>5.3. PROPOSED TERTIARY PLAN SANITARY SERVICING .....</b>	<b>57</b>
<b>6 WATER SERVICING.....</b>	<b>59</b>
<b>6.1. EXISTING WATER SERVICING AND REGIONAL SYSTEM CAPACITY .....</b>	<b>59</b>
<b>6.2. WATER DESIGN CRITERIA AND SYSTEM DEMAND .....</b>	<b>60</b>
<b>6.3. PROPOSED TERTIARY PLAN WATER SERVICING.....</b>	<b>61</b>
<b>7 ROADS .....</b>	<b>63</b>
<b>7.1. ROAD RIGHTS-OF-WAY .....</b>	<b>63</b>
<b>7.2. ROAD CROSSINGS OF THE NHS .....</b>	<b>63</b>
7.2.1. Road Crossing of the NHS (Alloa Drain) .....	63
7.2.2. Crossing of the NHS (Pedestrian Bridge).....	64
7.2.3. Road Crossing of the NHS (Woodlots).....	64
<b>7.3. BOUNDARY ROADS .....</b>	<b>65</b>
<b>8 CLIMATE ADAPTATION .....</b>	<b>66</b>
<b>9 DEVELOPMENT STAGING AND ESC PLANNING.....</b>	<b>70</b>
<b>9.1. EROSION AND SEDIMENT CONTROL PLAN DURING CONSTRUCTION.....</b>	<b>71</b>
<b>10 CONCLUSION .....</b>	<b>72</b>

## TABLES

Table 1.1: Watershed Drainage Divide (Alloa Phase 1 Tertiary Plan) .....	9
Table 1.2: Alloa Phase 1 Tertiary Plan – Projected Population by Land Use .....	10
Table 3.1: Erosion Criteria, Unit Volumes (SABE).....	15
Table 3.2: Erosion Control Criteria (Fletcher’s Creek) .....	16
Table 3.3: Quantity Control Criteria, Unit Volumes (SABE) .....	17
Table 3.4: Selected Quantity Control Criteria, Unit Flow Rates (Etobicoke Creek, Basin 1).....	17
Table 3.5: Quantity Control Criteria, Unit Flow Rates (Fletcher’s Creek) .....	18
Table 3.6: Quantity Control Criteria, Unit Volumes (Fletcher’s Creek) .....	19
Table 3.7: Percent Imperviousness by Land Use.....	21
Table 3.8: Pond Catchment Areas and Imperviousness .....	22
Table 3.9: SWM Pond 1 Stage-Storage-Discharge Relationship .....	24
Table 3.10: SWM Pond 2 Stage-Storage-Discharge Relationship .....	24
Table 3.11: SWM Pond 3 Stage-Storage-Discharge Relationship .....	25
Table 3.12: SWM Pond 4 Stage-Storage-Discharge Relationship .....	25
Table 3.13: SWM Pond 5 Stage-Storage-Discharge Relationship .....	26
Table 3.14: SWM Pond 6 Stage-Storage-Discharge Relationship .....	26
Table 3.15: SWM Pond 7 Stage-Storage-Discharge Relationship .....	27
Table 3.16: Extended Detention Orifice Sizing .....	27
Table 3.17: On-Site Catchment Areas and Imperviousness .....	28
Table 3.18: Private Storage 1 Volume Requirements & Target Flows.....	29
Table 3.19: Private Storage 2 Volume Requirements & Target Flows.....	29
Table 3.20: Private Storage 3 Volume Requirements & Target Flows.....	29
Table 3.21: Private Storage 4 Volume Requirements & Target Flows.....	30
Table 3.22: Private Storage 5 Volume Requirements & Target Flows.....	30
Table 3.23: Private Storage 6 Volume Requirements & Target Flows.....	30
Table 3.24: Private Storage 7 Volume Requirements & Target Flows.....	30
Table 3.25: Thermal Mitigation Measures.....	34
Table 3.26: Summary of Continuous Modelling Results – Site Water Balance (Etobicoke Creek) ...	36
Table 3.27: Summary of Infiltration Targets (Fletcher’s Creek).....	37
Table 4.1: Existing Hydraulic Structure Inventory .....	44
Table 4.2: Existing Riparian Storage (2D Model, No Culverts, West of Mississauga Rd) .....	46
Table 4.3: Existing Flood Storage (1D Unsteady-State, No Culverts, East of Mississauga Rd) .....	47
Table 4.4: Phase 1 Channel Crossings / Culvert Sizing .....	49
Table 4.5: Existing Riparian Storage (2D Model, No Culverts, West of Mississauga Rd) .....	50
Table 4.6: Proposed vs Existing Flood Storage (1D Unsteady-State, No Culverts, East of Mississauga Rd) .....	50
Table 5.1: Tertiary Plan Wastewater Servicing (Planned and Proposed Regional Projects) .....	54
Table 5.2: Peel Region Wastewater Generation Design Criteria.....	56
Table 5.3: Tertiary Plan – Wastewater Generation (Cumulative at Brisdale Sewer Connection) .....	57
Table 6.1: Tertiary Plan Water Servicing (Planned Regional Projects).....	59
Table 6.2: Peel Region Water Demand Design Criteria .....	61
Table 6.3: Alloa Phase 1 – Water Demand (Domestic) .....	61
Table 8.1: Alloa SWM Design – Climate Change Considerations.....	66

4

## APPENDICES

### Appendix A – Drawings and Figures

#### Introduction:

Figure 1.1	Subwatershed Boundaries
Figure 1.2	Tertiary Plan Study Area
Figure 1.4	Tertiary Plan Land Use Schedule / Proposed Development Plan

#### Development Constraints & Site Grading:

Drawing 2.0	Constraints Mapping
Drawing 2.1A	Grading Plan (Part 1)
Drawing 2.1B	Grading Plan (Part 2)
Drawing 2.1C	Grading Plan (Part 3)
Drawing 2.1D	Grading Plan (Part 4)
Drawing 2.1E	Grading Plan (Part 5)
Drawing 2.1F	Grading Plan (Part 6)
Drawing 2.2	Preliminary Cut-Fill Analysis

#### Stormwater Management Strategy:

Drawing 3.2A	Pre-development Drainage Plan
Drawing 3.2B	Pre-development Drainage to Existing Wetlands
Drawing 3.4A	Stormwater Management Facility Drainage Plan
Drawing 3.4B	Storm Servicing Plan
Drawing 3.5A	SWM Pond 1
Drawing 3.5B	SWM Pond 2
Drawing 3.5C	SWM Pond 3
Drawing 3.5D	SWM Pond 4
Drawing 3.5E	SWM Pond 5
Drawing 3.5F	SWM Pond 6
Drawing 3.5G	SWM Pond 7
Drawing 3.6.3	LID Alternatives
Drawing 3.6.4	Post-development Drainage to Wetlands

#### Natural Channel Design:

Drawing 4.1A	Pre-development Floodmapping
Drawing 4.1B	HEC-RAS Stations and Pre-development Flood Elevations
Drawing 4.2A	Post-development Floodmapping
Drawing 4.2B	HEC-RAS Stations and Post-development Flood Elevations
Drawing 4.3	Proposed NHS System and Trail Map
Drawing 4.4	Typical Road Crossing Detail Along NHS Corridor
Drawing 4.5A	NHS Cross Sections (1-3)
Drawing 4.5B	NHS Cross Sections (4-6)
Drawing 4.5C	NHS Cross Sections (7-9)
Drawing 4.5D	NHS Cross Sections (10-11)

**Sanitary Servicing:**

Drawing 5.1 Sanitary Servicing Plan

**Water Servicing:**

Drawing 6.1 Watermain Servicing Plan

**Roads:**

Figure 7.1A	8.0m Laneway (Std. 200)
Figure 7.1B	16.0m Local Window Street (Std. 201)
Figure 7.1C	18.0m Local Road
Figure 7.1D	20.0m Local Road
Figure 7.1E	22.0m Collector Road
Figure 7.1F	26.0m Collector Road
Drawing 7.2A	Preliminary Chinguacousy Road Plan & Profile
Drawing 7.2B	Preliminary Creditview Road Plan & Profile (Part 1)
Drawing 7.2C	Preliminary Creditview Road Plan & Profile (Part 2)

**Development Phasing:**

Drawing 9.1	Preliminary Development Staging
Drawing 9.2	Interim Alloa Drain Re-Alignment

**Appendix B – Design Sheets**

<b>B1</b>	Storm Sewer Design Sheet (10-yr Storm)
<b>B2</b>	Storm Sewer Design Sheet (100-yr Constant Flow Calculation)
<b>B3</b>	Sanitary Sewer Design Sheet

**Appendix C – Hydrology, SWM Pond Modelling & Calculations**

<b>C1</b>	Model Files – Continuous Model and Pond Design Model ( <b>Provided Separately</b> )
<b>C2</b>	Pond Extended Detention Drawdown Calculations
<b>C3</b>	Pond Permanent Pool Sizing Calculations
<b>C4</b>	Pond Thermal Mitigation Measures
<b>C5</b>	Memo: <i>Alloa Tertiary Plan Hydrologic Model Calibration</i> (Urbantech, March 2026) and associated Modeling Files ( <b>Modeling Files Provided Separately</b> )
<b>C6</b>	Memo: <i>Alloa Tertiary Plan (Phase 1) Downstream Capacity Analysis – Mayfield Road Crossings to Fletcher’s Creek</i> (Urbantech, March 2026)
<b>C7</b>	Memo: <i>Alloa Tertiary Plan (Phase 1) Downstream Analysis – Fletcher’s Creek</i> (Urbantech, March 2026) ( <b>Modeling Files Provided Separately</b> )

## Appendix D – Sensitivity Analysis

- D1 Memo: *Phase 1 Interim Conditions / Tertiary Plan – Application of Sensitivity Analysis Conclusions* (Urbantech, March 2026)  
Feature Based Water Balance (**Modelling Files Provided Separately**)

## Appendix E – Hydraulic Modelling

- E1 1D (Steady State, Unsteady State), 2D Modelling Files (**Provided Separately**)

## Appendix F – Climate Change:

- F1 Memo: *Future Climate Change Conditions Assessment - Confirmation of Regional Flow as Governing Flow with Respect to Secondary Plan / Tertiary Plan Block Sizing in the Context of Future Climate Change Conditions* (Urbantech, July 2025)

## Appendix G – Fluvial Geomorphology Reports:

- G1 Fluvial Geomorphology Assessment and Conceptual Natural Corridor Designs, Alloa Secondary Plan Area – Phase 1 Lands (Geo Morphix, March 2026)
- G2 Erosion Mitigation Assessment, Alloa Secondary Plan Area – Phase 1 Lands (Geo Morphix, March 2026)

## 1 INTRODUCTION

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### 1.1. PROJECT BACKGROUND

Urbantech Consulting has been retained by the Alloa Landowners Group to prepare a Functional Servicing Report (FSR) in support of Phase 1 of the Alloa Community Secondary Plan. The Phase 1 Study Area is shown in **Figure 1.2**. The Phase 1 lands are referred to herein as the Subject Lands or the Tertiary Plan Area.

This report should be read in conjunction with the Alloa Local Subwatershed Study (Crozier, 2026), Alloa Secondary Plan Scoped Servicing Report (Urbantech, 2026) and the Alloa Phase 1 Environmental Implementation Report (EIR) (Crozier, 2026), all under separate cover. This report has been prepared to satisfy the following:

- Town of Caledon Development Standards Manual (2019)
- Peel Public Works Stormwater Design Criteria and Procedures Manual (June, 2019)
- Consolidated Linear Infrastructure Environmental Compliance Approval (CLI ECA) Stormwater Management Criteria (September, 2022)
- Region of Peel Public Works Watermain Design Criteria (June, 2010)
- Region of Peel Public Works Linear Wastewater Standards (March, 2023)
- Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC) Authority Guidelines

Applicable site-specific background information, guidelines, policies, and design criteria have been considered in the development of this report.

The FSR addresses the functional servicing requirements (water, sanitary, stormwater management) necessary to support the Tertiary Plan and provides input into the preparation and submission of Draft Plans of Subdivision for the participating lands. It is intended to confirm municipal servicing feasibility and provide information on site grading, hydrology, and hydraulics as it relates to floodplain delineation across the Subject Area.

### 1.2. STUDY AREA

The Tertiary Plan (as shown in **Figure 1.2**) includes approximately 263 hectares (ha) of developable area (net of SWM Ponds and NHS). The study area is bounded by Mayfield Road to the south, Chinguacousy Road to the east and future Highway 413 to the north. The western boundary generally follows Creditview Road but extends further west as it approaches Mayfield Road. Under existing conditions, the land is predominantly agricultural.

The Tertiary Plan is bisected by a drainage divide between the Etobicoke Creek watershed and Fletcher's Creek watershed. As such, the lands fall within the jurisdiction of both Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC). The TRCA boundary includes the Etobicoke Creek watershed (northern portion of the site), and the CVC jurisdiction includes the Fletcher's Creek watershed (southern portion of the site). The adjacent watersheds are shown in **Figure 1.1**. **Table 1.1** summarizes the total area of the Tertiary Plan within each watershed.

**Table 1.1: Watershed Drainage Divide (Alloa Phase 1 Tertiary Plan)**

Description	Area (ha)	Percent of Total
Etobicoke Creek	194.0	59%
Fletcher's Creek	132.4	41%

There is a small area in the northeast corner of the Study Area designated as Greenbelt Outer Boundary. In addition, there are woodland and wetland features across the landscape. The Tertiary Plan concept maintains these natural features and associated connectivity where required, although future work may address alignment and refinement to these features. Wetlands within re-aligned watercourses (i.e., Wetland #7) are proposed to be removed and replicated in situ. The Alloa Municipal Drain has an existing associated floodplain that will be contained and regulated in the post-development condition. **Drawing 2.0** provides information on Tertiary Plan existing features and constraint limits.

### 1.3. BACKGROUND DOCUMENTATION

In preparation of the Phase 1 Tertiary Plan, the following reports and documents were referenced:

- Huttonville and Fletcher's Creeks Subwatershed Study (AMEC, 2011)
- Etobicoke Creek Hydrology Update Study (MMM Group, 2013)
- Etobicoke Creek Synthesis Study (AMEC, December 2014)
- Mount Pleasant Sub-Area 51-2 EIR/FSR (2016)
- Region of Peel SABE Scoped Subwatershed Study (2022)
- Region of Peel Development Charges Background Study – Consolidated Report (November, 2020)
- Region of Peel Water and Wastewater Master Plan for the Lake-Based System (2020)
- Region of Peel Settlement Area Boundary Expansion Water and Wastewater Service Analysis (August, 2021)
- Region of Peel Wastewater Development Charges 2026 (Mapping)
- Region of Peel Water Development Charges 2026 (Mapping)
- Alloa Local Subwatershed Study (Crozier, 2026)
- Alloa Secondary Plan Scoped Servicing Study (Urbantech, 2026)
- Alloa Phase 1 Lands / Tertiary Plan Area Environmental Impact Study (EIS) (Crozier, 2026)
- Fluvial Geomorphology Assessment and Conceptual Natural Corridor Designs, Alloa Secondary Plan Area – Phase 1 Lands (Geo Morphix, 2026)
- Erosion Mitigation Assessment, Alloa Secondary Plan Area – Phase 1 Lands (Geo Morphix, 2026)

### 1.4. LAND USE and POPULATION PROJECTIONS

The Tertiary Plan Land Use is shown in **Figure 1.4**, provided by Glen Schnarr & Associates. The proposed land use structure includes a collector road network which provides connectivity within the

9

Tertiary Plan, to surrounding development areas, and to the future planned interchange of Highway 413 at Chinguacousy Road. The Land Use Schedule shows mixed-use areas along the Mayfield Road corridor from Chinguacousy to Creditview and two large commercial blocks east of Creditview Road, along Mayfield Road. The highest density areas are located at the intersection of Mayfield Road and Chinguacousy, with additional medium-high density blocks proposed along Chinguacousy Road. The remainder of the plan is shown as neighbourhoods of low and medium density development. The Tertiary Plan includes four (4) neighbourhood parks, one (1) community park and a significant NHS block associated with the naturalized Alloa Drain channel and buffer. There are seven (7) SWM ponds and three (3) elementary school blocks.

Residential and employment population forecasts have been prepared by Urbantech based on the Tertiary Plan Land Use, unit counts (**Figure 1.4**) and people-per-unit forecasts for the area provided by GSAI. Population estimates are used for the purposes of calculating servicing needs (i.e., water demand and wastewater generation rates). **Table 1.2** summarizes the Tertiary Plan land use categories and associated area and population projections.

**Table 1.2: Alloa Phase 1 Tertiary Plan – Projected Population by Land Use**

Land Use	Total Units	People / Unit (PPU)	Total Population
Low Density Residential	2,038	4.2	8,560
Medium Density Residential	2,429	3.4	8,260
Medium – High Density <sup>Note 1</sup>	1,045	3.1 (> 1 Bed) 1.7 (1 Bed or Less)	2,440
Mixed Use <sup>Note 1</sup>	1,192	3.1 (> 1 Bed) 1.7 (1 Bed or Less)	2,780
Neighbourhood Centre (SP1) <sup>Note 1</sup>	1,126	3.1 (> 1 Bed) 1.7 (1 Bed or Less)	2,620
Elementary School <sup>Note 2</sup>	-	-	1,350
Commercial <sup>Note 3</sup>	-	-	282
SP2	-	-	655
<b>Total</b>			<b>26,947</b>

**Note 1** Med-High Density, Mixed Use and Neighbourhood Centre development is assumed 55% 1 Bed or Less, 45% > 1 Bed

**Note 2** There are three (3) Elementary Schools in the Tertiary Plan area. Each assumed 450 people (per Peel guidelines)

**Note 3** Commercial Population is calculated at 50 ppl/ha, assumed 50% of Mixed-Use areas

## 2 DEVELOPMENT CONSTRAINTS & PRELIMINARY GRADING

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### 2.1. TERTIARY PLAN PROPOSED GRADING

The future site grades required to service the Tertiary Plan Area lands are influenced by:

- Existing and/or proposed grades along the boundary roads (Mayfield Road, Creditview Road and Chinguacousy Road).
- Preliminary design information for future Hwy. 413.
- NHS boundaries and buffer limits. Refer to **Drawing 2.0** for details.
- Downstream stormwater outlet invert elevations which determine the elevation of future SWM facilities' normal water levels and, ultimately, storm sewer depth and serviceable drainage areas.

The site grading plan is shown in **Drawing 2.1A** to **Drawing 2.1F**. Development of site grading has taken into consideration the following requirements and constraints:

- Conformance to the Town's grading criteria.
- Minimize cut and fill operations and work towards a balanced site.
- Match existing boundary grading condition, where feasible.
- Match existing grades at woodland and wetland features and their buffers, where possible. Transition grading has been proposed within buffers in some areas (only where necessary) in order to avoid the use of retaining walls on private properties.
- Maintain subwatershed drainage boundaries, where possible.
- Provide suitable cover on proposed servicing.
- Provide overland flow conveyance for major storm conditions.

The majority of the Tertiary Plan lands slope from the north to the south in existing conditions, towards either the Alloa Municipal Drain or towards existing culverts across Mayfield Road. There are some areas south of the Alloa Municipal Drain, within the Etobicoke Creek watershed, which drain from south to north, towards the watercourse. The proposed development grading is generally consistent with the pre-development drainage pattern, and it is based on an overall SWM strategy that includes maximizing the lands that can drain by gravity to the proposed SWM facilities, while avoiding excessive sewer sizes and pipe conflicts.

Proposed local internal road grades vary between the Town's minimum accepted slope of 0.50% and do not exceed 5%. Sawtooth grading may be introduced to maximize overland flow drainage to SWM Ponds, minimize 100-year flow capture in the storm sewer and/or manage site earthworks. Sawtooth road grading will conform to the Town's minimum 0.50% road grade; however, the net grade over an extended length of road is reduced by introducing sections of road reversed grade at 0.50%. The net slope in these areas will not be less than 0.25% and will accommodate major system

flow conveyance. Proposed grading for the Subject Lands, including road grades and overland flow routes are illustrated on **Drawing 2.1A** to **Drawing 2.1F**.

## 2.2. CUT / FILL ANALYSIS

A preliminary cut/fill analysis has been carried out for the Tertiary Plan area. Refer to **Drawing 2.2** which shows areas of cut and areas of fill, along with preliminary depths.

Ultimately, site earthworks volumes are driven by development constraints, specifically SWM pond outlet elevations which are tied directly to watercourse limits. The decision to re-align and lower the existing Alloa Drain was made, in part, to provide appropriate gravity outlets for SWM ponds and to manage cut/fill requirements. Even so, it is anticipated that the overall site will require a significant net import (fill) of material for earthworks.

A Soil Management Plan will be established at Detailed Design to optimize the use of on-site soils for cut/fill operations. The goal of the Plan is to achieve a self-sustainable development with respect to excavated material to control the placement of organic soils such that there is negligible impact on the settlement performance of the compacted fill material.

## 2.3. BOUNDARY ROAD GRADES

Existing boundary roads are within the jurisdiction of either the Town of Caledon (i.e., Chinguacousy Road, Creditview Road) or the Region of Peel (Mayfield Road).

The Town and the Region have road widening projects either planned or on-going for all boundary roads associated with the Tertiary Plan Area. Ultimately, internal development grades will need to be compatible with the approved vertical alignment of the boundary road conditions after road urbanization projects are completed by the Region and the Town. For the purposes of this study, the following has been assumed:

- Mayfield Road – detailed design for Mayfield Road widening has been finalized by Peel Region. Region staff have provided detailed design drawings to the Tertiary Plan study team. The grading plan shown in **Drawing 2.1E** and **Drawing 2.1F** captures the design of Mayfield Road, as provided by Peel.
- Chinguacousy Road – the Town of Caledon is in the process of awarding the contract for detailed design for urbanization of Chinguacousy Road. The Town has provided road design drawings as contemplated through the Municipal Class Environmental Assessment (MCEA) Study. Proposed preliminary plan and profiles for Chinguacousy Road can be found on **Drawing 7.2A**. The grading plan shown in **Drawing 2.1B**, **Drawing 2.1D** and **Drawing 2.1F** reflects the most current EA design.
- A future widening project is planned for Creditview Road. The MCEA Study has not been completed to-date. For the purposes of this study, preliminary road grades have been identified for the Creditview road corridor to ensure they are compatible with development and can be serviced by proposed storm infrastructure. Further coordination with the Town will be required as work proceeds. Proposed preliminary plan and profiles for Creditview Road can be found on

**Drawing 7.2B** and **Drawing 7.2C**. Grading for Creditview Road is shown in **Drawing 2.1A**, **Drawing 2.1C** and **Drawing 2.1E**.

Also refer to **Section 7** for additional information on the Tertiary Plan roads.

#### **2.4. HIGHWAY 413**

The Tertiary Plan Area is bounded on the north side by the future planned Highway 413 (see **Figure 1.2**). As development planning for Alloa proceeds, coordination of Alloa land use with MTO requirements (e.g., Stormwater Management Ponds, Transitway Stations, interchanges, etc.) is required.

As part of the initial site grading plan, Urbantech has reviewed the preliminary Highway 413 grading, dated October 2024 and the January 2025 TRCA drainage report by MTO with respect to grading and drainage implications as they relate to the Alloa Development Plan. The following assumptions per the preliminary MTO design have been considered for the Tertiary Plan:

- Existing boundary roads (Creditview and Chinguacousy) will be reconstructed as flyovers in conjunction with Highway 413 construction.
- Location of proposed Hwy 413 crossings (bridges and culverts) is reflected in the Alloa Grading plan in **Drawing 2.1A** and **Drawing 2.1B** for external drainage conveyance through Alloa.

Recognizing that MTO's design work remains on-going, the grading concept proposed is preliminary and will need to be reviewed as development proceeds. It is noted that MTO remains open to consider changes to the preliminary Hwy. 413 SWM pond footprints through future design work based on the Alloa development input.

### 3 STORMWATER MANAGEMENT STRATEGY

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#### 3.1. BACKGROUND

The Alloo Secondary Plan Scoped Servicing Study (Urbantech, 2026), done in support of the Local Subwatershed Study submission provides guidance for the management of stormwater under post-development land use conditions. The guidelines established in the Local SWS form the foundation for the integrated stormwater management strategy proposed for the Phase 1 Tertiary Plan area.

#### 3.2. EXISTING CONDITIONS

Existing (pre-development) overland flow is split between the Fletcher's Creek and Etobicoke Creek subwatersheds (see **Figure 1.1**). The north portion of the site drains to the Alloo Municipal Drain, which discharges to Etobicoke Creek east of Chinguacousy Road. Municipal drains, while naturalized, are man-made municipal infrastructure constructed to improve drainage and reduce flooding of agricultural lands. The Alloo Municipal Drain is currently owned and maintained by the municipality. The future requirements and ownership of the municipal drain will be discussed with the Town of Caledon as work proceeds.

The south portion of the site drains to Mayfield Road. Adjacent to the site, Mayfield Road consists of a rural road right-of-way, which drains via existing roadside ditches and culverts to a storm sewer system in the neighbourhood to the south. This sewer network ultimately outlets to Fletcher's Creek.

A large portion of the site currently has tile drains. For the most part, the tile drain system directs flow to the Alloo Municipal Drain.

Pre-development drainage catchments, overland flow direction and ultimate discharge locations are shown in **Drawing 3.2A**.

TRCA updated the 2013 Etobicoke Creek Hydrology model in 2022 and provided the calibrated Visual OTTHYMO model for the study area to the Alloo study team (Urbantech Consulting) in 2024. This model forms the basis of the Tertiary Plan hydrologic analysis, including flow estimation, continuous modelling, and water balance assessments for the north portion of the site draining to Etobicoke Creek. This model uses the 2-year to 100-year 12-hour AES storm distribution (AMC II conditions), as well as the final 12 hours of Hurricane Hazel for the Regional event (AMC III conditions).

As discussed through the Local Subwatershed Study (Crozier, 2026) review process, calibration of the hydrologic model was requested, but deferred until sufficient monitoring data was acquired. In lieu of calibration, the Local Subwatershed Study and accompanying Scoped Servicing Study (Urbantech, 2026) included a sensitivity analysis to provide upper and lower bounds to the continuous modelling used for erosion analysis, wetland water balance, and overall site water balance. Urbantech and the landowners group agreed to re-visit calibration through later studies. Progress on the calibration is included in **Appendix C5** and Urbantech and TRCA staff agreed that additional data is required to complete the calibration work. Until such time, the conservative results

of the sensitivity analysis are proposed for erosion analysis and wetland water balance as described in the sensitivity analysis memo (**Appendix C5**).

### **3.3. STORMWATER MANAGEMENT DESIGN CRITERIA**

The stormwater management requirements for the Tertiary Plan Area are based on the criteria as specified in the Etobicoke Creek Hydrology Update (April 2013), the Subwatershed Study for the Huttonville and Fletcher's Creeks (June 2011) and the Heritage Heights Subwatershed Study Phase 2 Report (March 2022). The Scoped Subwatershed Study for the Settlement Area Boundary Expansion in the Region of Peel (January 2022) was also referenced to confirm that SWM criteria proposed in this report align with the SABE study.

The following sections outline the specific SWM criteria for the various outlets from the subject area to Etobicoke Creek, Huttonville Creek and Fletchers Creek, as per the applicable studies.

#### *3.3.1. Quality Control Requirements*

Etobicoke Creek and Fletcher's Creek require Enhanced (Level 1) Quality Control for the removal of 80% Total Suspended Solids (TSS), based on the MOE (2003) SWMF & Design Guidelines. This is required for the Subject Lands through the implementation of end-of-pipe SWM facilities and/or LID measures (also see **Section 3.6.2**).

#### *3.3.2. Erosion Control Requirements*

#### **Settlement Area Boundary Expansion**

The SABE Scoped Subwatershed Study provided recommended ranges of unit volumes for Extended Detention erosion control for Fletcher's Creek and Etobicoke Creek. The erosion control recommendations from the SABE study are summarized in **Table 3.1** below.

**Table 3.1: Erosion Criteria, Unit Volumes (SABE)**

	Unit Volume (Ranges) (m <sup>3</sup> /impervious ha)	
	Fletcher's Creek	Etobicoke Creek
Extended Detention	250	325

A summary of the erosion control recommendations from the SABE Scoped Subwatershed Study is provided in **Appendix G**. The SABE report targets have been further confirmed / refined based on the studies completed for the respective watersheds including the Mayfield West Comprehensive EIS, the Huttonville-Fletchers Subwatershed Study, the Block 51-1 / East Huttonville Creek EIR/FSR and the Block 51-2 / Fletchers Creek EIR/FSR studies.

### **Etobicoke Creek**

Erosion targets for Etobicoke Creek were established in the Mayfield West Comprehensive Environmental Impact Study and Management Plan (December 2014). As per the Mayfield West EIS, the erosion unitary target flow to be applied to the Tertiary Plan within the Etobicoke Creek subwatershed is 0.00031 m<sup>3</sup>/s/ha, and the target unitary storage for erosion control is 325 m<sup>3</sup>/impervious ha.

The exceedance of the downstream erosion thresholds in Etobicoke Creek was evaluated under pre- and post-development conditions, as discussed further in **Section 3.5.9**. This analysis was completed in order to confirm that in applying the erosion control targets for the subject area, erosive impacts are not increased downstream in Etobicoke Creek, as a result of the Alloa development.

### **Fletchers Creek**

As per the Subwatershed Study for the Huttonville and Fletcher’s Creeks (June 2011), the Tertiary Plan outlets to Flow Nodes F2 and F3 of Fletcher’s Creek. **Table 3.2** below summarizes the unit target rate and unit target volume for the required erosion control for the portion of the subject site draining to Fletcher’s Creek, as per the HFSWS.

It should be noted that the erosion threshold for Fletcher’s Creek was subsequently updated and further refined, based on discussions with CVC as part of the Mount Pleasant Sub-Area 51-1 and 51-2 EIR-FSR (August 2016). The agreed-upon erosion target unit flow rate for Fletcher’s Creek was revised to 0.00041 m<sup>3</sup>/s/ha. The updated unit flow rate for erosion control is to be applied to the Tertiary Plan area discharging Fletcher’s Creek.

**Table 3.2: Erosion Control Criteria (Fletcher’s Creek)**

Subwatershed	Unit Flow Rates (m <sup>3</sup> /s/ha)	Unit Volume (m <sup>3</sup> /impervious ha)
Fletcher’s Creek	0.00025 (HFWS – superseded) 0.00041 (EIR/FSS – approved)	250

The proposed SWM plan for the Tertiary Plan area will be designed according to the erosion control criteria outlined in the subwatershed studies for Etobicoke Creek and Fletcher’s Creek (as discussed above).

#### *3.3.3. Quantity Control Requirements*

### **Settlement Area Boundary Expansion**

The Settlement Area Boundary Expansion (SABE) Scoped Subwatershed Study provided recommended ranges of unit volumes for 100-year and Regional level quantity control for Fletcher’s Creek and Etobicoke Creek. The quantity control recommendations from the SABE study are summarized in **Table 3.3** below.

**Table 3.3: Quantity Control Criteria, Unit Volumes (SABE)**

Design Storm	Unit Flow Rates (Ranges) (m <sup>3</sup> /impervious ha)	
	Fletcher's Creek	Etobicoke Creek
100-Year Storm	600 - 1250	400 – 1250
Regional Storm	0 - 1225	0 - 1200

The SABE report targets have been further confirmed / refined based on the studies completed for the respective watersheds including the Mayfield West Comprehensive EIS, the Huttonville-Fletchers Subwatershed Study, the Block 51-1 / East Huttonville Creek EIR/FSR and the Block 51-2 / Fletchers Creek EIR/FSR studies as described below.

### **Etobicoke Creek**

As per the Etobicoke Creek Hydrology Update (MMM Group, April 2013), the subject area falls within the Etobicoke Creek Headwater (Basin 1) and contributes drainage to flow nodes A, B and D, as per Figure J-1 of the hydrology study. The 12-hour AES storm distribution was used for the Etobicoke Creek hydrology model to assess the 2 to 100-year peak flows under existing and future conditions. The last 12 hours of the Regional storm (Hurricane Hazel) was also simulated with AMC III conditions. Based on this assessment, target unit flow rates were determined for each catchment within Basin 1 of the Etobicoke subwatershed. These unit target rates reflect controlling post-development flows to 60% of existing flows, which was the criteria identified for the Etobicoke Creek headwater basins to ensure mitigation of downstream flow increases.

As there are several catchments within Basin 1, each with specific unit target flow rates, catchment 89 was selected as the basis for the quantity control criteria for the 2 to 100-year storms for the portion of the subject Alloa area within the Etobicoke Creek subwatershed, as this catchment has the most conservative unit flow rates. Similarly, the unit flow rate for catchment 85 was selected for the Regional storm, as it was the most conservative. **Table 3.4** below summarizes the unit target rates for the required quantity control for the portion of the subject site draining to Etobicoke Creek Basin 1.

**Table 3.4: Selected Quantity Control Criteria, Unit Flow Rates (Etobicoke Creek, Basin 1)**

Design Storm	Unit Flow Rates (m <sup>3</sup> /s/ha)
2-Year Storm	0.00272
5-Year Storm	0.00483
10-Year Storm	0.00648
25-Year Storm	0.00877
50-Year Storm	0.01059

Design Storm	Unit Flow Rates (m <sup>3</sup> /s/ha)
100-Year Storm	0.01255
Regional Storm	0.05155

In addition to the required storage to control the Tertiary Plan area within the Etobicoke Creek subwatershed to the unit flow rate for the Regional storm event, an additional unit storage of 214 m<sup>3</sup>/ha is required for Regional controls to account for the first 36 hours of the Regional event preceding the peak during the last 12 hours.

A summary of the Basin 1 quantity control requirements and unit flow rates from the Etobicoke Creek Hydrology Update is provided in **Appendix G**.

### **Fletcher's Creek**

As per the Subwatershed Study for the Huttonville and Fletcher's Creeks (June 2011), the subject area contributes drainage to flow nodes F2 and F3, as per Figure 3G of the subwatershed study. **Table 3.5** and **Table 3.6** below summarizes the unit target rates for the required quantity control for the portion of the subject site draining to Fletcher's Creek.

**Table 3.5: Quantity Control Criteria, Unit Flow Rates (Fletcher's Creek)**

Design Storm	Unit Flow Rates <sup>1</sup> (m <sup>3</sup> /s/ha)	
	Flow Node F2	Flow Node F3
25-Year Storm	0.0083	0.0083
100-Year Storm	0.0250	0.0260
Regional Storm	N/A	

<sup>1</sup> While only the 25-year and 100-year targets were provided in the HFSWS, the other storms targets have historically been determined through interpolation and subsequently confirmed through model verification. No targets for the regional storm were provided in the HFSWS; only the model verification determined if the provided storage and flow control adequately mitigated the post-development flow increase.

**Table 3.6: Quantity Control Criteria, Unit Volumes (Fletcher's Creek)**

Design Storm	Unit Flow Rates <sup>1</sup> (m <sup>3</sup> /impervious ha)	
	Flow Node F2	Flow Node F3
25-Year Storm	500	700
100-Year Storm	850	900
Regional Storm	446	Not required

<sup>1</sup> While only the 25-year and 100-year targets were provided in the HFSWS, the other storms targets have historically been determined through interpolation and subsequently confirmed through model verification.

A summary of the quantity control requirements from the Subwatershed Study for the Huttonville and Fletcher's Creeks is provided in **Appendix G**.

The proposed SWM plan for the subject Tertiary Plan area will be designed according to the quantity control criteria outlined for Etobicoke Creek and Fletcher's Creek (, and ). The proposed SWM design, based on the subwatershed studies for Etobicoke Creek and Fletcher's Creek will then be verified against the recommended ranges for quantity control volumes in the SABE Scoped Subwatershed Study.

#### 3.3.4. Consolidated Linear Infrastructure ECA Requirements

The proposed SWM strategy also aims to satisfy the Town of Caledon's Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) SWM Criteria, summarized as follows:

##### **Water Quality Control:**

Control the 90<sup>th</sup> percentile storm event and if conventional methods (end-of-pipe facilities e.g. ponds) are necessary, then the 80% total suspended solids (TSS) removal to achieve an Enhanced level of protection.

Quality control is in the following hierarchical order, with each step exhausted before proceeding to the next: 1) retention (infiltration, reuse or evapotranspiration), 2) LID filtration, and 3) conventional stormwater management.

##### **Water Balance:**

Control the annual post-development recharge to meet pre-development recharge. The infiltration deficit must be met through infiltration measures only.

#### 3.3.5. Thermal Mitigation Requirements

Thermal mitigation practices are recommended in the Subwatershed Study for Fletcher's Creek and in the SABE Scoped Subwatershed Study. Thermal mitigation can be achieved by implementing effective stormwater management facility measures (shading, orientation, outlet design, floating islands, etc.), including LIDs. The target SWM facility discharge temperature for thermal mitigation is 24°C (per CVC study "Thermal Impacts of Urbanization including Preventative and Mitigation

19

*Techniques*" (draft, December 2010)). Thermal mitigation options will be further refined through Draft Plans and detailed design.

### **3.4. PROPOSED STORMWATER MANAGEMENT PLAN**

The stormwater management plan proposed in support of the Phase 1 Tertiary Plan is designed to satisfy the required SWM criteria, as outlined in **Section 3.3**. Stormwater management, including quantity, quality and erosion control, will be provided for the Tertiary Plan area by several SWM pond facilities, on-site controls and LID measures.

As per **Drawing 3.4A**, the preliminary storm servicing plan identifies seven (7) proposed SWM pond facilities to achieve the SWM requirements for the proposed neighbourhood/residential areas. Two (2) of the SWM pond facilities are located in the Fletcher's Creek subwatershed, which will be designed to meet the SWM criteria from the HFSWS. Five (5) of the SWM pond facilities are located in the Etobicoke Creek subwatershed, which will be designed to meet the SWM criteria as per the Etobicoke Creek Hydrology Update and Mayfield West EIS. The proposed SWM pond locations have been selected based on the following criteria:

- To make use of existing / natural low points in terrain to minimize earthworks/cut and fill operations and maintain existing drainage patterns as much as possible.
- To maintain a permanent pool and drain into the receiving watercourse.
- To maintain flow input locations along the receiving watercourse.
- To minimize storm sewer infrastructure size.
- To efficiently use land and maximize serviceable area.

**Drawing 3.4A** also shows mixed use and medium-high rise development planned along the southeast boundary (adjacent to Chinguacousy Road between Mayfield Road and Tim Manley Avenue) that will be controlled by private on-site SWM facilities, discharging to a new clean water pipe running on Chinguacousy Road from north of Street A to Mayfield Road. Additional clean water collected from residential roofs and foundations (located adjacent to Chinguacousy Road) will also be directed to the clean water pipe. The clean water pipe will connect to an existing storm sewer on Mayfield Road which runs east to an existing culvert. The approved drainage plans for both the Mayfield West Phase 2 and Mount Pleasant Block 51-2 lands included provision for drainage from this area of Phase 1 Alloa to the clean water pipe on Mayfield Road.

As shown in **Drawing 3.4A**, there are several areas which are to be controlled by private on-site SWM facilities. These areas include commercial / medium-high density blocks, as well as residential areas where these catchments could not be accommodated by the proposed SWM ponds due to grading constraints.

Several of the medium-high density blocks in the southeast corner of the subject lands discharge to a clean water pipe on Chinguacousy Road.

### 3.4.1. Minor System

As per Town design standards and IDF parameters, the minor system is designed to accommodate the 10-year storm event flows. Flows that are greater than the 10-year storm event will be conveyed overland to the stormwater management facilities. The invert elevations of storm sewers at the inlet to SWM ponds are established such that the storm sewer system is not surcharged during a 10-year storm event, taking into consideration the extended detention elevation in the SWM pond for the 10-year storm. This will be confirmed during detailed design through a hydraulic grade line analysis. The minor system network is illustrated on **Drawing 3.4B**. Storm sewer design sheets are provided in **Appendix B1** and **Appendix B2**.

### 3.4.2. Major System

The major storm system will use the internal road network, designed with sufficient capacity to allow excess flows up to the 100-year design storm to be conveyed via overland flow within the proposed ROW limits. This will be confirmed at detailed design via an overland flow analysis, when final grading and servicing plans are available. The major system flow pathways and directions are shown on **Drawing 3.4B**.

Ultimate storm outlets across boundary roads will be coordinated with coincident road widening projects by the Region of Peel and Town of Caledon (e.g., Mayfield Road and Chinguacousy Road improvement projects).

## 3.5. SWM POND DESIGN

### 3.5.1. Imperviousness

The Subwatershed Studies provide recommendations for SWM end-of-pipe facility sizing based on a required storage per impervious hectare and a release rate per hectare. As such, to establish the preliminary pond design, the imperviousness of the contributing drainage areas to each proposed SWM facility was required. The imperviousness is utilized to calculate the permanent pool and target storage volumes for each SWM facility.

The catchment imperviousness values for each drainage area were determined based on the land use composition of each catchment. The proposed unit types and land use distribution within each catchment were determined from the Land Use Plan, as per **Figure 1.4**. A total imperviousness was assumed for each land use type based on the ratio of impervious surface (roofs, pavement, etc.) to total catchment area. The land use imperviousness values are summarized in **Table 3.7**.

**Table 3.7: Percent Imperviousness by Land Use**

Land Use Type	Percent Imperviousness
Single Detached Homes	57
Townhomes	80
Medium-High Density Residential	80

Land Use Type	Percent Imperviousness
Mixed-Use	100
Commercial	100
Elementary Schools	79
Neighbourhood Parks	10
Open Space	0
Natural Heritage System	0
SWM Ponds	100
Greenbelt Plan Area	0
Pumping Station / Reservoir	50
Special Policy Area	100
Road ROW	90

The catchment areas to the proposed SWM ponds and overall weighted imperviousness values are summarized in **Table 3.8**. Also refer to **Drawing 3.4A** for all drainage areas and associated imperviousness values.

**Table 3.8: Pond Catchment Areas and Imperviousness**

Catchment	Total Area (ha)	Impervious Area (ha)	Imperviousness (%)
SWM Pond 1	60.14	44.61	74.2
SWM Pond 2	34.72	28.50	82.1
SWM Pond 3	15.43	12.29	79.6
SWM Pond 4	28.77	21.18	73.6
SWM Pond 5	35.27	26.79	76.0
SWM Pond 6	49.96	36.60	73.3
SWM Pond 7	20.40	12.34	60.5

### 3.5.2. SWM Pond Design

The proposed SWM ponds are designed as wet pond facilities incorporating a wet forebay and subsequent wet cell. Flow between the forebay and wet cell is routed via a submerged weir. The proposed SWM ponds are able to meet or exceed all the SWM pond criteria provided in the previous sections. SWM pond configuration and design has respected the guidelines as set out by the Ontario Ministry of the Environment's (MOE) Stormwater Management Planning and Design Manual (March 2003).

The preliminary designs of the SWM ponds include:

- The side slopes within the ponds are 4:1 from the bottom of the permanent pool to 0.5 m below the normal water level, and from 0.5 m above the normal water level to the top of pond. 7:1 slopes are provided from 0.5 m below the normal water level to 0.5 m above the normal water level.
- The side slopes on the outside of the pond are 4:1 and were graded to match the proposed grades at the pond block boundaries.
- Grades around pond blocks are set to match the proposed development grades.
- The access roads are currently located around the SWM facility at the free board elevation and extend to reach the headwalls, outlet structures and sediment drying areas.
- The width of the access road is 5.0 m. The purpose of the access road is to provide a suitable road for machinery at the time of maintenance to reach the outlet/inlet structures and the bottom of the sediment forebays in order to be properly cleaned.
- A 0.3 m freeboard is established above the active storage water level.
- Invert elevations of inlet pipes in the SWM facilities were assumed at the permanent pool elevation.
- The pond outlets discharge to the nearest watercourse. Ponds located adjacent to Mayfield Road are proposed to discharge to the culverts that are proposed to be constructed by the Region.
- Further detailed design will be completed in accordance with the Town of Caledon and the Ontario Ministry of Environment (MOE) Design Criteria. Refinements will be made to the inlet and outlet structures, access roads and emergency overflow spillways.
- Overall minimum facility length-to-width ratio of 3:1.
- Minimum forebay length-to-width ratio of 2:1.
- Maximum permanent pool depth of 3 m.
- Maximum active storage depth of 3.2 m.

All reasonable assumptions have been made based on standard current engineering practice. Outfall configurations have only preliminarily been sited and will require further site investigation and design considerations.

The preliminary designs of the SWM ponds have been completed to establish the required size of each of the SWM blocks to ensure sufficient lands are provided. The initial drafting process of the SWM ponds was iterative and attempted to optimize use of the SWM blocks and minimize impacts to the surrounding lands.

### 3.5.3. SWM Pond Stage-Storage-Discharge Characteristics

**Section 3.3** provides the storage volume and flow targets for the 2 to 100-year and Regional storm events, based on the SWM criteria from the Subwatershed Studies. The proposed Tertiary Plan

23

SWM facilities were designed based on the conventional storage volume (not accounting for LID measure storages) and flow targets as described in **Section 3.3.3**.

The permanent pools for the proposed SWM facilities were sized according to Table 3.2 in the MOE's Stormwater Planning and Design Manual (2003), as discussed in **Section 3.3.1**. The quality control sizing calculations for the proposed SWM facility are provided in **Appendix C3**.

The preliminary stage-storage-discharge curves based on the proposed grading, as well as storage and release rate requirements, were developed for the proposed SWM facilities, as summarized in **Table 3.9** to **Table 3.15** below.

**Table 3.9: SWM Pond 1 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	11,429	38,107	255.00	N/A
Extended Detention	11,156	11,285	255.50	0.025
25-Year	22,312	22,760	255.95	0.499
100-Year	37,930	38,978	256.55	1.504
Regional	57,833	59,255	257.25	N/A
Max. High Water Level	N/A	63,794	257.40	N/A

**Table 3.10: SWM Pond 2 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	7,208	24,505	256.15	N/A
Extended Detention	7,126	7,764	256.65	0.014
25-Year	14,253	14,934	257.05	0.288
100-Year	24,229	24,416	257.55	0.868
Regional	36,943	37,628	258.20	N/A
Max. High Water Level	N/A	55,309	259.00	N/A

**Table 3.11: SWM Pond 3 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	3,118	5,021	257.85	N/A
Extended Detention	3,992	4,313	258.35	0.005
2-Year	4,738	4,805	258.40	0.042
5-Year	5,916	6,306	258.55	0.075
10-Year	6,720	6,815	258.60	0.100
25-Year	7,736	7,845	258.70	0.135
50-Year	8,498	8,892	258.80	0.163
100-Year	9,238	9,421	258.85	0.194
Regional	24,659	24,745	260.15	0.795
Max. High Water Level	N/A	26,051	260.25	N/A

**Table 3.12: SWM Pond 4 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	5,429	11,398	258.50	N/A
Extended Detention	6,882	7,512	258.95	0.009
2-Year	8,344	8,429	259.00	0.078
5-Year	10,483	11,222	259.15	0.139
10-Year	11,937	12,164	259.20	0.186
25-Year	13,782	14,066	259.30	0.252
50-Year	15,153	15,991	259.40	0.305
100-Year	16,511	16,963	259.45	0.361
Regional	45,161	45,432	260.80	1.483
Max. High Water Level	N/A	54,721	261.20	N/A

**Table 3.13: SWM Pond 5 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	6,844	12,906	257.85	N/A
Extended Detention	8,712	9,742	258.35	0.011
2-Year	10,434	10,828	258.40	0.096
5-Year	13,074	14,126	258.55	0.170
10-Year	14,854	15,238	258.60	0.229
25-Year	17,126	17,481	258.70	0.309
50-Year	18,811	19,749	258.80	0.374
100-Year	20,481	20,892	258.85	0.443
Regional	55,672	56,870	260.30	1.818
Max. High Water Level	N/A	70,569	260.80	N/A

**Table 3.14: SWM Pond 6 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	9,395	13,361	258.50	N/A
Extended Detention	11,902	12,873	259.10	0.015
2-Year	14,442	15,273	259.20	0.136
5-Year	18,152	18,924	259.35	0.241
10-Year	20,666	21,391	259.45	0.324
25-Year	23,861	23,885	259.55	0.438
50-Year	26,225	26,405	259.65	0.529
100-Year	28,589	28,953	259.75	0.627
Regional	78,250	79,542	261.55	2.575
Max. High Water Level	N/A	90,456	261.90	N/A

**Table 3.15: SWM Pond 7 Stage-Storage-Discharge Relationship**

Storm Event	Required Volume (m <sup>3</sup> )	Provided Volume (m <sup>3</sup> )	Stage (m)	Target Release Rate (m <sup>3</sup> /s)
Permanent Pool	3,255	7,139	260.25	N/A
Extended Detention	4,011	4,474	260.65	0.006
2-Year	5,102	5,708	260.75	0.055
5-Year	6,474	6,996	260.85	0.099
10-Year	7,428	7,648	260.90	0.132
25-Year	8,641	8,967	261.00	0.179
50-Year	9,548	9,634	261.05	0.216
100-Year	10,449	10,984	261.15	0.256
Regional	30,737	31,307	262.50	1.052
Max. High Water Level	N/A	48,069	263.45	N/A

The stage-storage-discharge data above is subject to change based on the detailed outlet structure design for the proposed SWM pond facilities. However, the target storage volumes and discharge rates will be maintained, unless the proposed drainage areas are revised at detailed design.

The grading details and cross sections of the proposed SWM facilities are illustrated on **Drawing 3.5A** to **Drawing 3.5G**.

#### 3.5.4. Drawdown Time

Preliminary orifice sizing was completed for the drawdown of the extended detention volume in each of the proposed SWM ponds. The extended detention orifice controls were sized based on the erosion target release rates, as per **Section 3.3.2** and **Tables 3.9** to **3.15** above. A minimum orifice size of 75 mm was applied.

**Table 3.16: Extended Detention Orifice Sizing**

SWM Pond	Extended Detention Volume (m <sup>3</sup> )	Extended Detention Release Rate (m <sup>3</sup> /s)	Orifice Size (mm)
SWM Pond 1	11,285	0.025	135
SWM Pond 2	7,764	0.014	100
SWM Pond 3	4,313	0.008	75
SWM Pond 4	7,512	0.009	80
SWM Pond 5	9,742	0.011	90

SWM Pond	Extended Detention Volume (m <sup>3</sup> )	Extended Detention Release Rate (m <sup>3</sup> /s)	Orifice Size (mm)
SWM Pond 6	12,873	0.015	100
SWM Pond 7	4,474	0.007	75

As per the drawdown time calculations provided in **Appendix C2**, the drawdown time for the proposed ponds ranges from 8.5 days to 17.4 days. Although this duration extends beyond the minimum 48 hours, it should be noted that this is consistent with other SWM facilities in the Fletcher's Creek and Etobicoke Creek subwatersheds and is due to the low erosion control targets. Typically, approximately 50% of the extended detention volume drains within the first several days.

### 3.5.5. On-site Controls Stage-Storage-Discharge Characteristics

As shown on **Drawing 3.4A**, there are several areas which are to be controlled by private on-site SWM facilities. These areas include commercial / medium-high density blocks, as well as residential areas where these catchments could not be accommodated by the proposed SWM ponds due to grading constraints.

The catchment areas to the proposed SWM ponds and overall weighted imperviousness values are summarized in **Table 3.17**. Also refer to **Drawing 3.4A** for all drainage areas and associated imperviousness values.

**Table 3.17: On-Site Catchment Areas and Imperviousness**

Catchment	Subwatershed	Total Area (ha)	Impervious Area (ha)	Imperviousness (%)
Chinguacousy Road Clean Water Pipe (Private Storages 1)	Fletcher's Creek (Node F3)	1.66	1.33	80
Chinguacousy Road Clean Water Pipe (Private Storages 2)	Fletcher's Creek (Node F3)	4.41	3.53	80
Chinguacousy Road Clean Water Pipe (Private Storages 3)	Fletcher's Creek (Node F3)	4.96	4.96	100
Creditview Road Storm Sewer (Private Storage 4)	Fletcher's Creek (Node F2)	9.57	9.57	100
Robert Parkinson Drive Storm Sewer (Private Storage 5)	Fletcher's Creek (Node F2)	2.99	2.99	100
Alloa Drain (Private Storage 6)	Etobicoke Creek	0.71	0.71	100

28

Catchment	Subwatershed	Total Area (ha)	Impervious Area (ha)	Imperviousness (%)
Alloa Drain (Private Storage 7)	Etobicoke Creek	3.46	2.94	85

The Town of Caledon Development Standards provides a comprehensive list of available stormwater management techniques. Specifically, for commercial blocks, available on-site controls include rooftop storage, parking lot storage, underground storage or a combination of the above. Quality control is to be provided by a combination of oil/grit separator (OGS) units, filtration and/or LID measures.

The CVC/TRCA LID Stormwater Management Planning and Design Guide will be referenced to provide further information on the design of these strategies at the detailed design stage.

The storage and release rate requirements for the private on-site SWM facilities were determined based on the SWM criteria for Etobicoke Creek and Fletcher's Creek subwatershed, as discussed in **Section 3.3**. are summarized in **Table 3.18** to **Table 3.24** below.

**Table 3.18: Private Storage 1 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
25-Year	930	0.014
100-Year	1,195	0.043

**Table 3.19: Private Storage 2 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
25-Year	2,470	0.037
100-Year	3,175	0.115

**Table 3.20: Private Storage 3 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
25-Year	3,472	0.041
100-Year	4,464	0.129

**Table 3.21: Private Storage 4 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
25-Year	4,785	0.079
100-Year	8,135	0.239

**Table 3.22: Private Storage 5 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
25-Year	1,495	0.025
100-Year	2,542	0.075

**Table 3.23: Private Storage 6 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
2-Year	249	0.002
5-Year	321	0.003
10-Year	359	0.005
25-Year	412	0.006
50-Year	449	0.008
100-Year	487	0.009

**Table 3.24: Private Storage 7 Volume Requirements & Target Flows**

Storm Event	Required Volume (m <sup>3</sup> )	Target Release Rate (m <sup>3</sup> /s)
2-Year	1,072	0.009
5-Year	1,367	0.017
10-Year	1,560	0.022
25-Year	1,797	0.030
50-Year	1,970	0.037
100-Year	2,143	0.043

It is noted that CVC does not generally support private / on-site Regional SWM controls. However, the Tertiary Plan's employment lands along Mayfield Road preclude large public facilities typically used to meet the Regional volume requirements. Each block must drain to discrete outlets provided

30

on Mayfield Road in order to convey drainage to channels, wetlands and facilities downstream. There is no practical way to consolidate runoff into shared ponds or larger detention areas due to grading constraints, and traditional, public wet-pond blocks are not feasible or practical for these small parcels.

Therefore, the quantity control requirements for each individual private site plan block along Mayfield Road will follow a hierarchy of evaluation:

1. Verify that the existing Mayfield Road sewers / culvert crossings (with no upgrades assumed) can convey the controlled 100-year peak. If it can, the block simply adheres to unit rates for the 2-year to 100-year events, as per the Huttonville Fletcher's Subwatershed Study and the Heritage Heights Subwatershed Study. If not, the allowable release rate must be reduced to match the pipe capacity, and additional on-site storage solutions (e.g., underground tanks, pipe storage, rooftop storage, surface storage, etc.) will be applied to ensure the 100-year peak never exceeds downstream capacity.
2. If outlet capacity is not limited, and where a conventional detention facility remains impractical, it is possible that post-development Regional peak flow is only marginally higher than the pre-development Regional flow. In this case, a "no-impact" analysis should be completed to demonstrate that releasing the uncontrolled Regional flows do not impact downstream water levels / infrastructure beyond acceptable thresholds (to be determined with the CVC). This would involve evaluating the downstream storm sewers, culverts/channels (HEC-RAS analysis) and overall hydrology (Huttonville Fletcher's HSP-F model). This approach was previously accepted by CVC for small areas in which meeting the Regional storage criteria was impractical and absence of the Regional volume had no effect downstream.

The individual requirements for each development block along Mayfield Road will be further refined through detailed design.

### 3.5.6. *Downstream Hydrologic Assessment*

A comparison of downstream flows was completed as part of the overall hydrologic assessment in order to confirm that the proposed SWM controls, including Regional control, will mitigate any increase in peak flows resulting from the subject development. A downstream assessment was completed for both Etobicoke Creek and Fletcher's Creek, as requested by the Town and TRCA. The analysis and results for Downstream Capacity Analysis memos for both Etobicoke Creek and Fletcher's Creek, provided in **Appendix C6** and **Appendix C7**.

As per the results summarized in the Downstream Capacity Analysis memos provided in **Appendix C6** and **Appendix C7**, there are no downstream impacts for either Etobicoke Creek or Fletcher's Creek resulting from the proposed development.

### 3.5.7. *SWM Pond Inlet and Outlet Design*

Inlet and outlet size and locations for each pond are shown on **Drawing 3.5A** to **Drawing 3.5G**. The size of inlet pipes has been minimized where possible; however, box culverts are preferred as they can provide greater conveyance capacity with less pipe depth in locations where cover is limited.

31

The proposed pond inlet structures will be designed according to the Town standards and will discharge into the pond forebay. The forebay will be designed according to the settling and dispersion length equations provided in Section 4.6.2 of the MOE SWM Planning and Design Manual (2003).

The SWM pond facilities will have multiple outlet components, including extended detention, flood flows, emergency spillway and a maintenance drawdown pipe or sump (where applicable). The pond outlet details will be determined at the detailed design stage.

The extended detention pipe will consist of a reverse-slope bottom draw pipe extending from the bottom of the pond to an orifice plate on the control structure. The submerged end of the proposed bottom draw pipe will be fitted with a perforated pipe section of sufficient area of opening and will be protected by a gravel jacket. The orifice plate will be sized to meet the required extended detention flows and required drawdown time under approximately 0.85 m of head (i.e., extended detention level). The orifice plate will also be sized to meet the Region's extended detention criteria for a minimum 48-hour drawdown time. The orifice plate will be bolted onto the outlet structure with the invert set at the permanent pool water level. To prevent potential blockage of the extended detention control by debris, etc., a minimum orifice size of 75 mm is desirable.

A series of orifices or a compound weir knock-out will be designed at the detailed design stage for the pond outlet control structure in order to achieve the quantity control target flows.

The conveyance of emergency flows (i.e., uncontrolled Regional flows) through the SWM pond facilities will be accommodated by emergency outlet structures within the pond set above the Regional pond operating water level, in the event that all outlet structures within the SWM pond are blocked. The emergency conveyance details will be provided at the detailed design stage for the proposed SWM facilities.

If the grading and pond design permit, maintenance sumps or drawdown pipes will be provided to drain the facilities for the purpose of maintenance works. These operations and maintenance structures will also connect to the pond outfall structures.

The proposed outfall headwalls for the pond outlets will be designed to Town Standards.

As shown on **Drawing 3.5A** to **Drawing 3.5G**, plunge pools with rip rap stone are proposed at the downstream ends of the SWM pond outlets in order to provide energy and velocity dissipation of flows from the pond.

### *3.5.8. Pond Naturalization*

The main purpose of stormwater management is to maintain watershed hydrology and protect the ecological health and integrity of downstream waterbodies by providing the flood, erosion and water quality controls necessary to protect downstream ecosystems. In addition to these functions, SWM facilities can complement and support adjacent natural heritage systems and their ecological functions. As this green infrastructure is typically constructed adjacent to valley and creek corridors which form part of natural heritage systems, they can enhance linkage and buffering functions and opportunities to improve the condition quality of adjacent natural features. Many of these functions can be achieved by naturalizing components of the SWM facilities by planting a diversity of locally native trees, shrubs and groundcovers.

The use of native species in naturalization is beneficial to maintaining and enhancing local biodiversity. Often times, adjacent natural heritage systems are in a degraded ecological state and have lost much of their native biodiversity, so providing a source of native seed nearby can help to restore these systems.

Consistent with the *Stormwater Management Facility Planting Guidelines* (CVC 2003) and *Thermal Impacts of Urbanization including Preventative and Mitigation Techniques* (CVC 2011), it is recommended that locally native tree, shrub and groundcover species be utilized for landscaping the proposed SWM facilities.

The purpose of inlet and outlet plantings is two-fold:

- To provide shading of incoming and outgoing water; and
- To help prevent substrate erosion.

Numerous native trees and shrubs can be utilized for these areas including, trembling aspen, large-toothed aspen, red maple, sugar maple, speckled alder, red-osier and grey dogwood, nannyberry, and numerous native species of willow.

Landscaping plans for the proposed SWM pond facility will be prepared at detailed design.

The timing of SWM pond landscaping is dependent on timing of development. Plant species that are dependent on the permanent pool elevation will not be installed until it is confirmed that the SWM facility functionally maintains the permanent pool elevations. Further, no planting of any proposed aquatic species in the sediment forebay and/or areas of the permanent pool will be undertaken until after initial cleaning and subsequent assumption.

#### 3.5.9. Downstream Erosion Assessment

In addition to applying the erosion criteria to the proposed SWM facilities, an erosion assessment was undertaken by GeoMorphix in order to evaluate the downstream impacts of the subject development within Etobicoke Creek. The continuous model output from the Visual OTTHYMO model provided by TRCA was used to compare the exceedance of the erosion threshold under both pre- and post-development conditions. As per the Erosion Mitigation Assessment prepared by GeoMorphix (March 2026) provided in **Appendix G2**, it was determined that the proposed SWM plan is effective in mitigating downstream erosion impacts within the receiving watercourse.

#### 3.5.10. Thermal Mitigation Measures

Several thermal mitigation techniques were researched as part of the HFSWS in an effort to develop a prioritized list of measures for implementation within the Huttonville Creek and Fletcher's Creek subwatershed. As a result, a number of mitigation measures were proposed in the HFSWS, including mitigation measures that research suggests will have an impact on reduction of water temperature (where feasible). The recommendations in the HFSWS were used as a guide for thermal mitigation as part of the SWM strategy for the subject lands.

Of specific interest is the CVC study “*Thermal Impacts of Urbanization including Preventative and Mitigation Techniques*” (draft, December 2010), which indicated that an east-west pond orientation can reduce the hours of potential solar radiation, although a north-south orientation is preferable for narrow SWM facilities. Similarly, orienting the long side of the facility perpendicular to the prevailing wind direction (west) can assist in reducing thermal impacts.

The Draft CVC Thermal Impacts report identified five “zones” where thermal mitigation measures can be implemented. These include:

- Zone 1 – Up-gradient (i.e., pond catchment area)
- Zone 2 – SWM facility inlet
- Zone 3 – SWM facility
- Zone 4 – SWM facility outlet
- Zone 5 – Riparian corridor

The HFSWS Phase 3 Report recommended a list of potential thermal mitigation measures which have been reviewed and considered for use in each of the Alloa SWM pond facilities. This list of potential measures, as per the HFSWS, is summarized in .

**Table 3.25: Thermal Mitigation Measures**

SWM Facility Feature	Zone
Energy transfer between warm storm runoff and cool sub-surface storm sewers	Zone 1
LID measures	Zone 1
Roof colour	Zone 1
Downspout disconnection	Zone 1
Up-gradient plantings	Zone 1
Buried inlet pipe	Zone 2
Inlet cooling trench	Zone 2
Inlet plantings	Zone 2
Shading of open water areas by maximizing canopy	Zone 3
Artificial shade systems	Zone 3
Floating island	Zone 3
Reduce open water area	Zone 3
Increased L:W ratio	Zone 3
Pond orientation to reduce solar inputs	Zone 3

SWM Facility Feature	Zone
Pond orientation to increase exposure to prevailing wind	Zone 3
Landscaped jetties for shading	Zone 3
Sub-surface SWM ponds	Zone 3
Outlet sub-surface cooling trench and shading	Zone 4
Concrete outlet pipe	Zone 4
Introduce cool water at SWM pond outlets such as foundation drain collectors (FDC), where feasible and/or a Thermal Siphon	Zone 4
Reversed slope submerged pond outlet and extra permanent pool depth at outlet	Zone 4
Distributed outlets along the NHS to take advantage of the NHS shading	Zone 4

A summary table of the recommended thermal mitigation measures for each pond is provided in **Appendix C4**.

### **3.6. SITE WATER BALANCE AND LOW IMPACT DEVELOPMENT**

In addition to meeting the quantity, quality, and erosion control targets, the SWM strategy will address water balance requirements for the site and adjacent wetlands. The site water balance aims to mimic pre-development groundwater recharge rates in order to maintain groundwater as a source of flow. Feature-based water balance aims to mimic pre-development wetland hydroperiods to maintain their ecological function.

#### **3.6.1. Site Water Balance**

A site water balance was conducted for the Alloo Secondary Plan as part of the Alloo Secondary Plan Scoped Servicing Study (Urbantech, 2026) in order to determine local pre-development annual infiltration volumes, impacts of proposed development to annual infiltration volumes, and potential mitigation measures to preserve annual groundwater recharge.

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 (i.e., 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. The evaporation component from impervious surfaces is relatively minor compared to the evapotranspiration component that occurs with a healthy vegetation cover. The net effect of the development of a property is expected to be an increase in the water surplus resulting in a decrease in infiltration and an increase in runoff.

It is important to note that the proposed development 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 taking or from septic effluent.

The water balance infiltration targets established for the Secondary Plan were applied to the Tertiary Plan. The site water balance assessment was previously completed for the Alloa Secondary Plan using a continuous hydrologic model, as per Town requirements. For the portion of the site within the Etobicoke Creek subwatershed, the TRCA's approved and calibrated Visual OTTHYMO hydrologic model was used as a basis for the site water balance continuous model.

The continuous model was simulated for the period of 1986 to 2007 using data from the Buttonville Airport weather station, as recommended by TRCA. This data set from Buttonville Airport was used for the sensitivity analysis until such time that sufficient monitoring data is available for model calibration. The selected data set captures a suitable range of wet and dry years, as well as extreme events, for the given period of 1986 to 2007. The results from the site water balance continuous model for the portion of the site within the Etobicoke Creek subwatershed are summarized in **Table 3.26**.

As per the Alloa Secondary Plan Scoped Servicing Study (Urbantech, 2026), the "low runoff" scenario has the most conservative infiltration target with respect to the site-wide water balance.

**Table 3.26: Summary of Continuous Modelling Results – Site Water Balance (Etobicoke Creek)**

Model Results / Targets	Infiltration (mm)
Pre-Development GWI (mm/year)	319
Post-Development GWI (mm/year)	188
GWI Deficit (mm/year)	131
Deficit / Precipitation (%)	16%
Target Retention (mm / impervious ha)	2.0
Mitigation Provided (mm / impervious ha)	7.6

As per **Table 3.26**, the target retention volume to mitigate the annual GWI deficit for the portion of the subject lands within Etobicoke Creek is 2.0 mm / impervious ha. As per the Fluvial Geomorphology Assessment and Conceptual Natural Corridor Designs report (Geo Morphix, 2026) provided in **Appendix G1**, the LID storage within the proposed channel design accommodates an equivalent volume of 7.6 mm over the proposed impervious area within the Tertiary Plan development area (9,248 m<sup>3</sup> / 121 impervious ha = 7.6 mm) .

For the portion of the site within the Fletcher's Creek subwatershed, the unitary infiltration targets from the HFSWS were applied to the subject area, which are based on the modelling that was done for the water balance analysis for Huttonville Creek and Fletcher's creek. These target infiltration volumes for the portion of the subject lands within Fletcher's Creek are summarized in **Table 3.27**.

**Table 3.27: Summary of Infiltration Targets (Fletcher's Creek)**

Land Use Type	LID Infiltration Target (m <sup>3</sup> /ha)	Total Area (ha)	Total Volume (m <sup>3</sup> )
Low Density Residential	10.4	35.91	373
Medium Density Residential	9.6	42.50	408
Commercial	17.3	15.75	272
School	6.4	3.24	21
NHS / Open Space / Park / SWM Pond	0	11.68	0
<b>Total</b>	-	<b>109.08</b>	<b>1,075</b>

As per **Table 3.27**, the target retention volume to achieve the infiltration target for the portion of the subject lands within Fletcher's Creek is 1,075 m<sup>3</sup>.

LID measures for stormwater management for the portion of the subject lands within the Fletcher's Creek subwatershed are recommended, where practical, in order to promote infiltration and mitigate the overall infiltration deficit resulting from post-development conditions, as discussed in **Sections 3.6.2** and **3.6.3**.

### 3.6.2. Low Impact Development Alternatives

While end of pipe facilities provide the minimum required SWM controls, the use of LID (Low Impact Design) stormwater management measures can be helpful to reduce the amount of runoff by increasing on site retention, infiltration, and evapotranspiration. The use of LIDs in a "treatment-train" approach has long been endorsed by the TRCA and CVC.

There are many LID measures available for use. 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 engineered LID measures such as infiltration and/or exfiltration trenches, HDFs, enhanced grass swales, and bioswales can be used to reduce runoff volumes and increase the potential for infiltration. Some examples of possible LIDs that are typical for this type of development include:

**Downspout Disconnection:**

Roof leader discharge to pervious surfaces such as lawns or to LID measures provides a source of clean water that can be infiltrated. This is a low / no maintenance, lot-level control that is typically implemented by default.

**Infiltration Trench:**

These are rectangular trenches lined with geotextile fabric, filled with clean granular stone or void-forming materials. They are suitable for sites with limited space for infiltration, such as narrow strips of land between buildings or properties, or along road rights-of-way. They primarily handle roof and walkway runoff.

**Bioretention:**

This infiltration practice utilizes the natural properties of soil and vegetation to treat runoff from paved areas and remove contaminants. Variations can include the inclusion or exclusion of an underdrain and impermeable liner. Bioretention can help achieve Stormwater Management (SWM) objectives related to water quality, water balance, and erosion control.

**Rain Barrel:**

Water collected in rain barrels can serve as a non-potable source for various purposes like toilet flushing, urinals, and irrigation. Rain barrels can contribute to meeting SWM objectives related to water quality, water balance, and erosion control.

**Soil Cells:**

A modular storage system designed to support the growth of large trees and provide effective stormwater management through processes like absorption, evapotranspiration, and interception.

**Infiltration Chambers:**

Infiltration chambers provide large volume of underground void space, all the while maintaining the necessary structural stability for sub-surface Best Management Practices (BMPs). They consist of a variety of proprietary modular structures that can be installed beneath paved parking lots or landscaped areas. Typically featuring open bottoms, perforated side walls, and optional stone-filled reservoirs below, these chambers are versatile in treating runoff from roofs, walkways, parking lots, and roads, given proper sedimentation pre-treatment measures. Due to their significant storage capacity, this technology is often utilized in areas where little to no space is available for other stormwater BMP solutions.

The following **Section 3.6.3** provides further evaluation of the SWM Best Management Practices (BMPs) mentioned above. The evaluation will consider technical feasibility, cost, maintenance requirements, and operational feasibility. While some LID approaches may be technically feasible, they may ultimately be cost-prohibitive or pose challenges in terms of maintenance and operation, particularly on a scale of this magnitude. Additional geotechnical / hydrogeological studies may be required prior to finalizing and confirming the selection of LID techniques.

### 3.6.3. Low Impact Development – Proposed Location and Size

**Drawing 3.6.3** shows the interpreted depth of groundwater throughout the Tertiary Plan area as well as preliminary preferred locations for LID measures. LID placement is typically best in areas where groundwater is at least 2+ m below proposed grade. As shown on **Drawing 3.6.3**, there are areas in the Tertiary Plan where high groundwater restricts potential locations for LID measures.

The proposed LID plan includes infiltration chamber facilities within park blocks, where feasible. On-site retention is also proposed for commercial blocks, mixed use blocks and school blocks. The proposed high-level LID plan is based on the CLI-ECA recommendations to incorporate public LIDs. Subject to Town approval, if the proposed public LIDs are not feasible due to maintenance constraints, opportunities to incorporate LIDs on private lots (i.e., infiltration trenches) can be investigated.

### 3.6.4. Feature Based Water Balance

As shown in **Drawing 3.2B**, there are four (4) existing wetlands throughout the Tertiary Plan area. A fifth wetland, adjacent to SWM Pond 1 (as shown in **Drawing 3.4A**), has been added in accordance with CVC requirements regarding compensation for previous features removed from the landscape.

To understand the existing hydroperiod and potential hydrological impacts due to the proposed development a feature-based water balance assessment has been completed for Wetland #4 and Wetland #5.

Wetland #7 is recreated within re-aligned watercourses in the Tertiary Plan and are considered 'flow through' features. There is also a re-created wetland feature located adjacent to SWM Pond 1. As such, these wetlands are designed and assessed differently. Information regarding the design of Wetland #7 is available in the Fluvial Geomorphology Assessment and Conceptual Natural Corridor Designs Report (Geo Morphix, 2026), available as **Appendix G1** of this report.

The feature-based analysis establishes the current hydrologic function of each relevant feature and determines if mitigation measures are required to preserve the water balance under post-development conditions. This assessment was done using the Visual OTTHYMO model provided by TRCA (modified as described in the preceding section), run in continuous mode. As previously noted, the Buttonville Airport climate data was used for the continuous hydrology model and simulated for the period of 1986 to 2007 in accordance with TRCA recommendations.

For the purposes of the Tertiary Plan FSR, the average monthly runoff was assessed for each wetland over the given simulation period for pre- and post-development conditions. The three sensitivity analysis scenarios were also included as part of the feature-based water balance assessment. The wetland water balance hydrology model and summary of water balance results are provided in **Appendix D1**. As per the feature-based water balance results provided, sufficient runoff volume to the existing wetlands is maintained under post-development conditions for all three of the sensitivity analysis scenarios.

The continuous model generates monthly runoff volumes for the feature-based water balance analysis for each wetland. Where available, detailed survey and water level monitoring in the wetland areas are used to simulate the wetland area as a reservoir and identify the changes in water levels.

The purpose of the surface water feature-based water balance completed for the subject wetlands within the Tertiary Plan area was to confirm that sufficient runoff is provided to each wetland, such that pre-development runoff conditions are maintained as a minimum. As part of the detailed FBWB during future studies, it will be confirmed that the ponding depth in each wetland is sufficient for ecological function, where, if required, any excess of runoff under post-development conditions will be mitigated through a refinement of the wetland catchment areas, while maintaining a suitable ponding depth.

Detailed for each wetland are discussed in the following sections.

#### **Wetland #4: Feature Based Water Balance Results**

Under pre-development conditions, an existing catchment of 9.88 ha is conveyed to Wetland #4, as shown on **Drawing 3.2B**. The existing drainage catchment consists primarily of woodlot and agricultural land.

Under post-development conditions, a proposed catchment of 9.31 ha is conveyed to Wetland #4, as shown on **Drawing 3.6.4**. The proposed drainage catchment consists primarily of woodlot (8.48 ha) and 0.83 ha of rear-lot drainage from the adjacent residential lands.

A continuous model of the drainage to Wetland #4 under pre- and post-development conditions was used to assess the impacts to water levels and storage depths within the subject wetland. The hydrology of the wetland catchments was simulated using the TRCA's approved Visual OTTHYMO model for Etobicoke Creek.

Wetland function in terms of water level/depth was assessed at a high level where a PCSWMM model was used to simulate the hydraulics within Wetland #4. The storage curve for Wetland #4 was developed using a LiDAR surface was acquired from the Natural Resources Canada (NRC) High Resolution Digital Elevation Model (October 2023). A QGIS Volume Calculator tool was used to generate depth-area curves for each wetland based on the aforementioned LiDAR data. The LiDAR data was also used to generate the cross-sectional geometry and slope profiles for the wetland outlet. Subsequently, FlowMaster v8i was utilized to develop the stage-discharge curve. A Manning's roughness coefficient of 0.05 was applied, reflecting an unmaintained channel with brush.

As per the model output results provided with the sensitivity analysis in **Appendix D1** it was observed that there is minimal change to the water level in the wetland in comparing pre- and post-development conditions.

### **Wetland #5: Feature Based Water Balance Results**

Under pre-development conditions, an existing catchment of 5.34 ha is conveyed to Wetland #5, as shown on **Figure 3.2B**. The existing drainage catchment consists primarily of wetland/woodlot and agricultural land.

Under post-development conditions, a proposed catchment of 5.89 ha is conveyed to Wetland #5, as shown on **Figure 3.6.4**. The proposed drainage catchment consists primarily of wetland/woodlot (4.61 ha) and 1.28 ha of rear-lot drainage from the adjacent residential lands.

A continuous model of the drainage to Wetland #5 under pre- and post-development conditions was used to assess the impacts to water levels and storage depths within the subject wetland. The hydrology of the wetland catchments was simulated using the TRCA's approved and calibrated Visual OTTHYMO model for Etobicoke Creek.

Wetland function in terms of water level/depth was assessed at a high level where a PCSWMM model was used to simulate the hydraulics within Wetland #5. The storage curve for Wetland #5 was developed using a LiDAR surface was acquired from the Natural Resources Canada (NRC) High Resolution Digital Elevation Model (October 2023). A QGIS Volume Calculator tool was used to generate depth-area curves for each wetland based on the aforementioned LiDAR data. The LiDAR data was also used to generate the cross-sectional geometry and slope profiles for the wetland outlet. Subsequently, FlowMaster v8i was utilized to develop the stage-discharge curve. A Manning's roughness coefficient of 0.05 was applied, reflecting an unmaintained channel with brush.

As per the model output results provided with the sensitivity analysis in **Appendix D1**, it was observed that there is minimal change to the water level in the wetland in comparing pre- and post-development conditions.

## 4 NATURAL CHANNEL DESIGN

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The existing floodplain limits shown in the Pre-Development Flood Mapping (**Drawing 4.1A** and **Drawing 4.1B**) are built upon work completed as part of the Alloa Local Subwatershed Study (Crozier, 2026). The existing flood hazard mapping for the Alloa Secondary Plan area informs the extent of the existing NHS and dictates the extent of future management strategies related to the development of the Alloa lands, for both interim (Phase 1) and ultimate conditions.

Under interim conditions (see **Drawing 4.2A** and **Drawing 4.2B**) floodplain limits and associated watercourses within Phase 1 of the Tertiary Plan area are intended to be regularized, realigned and improved. The NHS traversing the site under post-development conditions will include a corridor designed to contain erosion hazards, meander belt, flood hazard, crossings and other environmental features / considerations. The proposed NHS features are illustrated in **Drawing 4.3**.

The sections that follow provide additional information on the development of both existing and proposed floodplain / channel conditions for the Alloa Phase 1 Tertiary Plan. It is noted that hazards and regulatory allowances associated with natural features will be further reviewed and clarified as work proceeds, including future phases / ultimate conditions. In keeping with industry practice, Regional flood delineation is not shown for reaches with less than 50 ha of contributing drainage area, although other environmental factors may result in regulatory setbacks for such reaches.

### 4.1. EXISTING CONDITIONS

#### 4.1.1. Existing Conditions Floodplain Mapping

Etobicoke Creek has undergone various flood mapping studies, including the Etobicoke Creek Synthesis Study (CH2MHILL & TRCA, December 2014), which was used as the basis for the Mayfield West Stage 1 and Stage 2 Functional Servicing Report, and accompanying CEISMP and EIR studies completed by Crozier in support of development in the Mayfield West Phase 2 area.

The Visual OTHYMO (2022 model by TRCA) introduced revisions to flow data, cross-section locations, naming conventions, and geometry based on presumably improved topographic mapping. As described in Section 3.2 of the Alloa Secondary Plan Scoped Servicing Study (Urbantech, 2026) completed in support of the Local Subwatershed Study (Crozier, 2026), this model was updated by Urbantech for the Tertiary Plan area based on minor revisions to drainage areas. The updated “future” scenario was used for the existing conditions HEC-RAS analysis. Urbantech has further updated the existing TRCA flood mapping as described in the following sections. Note that the TRCA flood mapping is shown on the existing flood mapping **Drawings 4.1A** for comparison purposes only; the “updated” / Urbantech existing flood mapping governs.

#### West of Mississauga Road

While not specifically relevant to the Phase 1 Tertiary Plan, the approach to modelling the lands west of Mississauga Road influence the peak flows used in the Phase 1 channel. The 2022 TRCA model did not extend west of Mississauga Road. As described in the May 11, 2023 report by Urbantech Consulting prepared for Area 10 / 12300 Mississauga Road, and in the January 2026 Local

Subwatershed Study and Scoped Servicing Study, the existing regional floodplain in this area is best described as an extensive backwater system with a large, flat depression area. This type of system is difficult to analyze using standard / accepted modelling approaches. Through frequent consultation with TRCA and Town of Caledon staff and senior management in late 2022 to early 2023, the challenges with the hydraulic modelling and ultimate development of this area have been explored, and area-specific solutions have been developed and agreed to with the agencies to define a suitable approach to modelling the subject lands under existing and proposed conditions (specific to Area 10), including:

- The use of a 2D hydraulic model (with specific assumptions and parameters as prescribed by TRCA and noted herein, including the use of the shallow water equations / Eulerian-Lagrangian Method – SWE-ELM); and,
- Acknowledgment that post-development flood storage does not have to match pre-development flood storage as agreed to with TRCA staff (although best efforts to do so should be explored).

TRCA recommended the use of a quasi-steady state approach, in which hydrographs from the Visual OTTHYMO model were extended at the peak flow time until the end of the simulation. The ROUTE CHANNEL elements were removed from the Visual OTTHYMO model to avoid double-counting flow routing (i.e. in VO and in the 2D model). This approach was carried forward into the LSS/SSS studies and minor updates were made to the models in terms of Manning's roughness, flows, and ultimate channel design geometry. For the Phase 1 Tertiary Plan, only the existing conditions 2D model is relevant, as the ultimate development of the lands west of Mississauga Road are not part of Phase 1.

#### **Mississauga Road to Chinguacousy Road**

The floodplain in this location is based on the 1D, September 2022 TRCA model, surface (2015 LiDAR) and flows, with minor refinements to incorporate the recent ground surveys for the surrounding lands (RPE, April 2024 / JD Barnes, April 2024) and which includes the low-flow channel survey of the Alloa Drain. The peak flows from the updated Visual OTTHYMO model were incorporated into the model. As shown on **Drawing 4.1A**, the Urbantech Regional floodplain is generally consistent with the TRCA Regional floodplain, with any difference attributed to refinements to the surface topography. The existing conditions model in this area was updated through the Local Subwatershed Study and Scoped Servicing Study completed in support of the Secondary Plan based on refined topography and flows and has been used as the basis for the Phase 1 Tertiary Plan analysis.

#### **Chinguacousy Road to Downstream**

The Urbantech HEC-RAS model completed through the Mayfield West Phase II FSR process was updated to incorporate the revised flow data and geometry west of Chinguacousy Road and downstream of the FP Mayfield lands to the nearest confluence downstream of the proposed channel works in Etobicoke Creek. The future configuration of the channel/floodplain near the FP Mayfield lands was assumed to be in place east of Chinguacousy Road, as the permitting process is currently underway. The proposed works and accompanying hydraulic modelling were described in a memo

dated March 13, 2024. Therefore, the ultimate conditions for the FP Mayfield lands have been integrated into the existing (updated) TRCA model.

The existing floodplain limits shown on **Drawing 4.1A** is therefore a consolidation of:

- January 2026 LSS/SSS Existing Model, which is based on:
  - Existing May 11, 2023 2D Model west of Mississauga Road
  - Updated September 2022 TRCA model between Mississauga Road to Chinguacousy Road
  - Ultimate March 13, 2024 FP Mayfield Model east of Chinguacousy Road
  - Existing September 2022 TRCA east of FP Mayfield.

In general, the existing floodplain through the Alloa study area is large and is governed by backwater conditions downstream of Chinguacousy Road. The channel slopes throughout the study area are relatively flat and the backwater impacts are significant, to the extent that the floodplain west of Mississauga Road spills west, over Heritage Road. This was demonstrated in the 2D model for existing conditions.

#### 4.1.2. Existing Hydraulic Structure Inventory

The following culverts / crossing infrastructure are within the study area. Culvert information is based on the available crossing data from the original TRCA HEC-RAS model. Road centreline elevations were supplemented with the existing topographic surface in locations where the updated survey information did not agree with the original TRCA model.

**Table 4.1: Existing Hydraulic Structure Inventory**

Crossing Location & HEC-RAS Section	Crossing Type	Size of Opening [span x rise] or [diameter]	Upstream Invert	Downstream Invert	Road Centerline Elevation
		[mm]	[m]	[m]	[m]
Private DW Eto Hdwr S Trb P South P1 XS 872.64	CSP Circ.	0.4 assumed	264.70	264.68	265.32
Private DW Eto Hdwr S Trb P South P1 XS 848.31	CSP Circ.	0.4 assumed	264.54	264.54	265.32
Private DW Eto Hdwr S Trb P South P1 XS 697.28	CSP Circ.	0.4 assumed	264.56	264.49	265.43

44

Crossing Location & HEC-RAS Section	Crossing Type	Size of Opening [span x rise] or [diameter]	Upstream Invert	Downstream Invert	Road Centerline Elevation
		[mm]	[m]	[m]	[m]
12287 Mississauga Road DW Eto Hdwtr S Trb P South P1 XS 212	3x Conc. Box	1.72 x 0.88 3.59 x 0.88 1.78 x 0.88	262.24	262.18	263.73
Driveway Eto Hdwtr S Trb N South N1 XS 318	CSP Circ.	1.52	259.83	259.66	261.74
Creditview Road Eto Hdwtr S Trb N South N1 XS 143	CSP Circ.	1.7	259.23	259.03	261.54
Farm Road Eto Hdwtr S South 8 XS 676	CSP Circ.	0.4 assumed	259.10	259.09	260.77
Creditview Road Eto Hdwtr S South 8 XS 237	3x CSP Circ.	1.35 / 1.40 / 1.40	258.87	258.84	261.09
Chinguacousy Road Eto Hdwtr S South 6 XS 267	Conc. Box	6.05 x 1.67	256.56	256.56	258.58
Chinguacousy Road Eto Hdwtr S Trb H South H2 XS 180	Conc. Box	4.37 x 1.07	258.74	258.74	260.18
Chinguacousy Road Eto Hdwtr S Trb I South I1 XS 479	Conc. Box	3.00 x 0.86	261.27	261.27	262.22
Chinguacousy Road Eto Hdwtr S Trb F South F1 XS 824.71	Conc. Box	6.3 x 1.06	262.61	262.60	263.86

#### 4.1.3. Existing Riparian / Flood Storage

The riparian storage represents the relationship between the volume of water in the floodplain and the discharge (flow rate) of the watercourse. This relationship is typically assessed without any human-made structures, such as culverts, to understand the natural behavior of the watercourse and its capacity to convey and store water during various flow conditions. However, culverts can influence the extent and depth of flooding in the surrounding floodplain area and can affect the volume of water that the floodplain can store during flood events, impacting the flood hazard downstream.

To evaluate the existing riparian storage and flood storage (with culverts in place), the study area was divided into two specific areas: west of Mississauga Road, which features a large depression or ponding area serving as a significant storage region during flood events and which has been characterized with a 2D HEC-RAS model, and the area between Mississauga Road and Chinguacousy Road, which is more characteristic of conveyance systems rather than a storage area. The 1D HEC-RAS model was employed for the hydraulic modelling east of Mississauga Road. As agreed with TRCA staff, an unsteady-state modelling approach was permitted to properly characterize the existing and proposed storage between Mississauga Road and Chinguacousy Road, and to evaluate the potential impacts of changes in riparian storage.

Note that due to a spill between XS 834.36 and 946.76 on Reach K1, a lateral structure was added to allow flow from Reach K1 to drain towards Reach South Main. This was required to stabilize the 1D unsteady model and ensure all of the volume in the system was properly accounted for.

The results of the HEC-RAS model runs are presented in **Table 4.2** and **Table 4.3**, which show the existing floodplain storage with existing flows, assuming all crossings have been removed both west of Mississauga Road (2D model) and east of Mississauga Road to Chinguacousy Road (1D unsteady state model). Note that the 2D model results indicate a spill to the west, across Heritage Road. The flow lost to this spill was ignored, and the full flow generated by the catchments west of Mississauga Road were used in the hydraulic modelling east of Mississauga Road as a conservative measure for establishing the riparian storage targets and flood hazards.

**Table 4.2: Existing Riparian Storage (2D Model, No Culverts, West of Mississauga Rd)**

Location	Volume (m <sup>3</sup> )						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
West of Mississauga Road	25.47	73.08	113.876	171.327	213.804	254.74	482.452

**Table 4.3: Existing Flood Storage (1D Unsteady-State, No Culverts, East of Mississauga Rd)**

Location	Volume (x1000m <sup>3</sup> )						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
Eto Hdwtr S - South 6 to 10 (Main Channel)	20.51	37.84	53.21	72.79	87.06	101.29	368.72
Eto Hdwtr S - South K1	6.74	10.02	14.87	16.66	17.47	20.58	53.72
Eto Hdwtr S - South N1	3.62	5.56	7.16	9.65	11.64	13.82	64.88
Eto Hdwtr S - South O1	5.44	8.35	10.47	13.25	15.33	17.44	49.39
Eto Hdwtr S - South P1	3.39	5.25	6.72	10.05	11.65	13.22	38.13
<b>TOTAL</b>	<b>39.60</b>	<b>67.02</b>	<b>92.43</b>	<b>122.40</b>	<b>143.15</b>	<b>166.35</b>	<b>574.84</b>

The storage volumes computed for these areas are significant. As agreed with TRCA staff through meetings regarding the 12300 Mississauga Road lands, matching the storage volumes west of Mississauga Road is impractical (although best efforts should be investigated). Furthermore, the large floodplain west of Mississauga Road will be partially filled by the future Highway 413 extension, reducing the existing floodplain storage by at least 35%.

## 4.2. PROPOSED CONDITIONS

### 4.2.1. Proposed NHS and Channel Corridor

The proposed conditions hydrologic and hydraulic modelling builds upon the framework and data used in the existing conditions analysis, as well as the preliminary NHS corridor design, provided by GEO Morphix in consultation with Urbantech and Crozier.

The Phase 1 Tertiary Plan affects reaches South 6,7,8, M1 and N1, including the Alloa Drain, which will be realigned within a natural channel design corridor.

The post-development Phase 1 channel defines the NHS limits for the watercourse corridors and fully contains the post-development floodplain, as shown in **Drawing 4.2A**. The design focusses on a pool and run channel typology mixed with wetland and wet meadow features. The proposed wetland features provide connection to the floodplain and help maintain moist habitats while functionally attenuating flows. The objective of these features is to provide retention and detention of flows over longer attenuated periods. The design also enhances aquatic and terrestrial habitat and increases corridor variability by creating a low flow channel with variable geometry. This variability provides benefits to the system by replicating conditions found in natural systems, adding diversity to the valley corridor and providing additional pockets of sediment sources.

**Drawing 4.5A** to **Drawing 4.5D** provide details on the proposed watercourse profiles realignment and lowering and cross-section at various locations throughout the Phase 1 Tertiary Plan.

The Phase 1 channel will tie into the existing channel at Chinguacousy Road (downstream) and at Creditview Road (upstream).

### 4.2.2. Proposed Hydrologic Model

The hydrologic model was further updated by Urbantech to reflect post-development conditions based on the Tertiary Plan and proposed drainage area delineation (see **Drawing 3D**). Similar to the updates for existing conditions, model parameters for the existing, external catchments which drain into the Phase 1 Tertiary Plan area remained consistent with the original version provided by TRCA, except where larger, lumped catchments were split into smaller catchments to refine drainage patterns in areas requiring more resolution. Developed areas were modelled using the STANDHYD command.

The following scenarios were simulated for the Phase I post-development conditions:

- 25mm, 2-year to 100-year storms (12-hour AES, AMC II conditions), with Phase I SWM facilities in place.
- Regional storm – Hurricane Hazel (AMC III conditions), uncontrolled (no SWM facilities), for use in hydraulic modelling.
- Regional storm – Hurricane Hazel (AMC III conditions), with Phase I SWM facilities in place.

- Continuous model, with Phase I SWM facilities in place (for use in the feature-based water balance and erosion analysis).

The post-development Phase 1 Regional storm scenario (AMC III conditions) assuming no SWM facilities in place was used for hydraulic modelling / hazard mapping.

#### 4.2.3. Proposed Hydraulic Model

The primary objective of the post-development Phase 1 hydraulic modelling exercise is to compare the existing and Phase 1 conditions to identify changes and potential impacts on the floodplain, storage, and flow conveyance. The following sections provide a detailed overview of the proposed conditions modelling, highlighting significant changes and their implications. The Phase 1 corridor has been sized to handle the post-development, uncontrolled flows resulting from the Phase 1 development and land use.

#### **Proposed Hydraulic Structure Inventory**

The preliminary span of proposed culverts and crossings are sized based on hydraulic conveyance requirements but have also been confirmed to meet geomorphological function and small mammal passage (as required by the Terrestrial Ecologist). See **Drawing 4.4** for a typical road crossing detail along the NHS corridor. The proposed crossing designs will be refined at the detailed design stage to consider the updated hydraulic modelling, as well as ecological, fluvial, and geotechnical studies. The crossing designs incorporate requirements and recommendations from the TRCA Crossing Guidelines (2015).

The HEC-RAS model was used to evaluate the proposed culvert infrastructure within the Phase 1 study area. All new crossings were designed to pass the Regional storm without overtopping. The proposed conditions incorporate new or modified structures that are anticipated due to development or infrastructure projects.

**Table 4.4: Phase 1 Channel Crossings / Culvert Sizing**

Crossing Location & HEC-RAS Section	Crossing Type	Size of Opening [span x rise] or [diameter] (m)	Upstream Invert (m)	Downstream Invert (m)	Road Centerline Elevation (m)
Chinguacousy Eto Hdwr S South 6 XS 696	Conc. Box	19.0 x 2.5	256.69	256.64	262.26
Chinguacousy Eto Hdwr S South 6 XS 1575	Conc. Box	19.0 x 2.5	257.63	257.58	264.04
Creditview Road Eto Hdwr S	Conc. Box	19.0 x 2.5	258.02	257.96	260.20

49

Crossing Location & HEC-RAS Section	Crossing Type	Size of Opening [span x rise] or [diameter] (m)	Upstream Invert (m)	Downstream Invert (m)	Road Centerline Elevation (m)
South 6 XS 236					
Creditview Road Eto Hdwtr S Trb N South N1 XS 125	Conc. Box	9 x 1.75	258.95	258.85	262.20

### **Phase 1 Riparian / Flood Storage**

The riparian storage under Phase 1 conditions was assessed to understand the impact of planned developments and infrastructure modifications on floodplain storage capacity. The analysis used the agreed-upon 1D unsteady-state modelling approach and the “without culverts” geometry.

The results of the HEC-RAS model runs are presented in **Table 4.5** and **Table 4.6**, showcasing the differences in floodplain storage and discharge relationships for the 2D model area west of Mississauga Road, and the 1D unsteady state model east of Mississauga Road.

**Table 4.5: Existing Riparian Storage (2D Model, No Culverts, West of Mississauga Rd)**

Location	Scenario	Volume (x1000m <sup>3</sup> )						
		2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
West of Mississauga Road	Existing (No change under Phase 1 conditions)	25.47	73.08	113.876	171.327	213.804	254.74	482.452

**Table 4.6: Proposed vs Existing Flood Storage (1D Unsteady-State, No Culverts, East of Mississauga Rd)**

Location	Scenario	Volume (x1000m <sup>3</sup> )						
		2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
Eto Hdwtr S - South 6 to 10 (Main Channel)	Existing	20.51	37.84	53.21	72.79	87.06	101.29	368.72
	Interim	19.15	40.56	59.78	82.92	98.35	113.8	372.41
	Difference	-1.36	2.72	6.57	10.13	11.29	12.51	3.69

Location	Scenario	Volume (x1000m <sup>3</sup> )						
		2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
Eto Hdwtr S - South K1	Existing	6.74	10.02	14.87	16.66	17.47	20.58	53.72
	Interim	6.84	9.97	14.08	15.41	15.94	17.16	51.37
	Difference	0.1	-0.05	-0.79	-1.25	-1.53	-3.42	-2.35
Eto Hdwtr S - South N1	Existing	3.62	5.56	7.16	9.65	11.64	13.82	64.88
	Interim	4.13	6.9	9.05	12.1	14.43	16.77	69.07
	Difference	0.51	1.34	1.89	2.45	2.79	2.95	4.19
Eto Hdwtr S - South O1	Existing	5.44	8.35	10.47	13.25	15.33	17.44	49.39
	Interim	5.43	8.35	10.51	13.38	15.51	17.66	49.01
	Difference	-0.01	0	0.04	0.13	0.18	0.22	-0.38
Eto Hdwtr S - South P1	Existing	3.29	5.25	6.72	10.05	11.65	13.22	38.13
	Interim	3.29	5.25	6.69	10.01	11.6	13.26	37.77
	Difference	0	0	-0.03	-0.04	-0.05	0.04	-0.36
<b>TOTAL (1D)</b>	Existing	39.6	67.02	92.43	122.4	143.15	166.35	574.84
	Interim	38.84	71.03	100.11	133.82	155.83	178.65	579.63
	Difference	-0.76	4.01	7.68	11.42	12.68	12.3	4.79
<b>TOTAL (1D+2D)</b>	Existing	65.07	140.1	206.306	293.727	356.954	421.09	1057.292
	Interim	64.31	144.11	213.986	305.147	369.634	433.39	1062.082
	Difference	-0.76	4.01	7.68	11.42	12.68	12.30	4.79

For the Phase 1 channel east of Creditview Road, the riparian storage targets have been generally maintained and increased under interim conditions, with storage volumes exceeding existing condition for most storm events, except for a minor reduction during the 2-year event which can be addressed through detailed design of the corridor (wetland pockets, etc.).

Refer to **Appendix E1** for the graphics and digital model files associated with this evaluation.

The downstream analysis memos in **Appendix C6** and **Appendix C7** document the flow comparison with SWM facilities in place, which demonstrates that there is a net decrease in the Regional flow downstream of the study area

The proposed changes to the channel design within Phase 1 increase riparian storage and do not adversely impact downstream flows. The more efficient trapezoidal channel design improves flow conveyance, and the lost storage primarily comprises dead storage that does not significantly

51

contribute to flow dynamics. The validation using the 2D HEC-RAS models confirms that peak flows downstream remain within acceptable limits, ensuring that the proposed conditions maintain effective floodplain management and minimize flood risks.

#### **4.3. NATURAL CHANNEL DESIGN - EXPECTATIONS and IMPLEMENTATION**

##### *4.3.1. Design Expectations*

The proposed channel design will promote and improve communication with the floodplain, retention and detention of flows and sediment, fish habitat features and provide a stable geomorphic form.

The existing channel is low energy with intermittent flow that is controlled by the vegetation. It has good communication with its floodplain. There is evidence that modifications have been made to this channel previously given that it is part of the Municipal Drain system. There is compromised capacity for detention or retention due to the limited morphological variability.

The proposed Phase 1 channel design will have similar gradient and bankfull characteristics to the existing channel. The main goal of the design is to provide access to the floodplain and greater variability to the channel and floodplain. The addition of greater complexity in sediments will provide added benefits.

##### *4.3.2. Recommendations for Design and Construction of the Channel*

The following are recommendations for implementation:

- Construction should be carried out within the existing channel during low-flow conditions and as regulated by the fisheries timing window, or as dictated by the Conservation Authority.
- The design elements are unique and as such, the designer or representative should be part of construction supervision to ensure proper installation and function of the design elements. Onsite supervision will ensure a rapid response to construction issues.
- The constructed watercourse should be deemed stable by the designer prior to flow introduction.
- All works within the perimeter of the constructed watercourse should be isolated from the existing watercourse in order to mitigate against impacts, such as sediment loading. The perimeter of the constructed watercourse should be stabilized using the prescribed combination of coir cloth, live staking and seed. It is to be stable prior to the introduction of flows from the existing watercourse.
- Dewatering discharge should be pumped at least 30 m from the channel through a filter bag prior to release on the floodplain. The water should be dispersed across the floodplain through straw bales or Filtrexx Silt Soxx.
- All materials and equipment used in the constructed watercourse should be maintained to prevent deleterious substances from entering the water. A staging area, with appropriate

52

erosion controls, should be placed away from the work area. All re-fuelling and maintenance should be conducted in the staging area.

#### 4.4. TRAILS

Trails and pathways are intended to provide pedestrian linkages that facilitate the continuity of the Town of Caledon and Region of Peel active transportation networks, enhance the continuity of the Town's open space and transit systems, and provide access to recreational opportunities within each neighbourhood. A preliminary trail system is proposed throughout the Tertiary Plan area to connect important community destinations and take advantage of the natural features.

The proposed trail network within the Alloa Phase 1 plan is shown comprehensively on **Drawing 4.3**. The trail system includes:

- Recreational trails within the NHS, designed as 3.0 m wide limestone pathways. These trails follow the perimeter of the re-aligned Alloa Drain channel corridor (alternating between the north and south sides with a pedestrian bridge crossing for connectivity) and sections of the woodlots. These trails are anticipated to be located within the NHS buffer. Site grading for lots backing on to the NHS trail system has been designed to avoid private drainage across buffers to protect from trail wash-out. Refer to NHS cross-section drawings (**Drawing 4.5A**, **Drawing 4.5B**, **Drawing 4.5C**, and **Drawing 4.5D**) for additional information regarding trail design and location. **Section 7.2.2** provides additional information regarding the proposed pedestrian bridge.
- Urban Trails:
  - Sidewalks (throughout the plan).
  - Multi Use Trails (located along the major road corridors – Creditview Road, Chinguacousy Road and Mayfield Road).

Trails are designed to accommodate a wide range of users and abilities with trail gradients that meet Municipal and Provincial standards.

## 5 SANITARY SERVICING

### 5.1. EXISTING SANITARY SERVICING AND REGIONAL SYSTEM CAPACITY

The subject lands are serviced by Peel Region’s lake-based wastewater system, which collects wastewater from the City of Mississauga, the City of Brampton and part of the Town of Caledon (including the Alloa Phase 1 Tertiary Plan area). The Peel lake-based system consists of two (2) wastewater treatment facilities (G.E. Booth Wastewater Treatment Plant (WWTP) and Clarkson WWTP) and a network of pumping stations, forcemains and gravity sewers (both trunk and local). The system is divided into three main north/south trunk sewer systems – McVean, East and West.

The Tertiary Plan Area is tributary to the Peel Region West Trunk sewershed. Wastewater generated from the Phase 1 lands will drain to an existing sanitary connection (750 mm sewer) at Brisdale Drive, which has been designed to accommodate the Alloa Phase 1 wastewater flow. The Brisdale sewer is part of a sub-trunk network within the West Trunk system known as the Fletcher’s Creek trunk.

Peel Infrastructure Planning Staff have confirmed through on-going TAC meetings that there is existing capacity in the Fletcher’s Creek trunk sewer, via the Brisdale sanitary sewer, of 300 L/s. This is available immediately to the Tertiary Plan Area.

In addition, there is an existing 250 mm sanitary sewer west of Mayfield Road on Robert Parkinson Drive that has been approved as an outlet for the SPA2 Commercial Site. East of Chinguacousy, there is an existing 450 mm sewer on Tim Manley Blvd.

Planned and proposed Regional sanitary infrastructure projects that directly support the Tertiary Plan Area are summarized in **Table 5.1** and shown graphically in **Figure 5-1**. Refer to **Drawing 5.1** for further details.

Note that the Region of Peel’s 2026 Development Charges (DC) Wastewater Mapping identifies an alternative servicing strategy for lands north of the Alloa Drain within Phase 1, directing wastewater flows west toward Mississauga Road. However, based on work completed to date and ongoing discussions with Peel Region staff—most recently during meetings held the week of March 9, 2026—sufficient capacity has been confirmed within the Brisdale sanitary trunk sewer to accommodate all Phase 1 flows. As such, the Brisdale system is identified as the ultimate outlet for the full Phase 1 Tertiary Plan. It is therefore anticipated that the Region’s 2027 DC mapping, as well as the ongoing Infrastructure Master Plan, will be updated to reflect conveyance of all Phase 1 Tertiary Plan wastewater flows to the Brisdale system, consistent with the strategy illustrated in **Drawing 5.1**.

**Table 5.1: Tertiary Plan Wastewater Servicing (Planned and Proposed Regional Projects)**

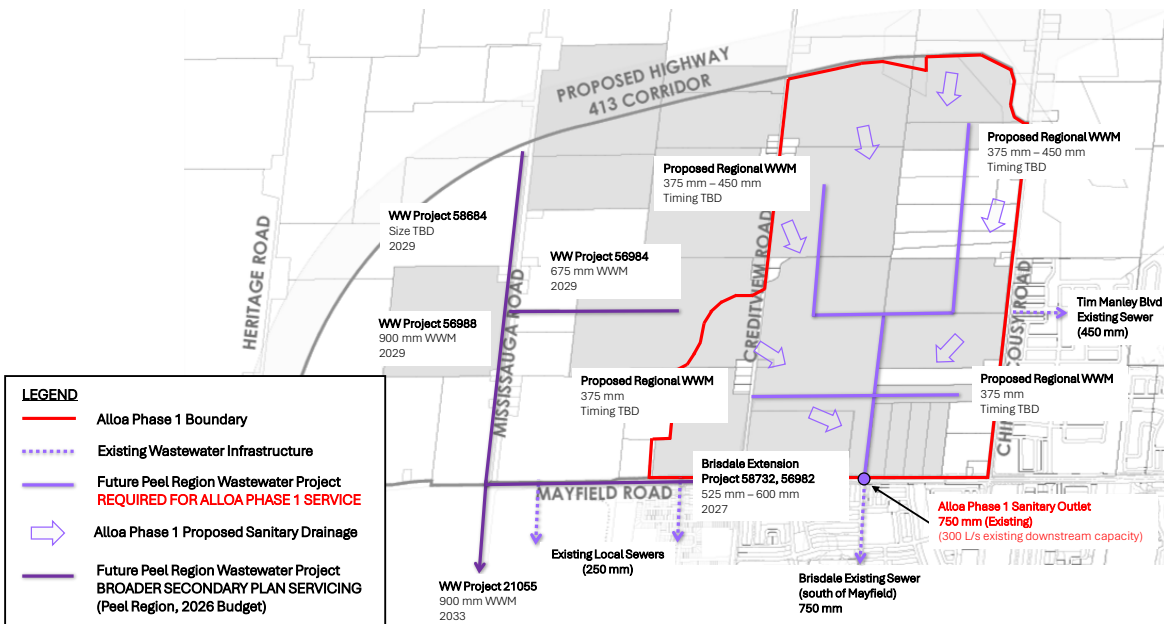
Project No. <sup>1</sup>	Project Description	Sewer Size (mm)	Project Timing <sup>2</sup>
56982, 58732	Brisdale Sewer Extension (Mayfield Road north to Tim Manley Extension)	525, 600	2027
58659, 58730	Street A Sanitary Sewers (Creditview to 176 m west of Chinguacousy)	375	2027

54

Project No. <sup>1</sup>	Project Description	Sewer Size (mm)	Project Timing <sup>2</sup>
Not Included in 2026 Peel DC Mapping	Street B (Tim Manley Extension) Sanitary Sewers (Street F to Street D)	450	TBD
Not Included in 2026 Peel DC Mapping	Street D Sanitary Sewers (Street B to Street C)	375, 450	TBD
Not Included in 2026 Peel DC Mapping	Street F Sanitary Sewers (Street B to 642 m south of Street C)	375	TBD

<sup>1</sup> Taken from Peel Region Wastewater Map 2026 (Map ID: 99-WW-DC), 2026 Budget (November, 2025).

<sup>2</sup> If required to accommodate development timing, the Alloa Landowner's Group may enter into a front ending agreement with Peel for delivery of necessary regional infrastructure ahead of the capital program planning schedule



**Figure 5-1: Tertiary Plan Wastewater Servicing (Existing/Future Regional Infrastructure)**

## 5.2. SANITARY DESIGN CRITERIA AND WASTEWATER GENERATION RATES

Peel Region wastewater design criteria and design standards are taken from the Public Works Linear Wastewater Standards (March, 2023). Pipe size, slope and depth, as shown in **Drawing 5.1** follow the requirements set out in the March 2023 Design Manual.

The calculated overall wastewater generation rates for the Tertiary Plan Area are shown in **Table 5.3**. The full sanitary design sheet is available in **Appendix B3**. It is noted that while the majority of the Tertiary Plan Area is directed to the Brisdale Sewer, there are two areas within the Plan directed to alternate sewers:

- SPA2 (Major Commercial) is directed south to an existing 250 mm sewer on Robert Parkinson Drive (approved by the Region of Peel as an outlet for this site).
- Area 13 (as shown on **Drawing 5.1**) comprises a 4 ha parcel located in the northeast portion of the Tertiary Plan. Wastewater flows from this area are proposed to be directed to the future Regional sanitary sewer on Chinguacousy Road, tributary to the existing Tim Manley sewer east of Chinguacousy Road. Proposed road grades along Chinguacousy Road introduce grading constraints for Area 13, resulting in this area being lower in elevation than lands to the west. Conveying wastewater west and south toward the Brisdale system, rather than east toward Chinguacousy as proposed, would deepen the downstream sanitary system by approximately 2–3 ft across the plan and necessitate a dual (stacked) sewer configuration—generally required where sewer depths exceed approximately 8 m—for an additional 1 km of pipe. Given the relatively small contributing flow from Area 13 (on the order of 8 L/s under peak wet weather conditions), it is anticipated that the downstream Regional system can accommodate this incremental increase in flow. Notably, Area 13 is the only location within the Tertiary Plan where local grading constraints would otherwise drive deeper servicing requirements across the broader system. Accordingly, the proposed servicing approach is considered appropriate for this area.

Sanitary flow rates are determined using:

- Land use areas as shown in **Figure 1.4** (Tertiary Plan Land Use Schedule).
- Population / Employment density targets, as outlined in **Section 1.4, Table 1.2**.
- Peel Region Sanitary Design Criteria shown in **Table 5.2**, taken from the March 2023 Design Manual and consistent with the 2020 Master Plan.

**Table 5.2: Peel Region Wastewater Generation Design Criteria**

Population Type	Average Dry Weather Flow (L/cap/day)	Peaking Factor	Inflow and Infiltration (L/s/ha)
Residential	290	Harmon Formula	0.260
Employment	270	Harmon Formula	0.260

**Table 5.3: Tertiary Plan – Wastewater Generation (Cumulative at Brisdale Sewer Connection)**

	Population + Jobs (Total)	Wastewater Flow (Peak) (L/s)
Tertiary Plan Area (Area 1 to Area 12)	26,900	291
SPA2	655	11
Area 13 (to Chinguacousy)	503	8

The values in **Table 5.3** are preliminary and subject to refinement in future studies as more information becomes available. Ultimately, pipes internal to the Alloa Phase 1 Tertiary Plan will be designed based on peak wet weather flow for their specific sewer catchment area, and in accordance with Peel Region’s design standards (size, slope, depth, etc.).

### 5.3. PROPOSED TERTIARY PLAN SANITARY SERVICING

**Drawing 5.1** shows the proposed Tertiary Plan sanitary servicing strategy, including all existing and future Peel Region service connections. The Tertiary Plan is intended to be serviced by a series of local sub-trunk sewers, generally draining from north to south and connecting into the existing 750 mm sewer at Brisdale Drive.

As noted in **Section 5.1**, discussions with Peel Region have confirmed that downstream sanitary infrastructure is in place to support the full Tertiary Plan Area. The sanitary outlet for the Phase 1 lands is the existing 750 mm trunk sewer on Brisdale Drive. The Brisdale sewer is sized to accommodate all development in Alloa Phase 1. The size and capacity of this sewer was originally approved through the Mount Pleasant Block 51-2 EIR/FSR and the associated Block 51-2 detailed subdivision designs. More recently (February 2025), Region Infrastructure Planning Staff have confirmed through hydraulic modelling that the existing 750 mm Brisdale sanitary sewer and downstream Fletcher’s Creek Trunk sewer system can immediately accommodate 300 L/s from the Alloa lands. Per the current Alloa Secondary Plan land use schedule, estimated Phase 1 development area tributary to the Brisdale sewer (including SWM facilities, but excluding NHS) totals approximately 246 ha with a population of 26,900. This results in a total wastewater flow of approximately 291 L/s to the Brisdale pipe, within the capacity limit of 300 L/s.

Also note that:

- As identified above, wastewater flow from Area SP2 is tributary to the agreed upon connection from the future Costco Site Plan to Robert Parkinson Drive (this area is not included the calculated flow to the Brisdale sewer).
- As identified above, a four (4) ha parcel (shown as Area 13 on **Drawing 5.1**) is directed to a future Regional sewer on Chinguacousy Road, tributary to the existing Tim Manley sewer downstream to the east.

- There is an existing 450 mm diameter sewer connection at the intersection of Tim Manley Blvd and Chinguacousy Road that could be utilized by Alloa Phase 1 (eastern boundary) as a temporary and/or ultimate servicing outlet. Further discussion with Peel Region staff is required to confirm servicing capacity in this sewer.

## 6 WATER SERVICING

### 6.1. EXISTING WATER SERVICING AND REGIONAL SYSTEM CAPACITY

The Subject Lands are serviced by the Region of Peel's lake-based water system, which distributes water from Lake Ontario to the City of Mississauga, the City of Brampton and part of the Town of Caledon (including the Alloa Secondary Plan). The Region's lake-based system consists of two (2) treatment and three transmission systems (west, central and east), each containing a series of booster pump stations, water reservoirs and elevated tanks. The Tertiary Plan Area is part of the west transmission system.

There are a total of seven (7) water pressure zones in the Peel System, each separated by approximately 30 m intervals of elevation. The Tertiary Plan Area is proposed to develop on the Pressure Zone 7 West (7W) system. Zone 7W has a top water level of 327.7 m, a hydraulic grade line of 335.3 m and services elevations between 243.4 m and 289.6 m. The Alloa Booster Pump Station and Alloa Reservoir, both located within the Alloa Secondary Plan area (west of Creditview Road, north of Mayfield Road) provide storage and pumping capacity for the Alloa Secondary Plan area as well as other growth areas within Zone 7W.

The Zone 7W system is intended to be expanded in the near-term to include new transmission mains from the Alloa Booster Pump Station to the new West Caledon Elevated Tank. A Schedule C Municipal Class Environmental Assessment study is currently underway to select the ultimate location for the Elevated Tank and the alignment of the future transmission mains. This study is anticipated to be completed by mid 2026. Currently, the Alloa Reservoir provides all of the Zone 7W floating storage. The future addition of the West Caledon Elevated Tank will improve the storage capacity for the zone as well as system redundancy and security of supply.

Preliminary hydraulic analysis undertaken by Peel Region staff have confirmed that Tertiary Plan development is not reliant on the future West Caledon Elevated Tank (or associated distribution / transmission mains). Phase 1 development can proceed with only the trunk watermains within Phase 1, as identified on **Drawing 6.1**. Additional modelling at Detailed Design stages may be required to confirm extent, timing and serviceability of the Phase 1 lands north of the Alloa Drain, ahead of planned infrastructure improvements. Broader area projects, like the West Caledon Elevated Tank, will provide ultimately provide additional capacity and security for the remainder of the Secondary Plan area (Phase 2).

Planned Regional water infrastructure projects that directly support the Tertiary Plan are summarized in **Table 6.1** and shown graphically in **Figure 6-1**.

**Table 6.1: Tertiary Plan Water Servicing (Planned Regional Projects)**

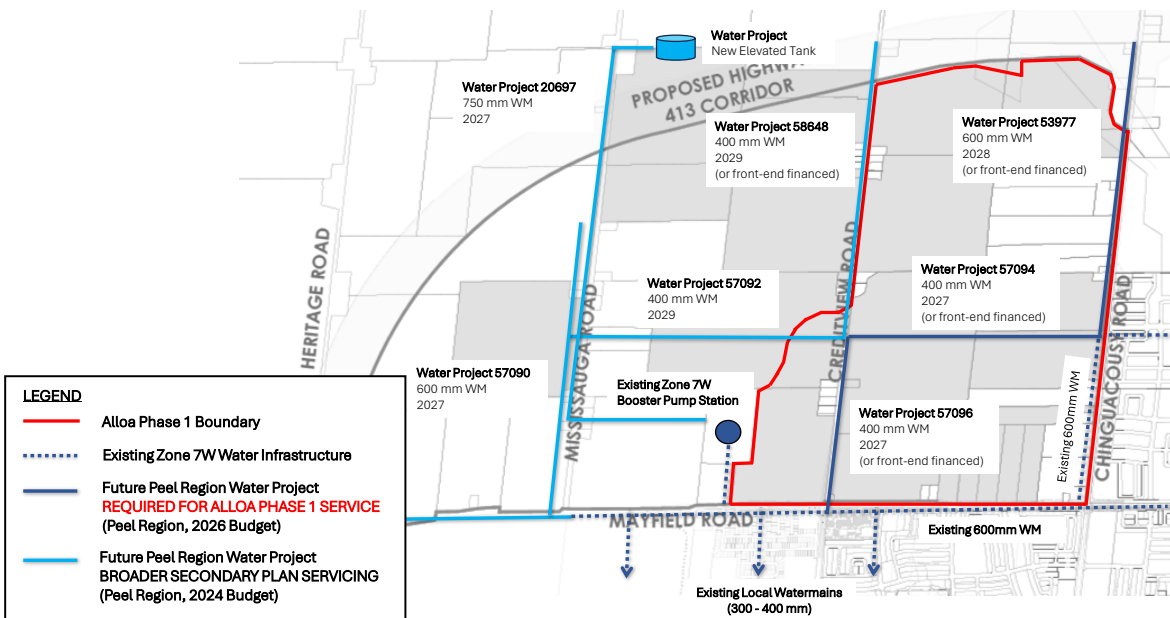
Project No. <sup>1</sup>	Project Description	Project Timing <sup>2</sup>	Supporting
53977	600 mm watermain on Chinguacousy Road from Tim Manley Blvd to Old School Road	2028	Phase 1 Alloa, Development East of Chinguacousy
57094	400 mm watermain on new Alloa internal east-	2027	Phase 1 Alloa

59

Project No. <sup>1</sup>	Project Description	Project Timing <sup>2</sup>	Supporting
	west road from Chinguacousy Road to Creditview Road		Phase 2 Alloa
57096	400 mm watermain on Creditview Road from Mayfield Road north to new Alloa internal east-west road	2027	Phase 1 Alloa Phase 2 Alloa

<sup>1</sup> Taken from Peel Region Wastewater Map 2026 (Map ID: 98-W-DC), 2026 Budget (November, 2025).

<sup>2</sup> If required to accommodate development timing, the Alloa Landowner's Group may enter into a front ending agreement with Peel for delivery of necessary regional infrastructure ahead of the capital program planning schedule



**Figure 6-1: Alloa Phase 1 Water Servicing (Existing/Future Regional Infrastructure Plan)**

## 6.2. WATER DESIGN CRITERIA AND SYSTEM DEMAND

Peel Region provides design criteria and water supply standards to ensure uniformity in their system. The Region of Peel Public Works Design, Specifications and Procedures Manual (June, 2010) provides comprehensive instruction for the design and construction of municipal services. Watermain size, slope and depth, as shown in **Drawing 6.1**, follows the June 2010 Design Manual.

Peel Region per capita water demand criteria were updated through the 2020 Water and Wastewater Master Plan. As such, the criteria in the June 2010 Design Manual are considered superseded by the 2020 Master Plan values. The Master Plan water demand criteria are shown in **Table 6-2**.

Similar to sanitary flow rate calculations, water demand rates are determined using:

- Land use areas as shown in **Figure 1.4** (Tertiary Plan Land Use Schedule).
- Population / Employment density targets, as outlined in **Section 1.4, Table 1-2**.
- Peel Region Water Demand Criteria shown in **Table 6.2**.

**Table 6.2: Peel Region Water Demand Design Criteria**

Population Type	Average Dry Water Demand (L/cap/day)	Max Day Peaking Factor	Peak Hour Peaking Factor
Residential	270	1.8	3.0
Employment	250	1.4	3.0

Preliminary water demand rates are tabulated in **Table 6.3**. The values are preliminary and subject to refinement in future studies as more information becomes available.

**Table 6.3: Alloa Phase 1 – Water Demand (Domestic)**

	Average Day Demand (L/s)	Max Day Demand (L/s)	Peak Hour Demand (L/s)
Phase 1 Tertiary Plan Area	84	148	251

In addition to the domestic demand outlined above, the water distribution system will provide water capacity for fire protection, in accordance with the requirements of the Underwriters Laboratories of Canada. Fire flow will be further defined as more information becomes available regarding built form. Water distribution systems are commonly designed to provide either Max Day + Fire Flow or Peak Hour Flow (whichever is higher).

The Region requires delivery pressures between 40 psi and 100 psi (not including during fire events).

The water distribution system analysis, including local watermain sizing and layout, for the subject site will be completed/confirmed as engineering proceeds and more information is available regarding built form and neighbourhood concept plans. Interim water servicing and looping is also to be determined, based on the future development phasing, as applicable. The Tertiary Plan watermains will be designed to supply demand under all operating scenarios, while maintaining adequate pressure to the system as required by Peel Region

### **6.3. PROPOSED TERTIARY PLAN WATER SERVICING**

**Drawing 6.1** illustrates the proposed Tertiary Plan water servicing strategy, including all existing and planned Peel Region service connections. The Alloa Phase 1 area is intended to be serviced by a network of local 300 mm watermains, connected to and looped with existing and proposed Regional DC infrastructure.

Smaller diameter watermains are shown along Creditview Road and Street B in **Drawing 6.1**. These represent local distribution mains required to provide direct service connections to residential properties fronting these corridors. Similar local watermains will be provided throughout the plan on all local roads; however, for clarity, only those located on collector and arterial roadways are shown on the Tertiary Plan drawings for information purposes.

There is an existing 600 mm diameter Zone 7W watermain that runs along Mayfield Road from Mississauga Road to east of Chinguacousy Road. There is also an existing 600 mm diameter Zone 7W watermain that runs north on Chinguacousy Road, terminating at Tim Manley Blvd. This watermain will be extended further north by the Region in the 2028 timeframe. The Tertiary Plan Area will use these existing watermains for water distribution and looping. Additional Regional DC watermains on Creditview Road and mid-block within the Tertiary Plan area will be required for development of Phase 1.

## 7 ROADS

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### 7.1. ROAD RIGHTS-OF-WAY

New road rights-of-way (ROW) are proposed throughout the Tertiary Plan Area. In addition to providing passage of traffic, the proposed road ROWs will be sized sufficiently to accommodate all proposed services and utilities, as well as to convey overland flow for major storm conditions, as required.

In consultation with the Town of Caledon, the Alloa Project Team has developed road cross sections specific to the Alloa Secondary Plan area to meet urban design objectives. **Figure 7.1A** through **Figure 7.1F** provide endorsed cross-sections and servicing details for each ROW width. Standard ROWs proposed for the Tertiary Plan are as follows:

- 26.0 m ROW – Major Collector, On-Street Parking and MUP (Both Sides)
- 22.0 m ROW – Residential Minor Collector, Single Parking Lane and MUP (Both Sides) (2 Options)
- 20.0 m ROW – Residential Local, Single Parking Lane, MUP (One Side), Sidewalk (One Side) (2 Options)
- 18.0 m ROW – Residential Local, Sidewalk (Both Sides)
- 16.0 m ROW – Residential Local Window Street, Sidewalk (One Side)
- 8.0 m (Laneway)

### 7.2. ROAD CROSSINGS OF THE NHS

As shown in **Drawing 4.3** there are five (5) NHS road crossings proposed for Phase 1 associated with the re-aligned Alloa drain channel, one (1) pedestrian bridge crossing, and two (2) NHS road crossings associated with woodlots.

#### 7.2.1. Road Crossing of the NHS (Alloa Drain)

The Tertiary Plan design shown on **Drawing 4.3** illustrates the road system that includes five (5) crossings of the NHS associated with Alloa Drain:

- Chinguacousy Road
- Street D
- Street F
- Creditview Road (two (2) crossings)

Crossing design has been prepared based on review of the proposed road crossing locations, stream crossing grading designs, hydraulics, fluvial geomorphology and ecological requirements. Hydraulic requirements for crossings are discussed in **Section 4.2.3**, with the full hydraulic assessment and results from HEC-RAS modelling of the new channel corridors and road crossings in **Appendix E1**. A standard NHS crossing is shown in **Drawing 4.4**. The preliminary span of proposed culverts and crossings (associated with the channel) are sized based on hydraulic conveyance requirements but

have also been confirmed to meet geomorphological function and small mammal passage (as required by the Terrestrial Ecologist). Additional information regarding the fluvial geomorphological and ecological requirements associated with crossings are discussed in the Alloa Phase 1 Tertiary Plan Area EIR (Crozier, March 2026). Grading details, including proposed size and inverts / obverts are shown in **Drawing 3.1C** and **Drawing 3.1D**.

The proposed crossing design(s) have been guided by the following considerations:

- Align crossing perpendicular to the stream corridors where feasible.
- Minimize flood risk through the design of crossings that convey the Regional Storm event without road overtopping or increasing flood levels offsite;
- Consider stream realignment design, erosion hazards and as a minimum, be 3 times the bankfull channel width to reduce risks from channel migration over time.
- Align crossing to avoid or minimize the physical footprint impact to habitats and on terrestrial and aquatic connectivity.
- Incorporate natural channel design.
- Satisfy the openness ratio for the passage of wildlife and address fish passage.
- Identify design measures to minimize crossing length

Municipal services will be accommodated within the right-of-way at all NHS crossing locations. Watermains may be located between the road surface and the top of culvert, if space permits. Otherwise, both water and sanitary will be installed below the culvert, with appropriate vertical clearance from the culvert footings and the channel and encased in steel. When required, concrete reinforced storm trunk sewers will be installed above creek crossings with a minimum clearance of 0.30m between outside walls.

#### *7.2.2. Crossing of the NHS (Pedestrian Bridge)*

As shown on **Drawing 4.3**, a 55 m long pedestrian bridge is proposed from the northeast corner of SWM Pond 4 across the Alloa channel corridor to the neighbourhood park on the north side of the channel. This bridge provides trail connectivity from the south side of the plan to the north side of the plan and forms an important overall linkage through associated natural features, including the woodlots in the north and south of the plan.

Design of the pedestrian bridge will be completed by a Structural Engineer during detailed design, in coordination with civil, geomorphological and ecological teams. There are no municipal services associated with this bridge. The preliminary profile is shown on **Drawing 4.5A**.

#### *7.2.3. Road Crossing of the NHS (Woodlots)*

The Tertiary Plan design shown on **Drawing 4.3** illustrates the road system that includes two (2) crossings of the NHS associated with woodlots:

- Street C
- Street B

Road crossings through woodlots have been designed from a grading perspective to minimize impact and encroachment through the wooded areas. Where possible, roads pass through perpendicular to the woodlot to minimize overall impact.

The Street C corridor shown is reflective of the preferred alignment endorsed by the Town of Caledon, considering intersection locations to the east and west. Road grading has been designed to minimize impact to the extent possible.

Compensation, as required, is discussed in the Alloa Phase 1 Tertiary Plan Area EIR (Crozier, March 2026)

### **7.3. BOUNDARY ROADS**

Existing boundary roads are within the jurisdiction of either the Town of Caledon (i.e., Chinguacousy Road, Creditview Road), the Region of Peel (Mayfield Road) or the MTO (Highway 413)

The Town and the Region have road widening projects either planned or on-going for all boundary roads associated with the Phase 1 Tertiary Plan. Refer to **Section 2.3** and **Section 2.4** for additional details.

Ultimately, internal development grades will be coordinated with on-going Town, Region and MTO road projects. Refer to **Drawing 7.2A**, **Drawing 7.2B** and **Drawing 7.2C** for Creditview Road and Chinguacousy Road preliminary road profiles and servicing.

## 8 CLIMATE ADAPTATION

The Local Subwatershed Study (Crozier, 2026) assessed climate change impacts and concluded that the impacts did not impact the Secondary Plan or Tertiary Plan as it relates to scope of work and general block sizing. For example, IDF parameters may impact the sizing of storm sewers, number of catchbasins, and modelled return period flows for establishing the 2-year to 100-year flows and volumes in ponds, but the pond blocks, channel blocks, and other major infrastructure (road crossings) have been sized based on the conservative Regional storm criteria (control to 60% of existing Regional flows + 214 m<sup>3</sup>/ha of additional storage). It was also confirmed that the Regional storm governs in all cases as it relates to establishing flood flows in the channel for the subject lands, versus the 100-year or climate-adjusted 100-year storm. Refer to the Future Climate Change Conditions Assessment memo (Urbantech, July 2025) in **Appendix F1** for details.

Climate change may impact continuous flows and the related wetlands, site wide water balance, and erosion impacts. However, it was agreed that there is no “climate adjusted” continuous data set (temperature and rainfall) that could be used for the continuous model assessment. The Sensitivity Analysis Approach Prior to Model Calibration memo (Urbantech, January 2026) in Appendix C2 of the Alloa Secondary Plan Scoped Servicing Study (Urbantech, January 2026) provides a range of impacts that could be considered in lieu of a continuous, climate-adjusted data set. Furthermore, TRCA indicated that provision of adequate LID measures / infiltration could counteract the long-term effects of climate change, including more frequent / more intense rainfall events. If a climate-adjusted continuous data set becomes available, it could be used to further assess wetland water balance, site wide water balance, and erosion impacts for future climate scenarios. At this time, the following approach as presented at the April 23<sup>rd</sup>, 2025 workshop continues to be proposed, with some modifications:

**Table 8.1: Alloa SWM Design – Climate Change Considerations**

Component	Impact from Climate Change	Notes	How to evaluate	When	Asset Life Evaluation
<b>Storm Sewer Sizing</b>	<input checked="" type="checkbox"/> Yes — increased IDF curves à larger peak flows à larger sewers / additional CB capture capacity required	Design flows based on 2–100 year events	IDF_CC Tool / Canadian Climate Atlas for 2-year to 100-year storms, other CC recommendations from surrounding municipalities	<b>Evaluate</b> at detailed design	Functional lifespan is tied to the frequency of exceedance of design flow. Climate change can shorten this by increasing rainfall intensities. Climate change is unlikely to impact structural degradation.

Component	Impact from Climate Change	Notes	How to evaluate	When	Asset Life Evaluation
<b>Culvert Sizing</b>	✗ No — sized for <b>Regional Storm</b>	The Regional storm is historical and not climate-adjusted	No adjustment to Regional storm required.	See Climate Change Assessment Memo ( <b>Appendix F</b> )	Structure / sizing based on Regional storm conveyance – structure life unlikely to be impacted by climate change effects on hydrology.
<b>Channel Block / Floodplain Hazard</b>	✗ No — sized for <b>Regional Storm</b>	The Regional storm is historical and not climate-adjusted	No adjustment to Regional storm required.	See Climate Change Assessment Memo ( <b>Appendix F</b> )	Channel corridor and flood hazards based on Regional storm conveyance – unlikely to be impacted by climate change. Natural channel design best practices and substantial meander belt width ensure channel can adapt in relation to changes in flows.
<b>SWM Pond Blocks</b>	✗ No — quantity control based on Regional	Smaller storms and frequency of ED may change; longer drawdown times if rainfall events are more frequent.	IDF_CC Tool for 2-year to 100-year storms ED - Run climate-adjusted continuous precipitation and temperature data (provided by the Town)	See Climate Change Assessment Memo ( <b>Appendix F</b> )	Changes in rainfall frequency and duration may require adjustments to extended detention orifice controls, but no impact to service life or total sediment loading is expected, other than vegetation stress.

Component	Impact from Climate Change	Notes	How to evaluate	When	Asset Life Evaluation
<b>Wetland Water Balance</b>	<input checked="" type="checkbox"/> Yes — changes in rainfall & temperatures / evaporation à more or less frequent inundation	Impacts water balance, hydroperiods. LSWS current examined extreme (wet and dry) years.	Run climate-adjusted continuous precipitation and temperature data (provided by the Town)	<b>Evaluate</b> at detailed design	Adaptive management measures may have to be implemented to ensure wetland hydroperiods are maintained; this may introduce additional infrastructure that requires maintenance / replacement over time.
<b>LID Features / Site Water Balance</b>	<input checked="" type="checkbox"/> Yes / <input checked="" type="checkbox"/> No - changes to runoff, variable infiltration, but mitigation target based on existing conditions. LIDs not factored into pond calculations	<b>If less rainfall</b> , then potentially insufficient recharge. <b>If more rainfall</b> , then water balance will continue to be met.	Run climate-adjusted continuous precipitation and temperature data (provided by the Town)	<b>Evaluate</b> at detailed design	Functional service life of LID features such as vegetation may be impacted by climate change.

The Resilient Caledon Community Climate Change Action Plan identifies how the Town of Caledon intends to respond to potential climate-related challenges including changes in the frequency of extreme weather (droughts, floods, etc.). In order to design a community that is resilient to climate change, the following items have been (and will continue to be) considered as the studies for this area advance.

**Flood hazards:** As noted in the preceding table, flood hazards in the adjacent creeks have been established using the regional event (Hurricane Hazel) which is based on an historic event. As such, the extent of existing or proposed flood hazards will not be affected by increased intensity, frequency and duration of storm events due to climate change.

**Erosion:** As there is the potential for increased frequency of flows in the creeks due to climate change, the impacts of these flows on erosion protection measures should be considered at detailed design. While this will not affect channel block sizes, it could impact the sizing of stone protection or other mitigation measures at detailed design

**Stormwater Management:** All proposed stormwater management facilities within the study area have been designed to control, and in the case of Etobicoke Creek facilities, over-control the regional

event. Due to the use of this historical storm in the sizing, the pond blocks are not anticipated to increase as a result of climate change.

**Storm Sewers:** To ensure stormwater sewers/downstream culverts are able to withstand the impacts of climate change during more frequent and/or intense events, the proposed sizes will be reevaluated at the detailed stage of the design when considering the potential for increased frequency, duration and intensity of storm events. The storm sewers in the community are currently designed to convey the 10-year storm event in accordance with Caledon standards. This requirement is more conservative than other GTA municipalities which only require storm sewers to be designed to convey the 5-year event. The storm sewer design can be updated through the detailed design process once the Town has published updated IDF parameters incorporating climate change.

**Irrigation:** In parks and site plan blocks, the potential for storing stormwater and utilizing it for irrigation should be explored in future studies to decrease reliance on municipal water during drought conditions. Increased irrigation demand due to potential drought should be considered in the final water distribution analysis. This can be mitigated through public education, signage, and the incorporation of efficient fixtures and irrigation methods.

**Roadways:** Proposed roadways within the development will be designed to avoid excessive flooding during large storms as well as ensuring adequate conveyance of flows. This can be accomplished by verifying the capacity in the roadways compared to the 100-year event, as well designing and implementing adequate catchbasins to capture the flows.

**Site water balance:** Where feasible based on soil / groundwater constraints, LIDs such as green roofs (in the site plan / high density blocks), infiltration measures, tree pits, etc., in will be utilized in the design to mitigate the effects of climate change (i.e., managing more frequent runoff events).

**Environmental features / wetlands:** Potential impacts of climate change on feature-based water balance for the wetlands will continue to be evaluated and have considered extreme conditions (wet / dry years). Mitigation could include utilizing stormwater to irrigate the wetlands and preparing monitoring plans for post-development to evaluate the health of the wetlands.

## 9 DEVELOPMENT STAGING and ESC PLANNING

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Preliminary development staging and sub-phases for the Tertiary Plan Area shown in **Drawing 9.1**.

The staging plan provides a logical extension of growth in this area of Caledon and is consistent with Town and Regional infrastructure planning (water, sanitary, roads).

Development is intended to be phased in accordance with the availability of servicing infrastructure provided by the Region of Peel. From a drainage perspective, the Alloa Secondary Plan is situated within the existing Etobicoke Creek and Fletchers Creek subcatchments. The pre-development drainage boundaries are generally being maintained in the post-development condition. For the Fletchers Creek catchment (generally south of the Alloa Drain), post-development outlets are readily available at Mayfield Road and Chinguacousy Road and municipal servicing is in place. In contrast, the build-out of the Etobicoke Creek catchment is contingent on the realignment and lowering of the existing Alloa Drain.

The realignment and lowering of the Alloa Drain is expected to occur in phases to support the varying development timelines within the Tertiary Plan Area. As holdout properties prevent full completion of the drain realignment currently, partial lowering is proposed on the participating properties (see **Drawing 9.2**) to allow as much of the Alloa Phase 1 lands to proceed as possible. This will include a temporary drain connection and a temporary swale west of Creditview Road to support phased realignment for Phase 1. Lands adjacent to the holdout properties may explore partial development scenarios through individual applications beyond the existing Regional floodplain or by providing appropriate compensation for any interim floodplain alteration works (subject to Agency approvals and permits).

Where feasible, the existing Alloa Drain and its contributing tributaries will remain in place during the construction of the ultimate channel system. In locations where the ultimate channel alignments conflict with existing watercourses, temporary diversion channels will be implemented to maintain overland flow and conveyance throughout the creek works.

The Alloa Earthworks Program will require substantial import of clean fill from off-site sources to achieve overall site grading balance. To facilitate this large-scale, multi-year operation, Town Council authorized staff in April 2025 to apply the expedited site alteration permit review and issuance process to all eligible lands within Phase 1 / Stage 1, south of the Alloa Drain.

It is also important to note that:

- Opportunities for partial development under the interim Natural Heritage System (NHS) condition will be further explored at the draft plan and detailed design stage, as applicable to specific landowner applications.
- If required to accommodate development timing and phasing, the Alloa Landowner's Group may enter into a front-ending agreement with Peel Region to deliver necessary regional infrastructure ahead of the capital program planning schedule. This will be further discussed as planning proceeds.

- Phasing internal to each Block will be determined as work proceeds and draft plans come forward. Considerations for interim phasing of stormwater management, water, sanitary and floodplain channelization will be reviewed, as required, with the Planning Authorities at an appropriate time in the process. Coordination within sub-phases will be necessary to ensure adequate site access, servicing, etc.

### **9.1. Erosion and Sediment Control Plan During Construction**

Rigorous erosion and sediment control measures will be designed, implemented and maintained throughout the construction period. At detailed design, an Erosion and Sediment Control Plan will be prepared and designed in conformance with the Town and Conservation Authority guidelines (e.g., Guidelines for Erosion and Sediment Control for Urban Construction Sites (2006)). Erosion and sediment control will be implemented for all construction activities including topsoil stripping, earthworks, foundation excavation and stockpiling of materials and will remain in place and functional until bare surfaces are stabilized.

The following erosion and sediment control measures are typical for this type of development:

- Natural features will be staked, and temporary fencing provided to keep machinery out of sensitive areas.
- Sediment control fence and snow fence will be placed prior to earthworks.
- Logistics/construction plan will be implemented to limit the size of disturbed areas, minimizing the non-essential clearing and grading areas.
- Temporary sediment ponds.
- Rock check-dams and cut-off swales will be provided, where required, in order to control, slow down and direct runoff to sediment basins.
- Sediment traps will be provided.
- Gravel mud mats will be installed at construction vehicle access points to minimize off-site tracking of sediments.
- All temporary erosion and sediment control measures will be routinely inspected / monitored and repaired during construction. Temporary controls will not be removed until the areas they serve are restored and stable.
- The “multiple barrier approach” will be applied to all construction stages to ensure erosion is prevented rather than reduced. Recommended measures are to be installed prior to the initiation of the earthworks and grading.

ESC Applications will be prepared to support any creek re-alignments and grading works within and outside of TRCA/CVC regulation limits. Temporary sediment control ponds will be constructed at locations of the ultimate SWM Ponds. Temporary diversion channels and crossings (as required) will be constructed to accommodate ultimate creek alignments. ESC measures will be implemented to protect diversion channels and watercourses at all times during construction.

71

## 10 CONCLUSION

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This Functional Servicing Report (FSR) has been prepared in support of the Phase 1 Tertiary Plan for the Alloa Secondary Plan Area. The report evaluates the feasibility of providing municipal servicing infrastructure, including stormwater management, sanitary servicing, water servicing, and site grading, to support the proposed development of approximately 263 ha of lands within the Town of Caledon.

Based on the analyses completed herein, the following conclusions are provided:

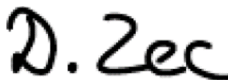
- The proposed servicing strategy demonstrates that the Phase 1 Tertiary Plan Area can be adequately serviced in accordance with applicable Town, Regional, and Conservation Authority criteria. The integrated servicing approach reflects coordination with the Local Subwatershed Study, Scoped Servicing Study, and supporting technical work, and provides a comprehensive framework to support Draft Plan of Subdivision approvals.
- The proposed stormwater management strategy incorporates a combination of end-of-pipe facilities, on-site controls, and Low Impact Development (LID) measures to address quantity, quality, erosion, and water balance requirements for both the Etobicoke Creek and Fletcher's Creek subwatersheds.
- Seven (7) SWM ponds, supplemented by private on-site controls, have been strategically located to maximize gravity servicing, maintain pre-development drainage patterns where feasible, and minimize infrastructure requirements. The proposed facilities can achieve the required storage volumes and discharge targets established through the applicable subwatershed studies and SABE criteria.
- Continuous modelling, sensitivity analysis, and erosion assessments demonstrate that the proposed strategy does not result in adverse downstream impacts and is consistent with established erosion thresholds. Water balance objectives are addressed through a combination of infiltration-based LID measures and site-level mitigation strategies, to be further refined through detailed design.
- The proposed natural channel design for the realignment of the Alloa Municipal Drain establishes a stable and functional corridor that contains the post-development floodplain within the defined NHS limits. The design integrates hydraulic, geomorphological, and ecological considerations to provide a resilient system that supports flow conveyance, flood attenuation, and habitat enhancement.
- Hydrologic and hydraulic modelling confirms that the proposed channel and associated crossings can safely convey Regional storm flows, which govern system design. The proposed corridor also provides opportunities for floodplain storage, wetland integration, and long-term system stability.
- Sanitary servicing for the Tertiary Plan Area is proposed to be accommodated through connections to the existing and planned Regional wastewater system, consistent with the

72

Region of Peel servicing strategy. Based on the analysis completed to-date and coordination with Regional infrastructure planning, sufficient capacity is available to accommodate the projected wastewater flows from all Phase 1 lands through the existing Brisdale sewer.

- The proposed water servicing strategy includes a looped distribution network connected to existing and planned Regional infrastructure, providing redundancy and reliability of supply. The system has been developed in accordance with Regional design criteria and is expected to meet domestic and fire flow requirements for the proposed development.
- The proposed grading strategy has been developed to balance servicing requirements, natural feature constraints, and boundary conditions, including planned road works and the future Highway 413 corridor. The grading approach maintains overall drainage patterns, provides appropriate servicing depths, and facilitates gravity drainage to SWM facilities.
- Assessment of future climate conditions indicates that the Regional storm event governs system design and floodplain limits within the Tertiary Plan Area. As such, the proposed infrastructure sizing and channel design are considered robust with respect to anticipated climate variability.

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# APPENDIX A

## DRAWINGS AND FIGURES

# APPENDIX B

# APPENDIX C

# APPENDIX D

# APPENDIX E

# APPENDIX F

# APPENDIX G