White Church Secondary Plan

Water, Wastewater and Stormwater Master Servicing Plan

December 2023

Submitted by:

SCS Consulting Group Ltd
30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8
Phone 905 475 1900
Fax 905 475 8335

Project Number: 2600

Table of Contents

List of Tables

List of Figures

List of Appendices

Submission History

Submission	Date	In Support Of	Distributed To
1st	December 2023	OPA	Hamilton

1.0 Introduction

SCS Consulting Group Ltd. has been retained by the White Church Landowners Group to prepare a Water, Wastewater and Stormwater Master Servicing Plan in support of the White Church Secondary Plan, located in the City of Hamilton.

1.1 Purpose of the Master Servicing Plan

The Water, Wastewater and Stormwater Master Servicing Plan (MSP) has been prepared in support of an Official Plan Amendment application for the proposed development. The Secondary Plan is provided in **Appendix A**. The proposed development consists of the following land uses:

- residential,
- neighbourhood park,
- community park,
- natural open space,
- institutional (school),
- mixed-use – medium density,
- utility (SWM facility blocks),
- pipeline/recreational trail, and
- proposed road rights-of-way.

The purpose of this report is to demonstrate that the development can be graded and serviced in accordance with the City of Hamilton, the Niagara Peninsula Conservation Authority (NPCA), and the Ministry of Environment, Conservation and Parks (MECP) design criteria.

1.2 Study Area

The Subject Lands comprise a grouping of parcels generally bounded by Upper James Street to the west, Airport Road East to the north, Miles Road to the east and White Church Road to the south (see **Figure 1.1**). Additionally, a portion of the Secondary Plan area extends northeast of Airport Road East. This portion is informally referred to as the 'panhandle' within this report. The study area is approximately 326 ha in size.

The existing Subject Lands are primarily comprised of agricultural land (sod farm), an existing golf course, and open space areas. The Subject Lands are located within the headwaters of Twenty Mile Creek and the Upper Welland River. Two existing pipelines, owned by Enbridge and Westover Express Pipeline Limited, traverse the subject lands from east to west.

1.3 Background Servicing Information

In preparation of the servicing and stormwater management (SWM) strategies, the following design guidelines and standards were used:

- Hamilton Comprehensive Development Guidelines and Financial Policies Manual (2019);
- Hamilton Secondary Plan Guidelines for Urban Expansion Areas (Draft 2023);
- Hamilton Complete Streets Guidelines (June 2022);
- Niagara Peninsula Conservation Authority Stormwater Management Guidelines (March 2010);
- Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003); and
- Enbridge Crossing and Encroachment Guide and Requirements – Canada (October 4, 2023).

The servicing and SWM strategies in this report reference the following approved reports:

- City of Hamilton Airport Employment Growth District-Phase 2 Water & Wastewater Servicing Master Plan Update, dated December 2016;
- City of Hamilton Water and Wastewater Master Plan Class Environmental Assessment Report, dated November 22, 2006;
- NPCA HEC-RAS Hydraulic Model, Twenty Mile Creek, 2023 Revision; and
- NPCA Twenty Mile Creek Watershed Plan, 2006.

The servicing and SWM strategies are also based on the following approved Engineering Drawings:

- Dickenson Road East Sanitary Sewer Installation Issued for Tender Drawings, prepared by IBI Group, dated February 2022;
- Proposed Sewage Pumping Station S-H27 Hwy 6 and Homestead Drive Site Plan, prepared by the Regional Municipality of Hamilton-Wentworth, dated March 1995;
- Drawing Set 88-S-16 Hwy No. 6 Proposed Sanitary Sewer, prepared by the Regional Municipality of Hamilton-Wentworth, dated April 1988 and May 1989;
- Drawing Set 95-W-66 Cayuga Water System Trunk Watermain (Mount Hope to Caledonia), prepared by Thorburn Penny Consulting Engineers, dated February 1994;

- Drawing Set 90-W-16 Sheets 1-6 Airport Road Proposed Watermain, prepared by the Regional Municipality of Hamilton-Wentworth, dated August 1990;
- Drawing Set 12-W-04 Homestead Drive Existing Conditions, prepared by the City of Hamilton, dated March 2012; and
- Drawing 02-W-43 Sheet 1 Miles Road Proposed 200 Replacement Watermain, prepared by the City of Hamilton, dated January 2006.

Excerpts from the above listed documents are included in **Appendix B**.

Consultation meetings with Hamilton and NPCA were held on October 2, 2023 and October 6, 2023.

2.0 Stormwater Management

2.1 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the greatest requirements of each of the design guidelines and standards listed in **Section 1.3** and discussions with agencies. The stormwater runoff criteria are summarized below in **Table 2.1**:

Table 2.1: Stormwater Runoff Control Criteria

Criteria	Control Measure
Quantity Control	Match or reduce post development peak flows to pre-development peak flows for a range of design storm events (2, 5, 25 and 100-year storm events). Different design storm distributions and durations shall be assessed in order to determine the critical storm that yields the lowest predevelopment peak flow and the highest post-development peak flow. At a minimum, the 3-hour Chicago, 12-hour AES and 24-hour SCS distributions should be considered. (NPCA)
Quality Control	A minimum of "Normal" level of water quality treatment, as defined in the MOE design guidelines (2003) is required for all SWM facilities. This is equivalent to a 70% TSS reduction. (NPCA) "Enhanced" level of water quality treatment (80% TSS reduction) will be required on all watercourses containing Type 1 – critical fish habitat. (NPCA) The SWM Facility for a development site is required to include measures to eliminate or mitigate adverse temperature impacts due to the increase in impervious surfaces and the ponding of water in SWM ponds. Particular attention is to be given to those systems discharging to coolwater or coldwater receiving systems. (NPCA) Post-development water temperature regime is to mimic or enhance the pre-development regime. (NCPA)

Criteria	Control Measure
Erosion Control	Erosion control to detain and release the 25mm, 4-hour Chicago design storm over a 24-hour period shall be provided for all receiving systems that are demonstrated to be stable watercourses or for proposed development that comprise less than 10% of the total area that drains to the receiving system. The geomorphologic assessments and criteria contained in the SWM Design Manual (MOE, 2003) shall be used for all receiving systems that are unstable under existing conditions or for proposed developments that comprise a significant proportion of the total area draining to the receiving system.
Water Budget	Water balance impacts should be evaluated during the design of a site stormwater management system. All efforts should be made to match pre- and post-development infiltration volumes in order to maintain groundwater recharge. (NPCA) Untreated stormwater shall be prevented from being directly infiltrated. (NPCA)
Phosphorus Removal	Phosphorus removal targets will be typically provided for in the TSS removal targets, unless specific targets are developed through a management strategy. (NPCA)Not anticipated to be required.

2.2 Existing Drainage

An existing drainage plan was prepared for the study area. The drainage boundaries were determined using a combination of detailed ground based topographic survey and remote sensing completed by A.T. Mclaren in 2023. The existing drainage plan is shown in **Figure 2.1.**

Under existing conditions, storm runoff from approximately 113 ha drains north east to drainage features which are tributary to Twenty Mile Creek via culverts under Airport Road East and culverts under Miles Road. Storm Runoff from the “panhandle” lands north of Airport Road is also tributary to Twenty Mile Creek. Storm runoff from approximately 209 ha drains south to existing drainage features which are tributary to the Upper Welland River, via culverts under White Church Road East. Also within the Upper Welland River Subwatershed, storm runoff from approximately 22 ha drains east to an existing drainage feature and online golf course pond, which outlets to existing culverts under Upper James Street.

2.2.1 Existing Site Characterization

The soil classifications were identified using the Landtek Geotechnical Desktop Study (December 2023 – submitted under separate cover) and land uses visible in recent aerial photography and site reconnaissance. The Landtek Study notes that the predominant soil type is clayey and silty till soils in the south and Glacio-lacustrine silts and clays in the north.
These soils are considered Hydrologic Soil Group C according to the MTO Drainage Management Manual (1997) Design Chart 1.08. The Soil Conservation Service Curve Number (CN) and runoff coefficient used for both the Hydrologic Soil Group C are shown in **Table 2.2**.

Table 2.2: CN and Runoff Coefficient Summary

Land Use or Surface Classification	CN for Soil Group C	Runoff Coefficient for Soil Group C[1]
Woodland	73	0.08
Pasture	76	0.10
Cultivated	71	0.22
Impervious Area	98	0.90

Source: MTO Drainage Management Manual (1997)
Note: 1 – Runoff Coefficients used are for flat topography

2.2.2 Existing Hydrologic Modelling

Hydrologic modelling was undertaken using the Visual Otthymo Version 5.0 software (VO5) based on the 3-hour Chicago, 12-hour AES and 24-hour SCS Distribution methods. The study area is located within the City of Hamilton, therefore, the Mount Hope IDF rainfall information was obtained from the Hamilton Comprehensive Development Guidelines and Financial Policies Manual to determine the existing peak flows to outlet locations. The existing flows from the study area to the outlet locations are summarized in **Appendix C**.

The 12-hr AES design storm produced lower peak flows for the site and are therefore used as targets for proposed modelling.

A summary of modelling parameters and an existing VO6 schematic are provided in **Appendix C**. A digital download page with the VO6 hydrology model is also provided in **Appendix C**.

2.3 Best Management Practices

In accordance with the Ministry of Environment, Conservation and Parks Stormwater Management Planning and Design Manual (2003), and the Hamilton Comprehensive Development Guidelines and Financial Policies Manual, a wide range of stormwater management techniques has been considered including lot level, conveyance system and end-of-pipe controls. Tables G.1 and G.2 of the Hamilton Guidelines provide a comprehensive list of stormwater management practices and the City's perspective on each practice. Based on these tables, the following stormwater management practices will be considered within the residential areas of Secondary Plan:

- Roof leader discharge to surface
- Roof leader discharge to soakaway pits
- Porous pavement (for residential driveways)
- Pervious pavement (for driveways)
- Pervious pipe systems
- Pervious catchbasin systems

Within the mixed-use medium density area of the Secondary Plan, the following additional stormwater management practices will be considered:

- Rooftop storage
- Parking lot storage
- Manufactured Treatment devices (oil grit separators)

At the Draft Plan stage, a hydrogeology assessment and water balance evaluation will be completed to confirm the recommended Low Impact Development (LID) techniques and to quantify the proposed rainwater retention volume.

Per the Hamilton Guidelines, end-of-pipe facilities may include wet ponds, dry ponds, wetland or hybrid stormwater management facilities. The Hamilton guidelines allow for superpipes for redevelopment of existing areas, where it can be demonstrated that there is no suitable alternative. Additional end-of-pipe facilities such as infiltration trenches may be considered subject to geotechnical assessment.

Beacon Environmental has advised that the Subject Lands are located within the Bird Hazard zones associated with the Hamilton Airport. Therefore, it is desirable to minimize wet ponds. Where wet ponds are proposed, design measures such as steep slopes and dense plantings will be provided to discourage use by water fowl.

2.4 Proposed Storm Drainage

Seven stormwater management facilities (SWMF) are proposed to service the proposed development. The proposed SWMF have been situated to generally maintain the

existing drainage boundaries to the extent feasible. SWMF 1 is proposed to outlet to the existing drainage feature east of Upper James Street. SWMF 4 is proposed to be located south of White Church Road within the Greenbelt lands, outside of any natural heritage features and associated buffers, on lands owned by a participating landowner in the White Church Landowners Group. SWMF 4 will outlet to an existing drainage feature. The other five SWMFs are proposed to outlet to existing culverts under White Church Road, Miles Road and Airport Road East.

The proposed drainage boundaries take into account the existing topography and existing gas pipelines. Storm sewer crossing elevations and allowable grading criteria associated with the gas pipelines have been taken into consideration in establishing the proposed stormwater drainage plan. A detailed subsurface investigation of the pipeline elevation will be undertaken at the Draft Plan stage.

On-site controls are proposed for Catchment 207, a proposed park block, bounded by Upper James Street to the west and an existing drainage feature to the east. Catchment 207 is approximately 3.3 ha and is therefore not large enough to support a stormwater management pond. The on-site controls will outlet to the existing drainage feature and be conveyed through the existing culverts at Upper James Street.

On-site controls are also proposed for the “panhandle” areas north of Airport Road East, with outlets to the existing drainage feature that flow west to east through this area.

Due to grading constraints in the southeast portion of the Subject Lands, the runoff from Catchments 212 and 213 cannot be conveyed to a SWMF, and will outlet directly to the existing culverts at Miles Road and White Church Road. At the Draft Plan stage, alterative stormwater measures such as pervious catchbasins, superpipes and oil grit separators will be considered for these areas.

The proposed storm drainage plan is shown on **Figure 2.2**.

2.5 Proposed Stormwater Management Plan

2.5.1 Quantity Control

The proposed end-of-pipe SWM facilities will control proposed flows from the site to existing flow rates for the 2 to 100 year storm events. The SWMF may consist of wet or dry facilities.

Table 2.3 summarizes the pre-development catchments used to establish the target release rates for each SWMF.

Table 2.3: Summary of Target Release Rates

SWMF	Description of Outlet Location	Pre-Development Catchment ID (used to Set Target Flows)	Pre-Development Catchment Area (ha)
SWMF 1	1200 mm dia. Open Bottom Concrete Culvert	101	17.87
SWMF 2	1000 mm dia. Culvert	102	32.00
SWMF 3	900 mm dia. Culvert	104	57.94
SWMF 4	Drainage Feature South of White Church Road	107,108	21.38
SWMF 5	Twin 600 mm dia. culverts.	109	23.26
SWMF 6	600 mm dia Culvert	116	41.78
SWMF 7	800 mm dia. Culvert	118	63.51

The target flows for each of the SWMFs, based on the pre-development peak flow to the corresponding outlet locations, are summarized in **Table 2.4**.

Table 2.4: Summary of Target Release Rates

Return Period Storm	SWMF 1 (m^3/s)	SWMF 2 (m^3/s)	SWMF 3 (m^3/s)	SWMF 4 (m^3/s)	SWMF 5 (m^3/s)	SWMF 6 (m^3/s)	SWMF 7 (m^3/s)
2 Year	0.143	0.212	0.430	0.169	0.164	0.288	0.441
5 Year	0.264	0.406	0.796	0.311	0.305	0.537	0.815
10 Year	0.353	0.552	1.066	0.418	0.410	0.722	1.093
25 Year	0.472	0.750	1.428	0.562	0.551	0.972	1.466
50 Year	0.563	0.905	1.707	0.674	0.660	1.165	1.755
100 Year	0.656	1.065	1.995	0.788	0.772	1.365	2.052

Note: The 12-hr AES design storm produced lower peak flows for the site and are therefore used as targets for proposed modelling.

The preliminary grading and storage requirements for the end-of-pipe SWM facilities will be provided at the Draft Plan stage.

The details of the on-site controls for Catchment 207 (park) and the "panhandle" lands north of Airport Road East will be provided at the Site Plan stage.

2.5.2 Quality Control: TSS

Water quality control will be provided Quality control will be provided by a treatment train of low impact development techniques and end-of-pipe facilities. As described in **Section 3.2**, low impact development techniques may include:

- Roof leader discharge to surface
- Roof leader discharge to soakaway pits
- Porous pavement (for residential driveways)
- Pervious pavement (for driveways)
- Pervious pipe systems
- Pervious catchbasin systems

Based on the NPCA criteria, it is anticipated that "Normal" level of water quality treatment (70% TSS reduction), as will be provided for all SWMFs. If critical fish habitat is identified through the ecological studies, "Enhanced" level of water quality treatment (80% TSS reduction) will be provided for the associated SWMFs.

The on-site water quality control requirements for Catchment 207 (park) and the "panhandle" lands north of Airport Road East will be provided at the Site Plan stage.

As noted in Section 2.3, if wet pond features are utilized, appropriate mitigative measures shall be implemented based on the proximity of the facilities within the Bird Hazard zones associated with the Hamilton Airport. Measures may include steep slopes and dense plantings will be provided to discourage use by water fowl.

2.5.3 Erosion Control

The attenuation of the extended detention volume in the SWMFs will provide erosion protection for the downstream watercourse as well as promote sediment removal for water quality. The extended detention volume for the proposed stormwater management facilities will be sized based on the detention of the 25 mm - 4 hour Chicago rainfall event. The volume calculated for the extended detention will be attenuated for a minimum of 24 hours. At the Draft Plan stage, an erosion assessment will be completed at each SWMF outlet, and the extended detention volume may be released over a longer duration if warranted.

At the Site Plan Stage, erosion control for Catchment 207 (park) and the "panhandle" lands north of Airport Road East will be provided to the extent feasible through infiltration based LIDs.

2.5.4 Water Budget

Where feasible, measures to minimize impacts on the water budget will be incorporated into the development design. A Hydrogeological Study is underway by Landtek, which will provide the estimated existing infiltration volume on the Subject Lands, and will establish infiltration targets for each property within the Subject Lands.

Low impact development measures will be implemented, where feasible, to maintain or increase existing infiltration rates. As described in **Section 2.3**, low impact development measures may include:

- Roof leader discharge to surface
- Roof leader discharge to soakaway pits
- Porous pavement (for residential driveways)
- Pervious pavement (for driveways)
- Pervious pipe systems
- Pervious catchbasin systems

2.6 Storm Servicing

The storm sewer system (minor system) will be designed for the 5 year return storm as per the Hamilton standards.

The major system flow drainage (up to the 100 year storm event) will generally be conveyed overland along the road rights-of-way and easements. The depth of the 100 year storm event flows within the road-rights-of way will not exceed the crown of the road.

The storm sewer system will typically be designed with grades between 0.5% and 2%. Throughout the proposed development, the storm sewer will be constructed at a minimum depth of 1.2 m to provide frost protection and 2.75 m for foundation drains. It is anticipated that storm sewers will be able to be designed with sufficient depth to service foundation drains by gravity through most of the development. However, due to shallow depth of the existing culverts under the boundary roads, it will not be possible to provide deep enough storm sewers to service foundation drains by gravity in some areas closer to the shallower storm outlets, therefore, sump pumps will be required. Specific boundaries of the areas requiring sump pumps will be confirmed at the Draft Plan application stage when detailed local road networks are available.

The general storm system drainage routing has been shown on **Figure 2.2.**

The storm drainage system will be designed in accordance with the Hamilton and MECP guidelines, including the following:

- Pipes to be sized to accommodate runoff from a 5 year storm event,
- Hydraulic gradeline analysis to be completed for the 100 year storm event, to confirm hydraulic gradeline is minimum 0.3 m below basement floor elevation;
- Minimum Pipe Size: 300 mm diameter,
- Maximum Flow Velocity: 3.65 m/s,
- Minimum Flow Velocity: 0.8 m/s,
- Minimum Pipe Depth: 2.75 m to obvert (unless justified in servicing report),

The rainfall intensity will be calculated as follows, where 'i' is the rainfall intensity (mm/hour) and A, B, and C are as per **Table 2.4**:

$i = A / (T_c + B)^c$

Table 2.4: Rainfall Intensity Parameters

Return Period Storm	A	B	C
2 Year	646	6	0.781
5 Year	1049.5	8	0.803
10 Year	1343.7	9	0.814
25 Year	1719.5	10	0.823
50 Year	1954.8	10	0.826
100 Year	2317.4	11	0.836

2.7 Overland Flow

Major system flows (greater than the 5 year up to the 100 year storm event) will be conveyed within the road rights-of-way to the stormwater management facilities. The depth of the 100 year storm event flows within the road-rights-of way will not exceed the crown of the road.

3.0 Sanitary Servicing

3.1 Existing Sanitary Sewer System

The Mount Hope community to the west is serviced by a series of existing sanitary pump stations, HC024 (Airport), HC027 (Homestead), HC019 (Mount Hope), and HC018 (Twenty Road). The Airport pump station pumps sanitary flows to a gravity sewer on Provident Way which conveys flows to the Homestead pump station. The Homestead pump station pumps north to an existing 600 mm diameter sanitary sewer on Homestead Drive. Sanitary flows are conveyed north to the Mount Hope pump station, which pumps north to an existing 675 mm diameter sanitary sewer on Upper James Street, north of English Church Road. The sanitary flows are pumped north again at the Twenty Road pump station. Ultimate the sanitary flows are conveyed Woodward Ave Wastewater Treatment Plant. The existing sanitary sewer system is illustrated on **Figure 3.1.**

The construction of a 1500 mm diameter trunk sanitary sewer along Dickenson Road is currently underway by the City. Upon completion of the Dickenson Road truck sewer, flows from the existing sanitary sewer system on Upper James Road, south of Dickenson Road will be diverted to the Dickenson Road trunk sanitary sewer.

3.2 Proposed Sanitary Sewer System

A sanitary pump station is proposed in the northeast corner of the Subject Lands to service the approximately 227 ha of the proposed development, including the "panhandle" lands north of Airport Road. The sanitary pump station will pump the sanitary flows north via a proposed forcemain on Miles Road to the Dickenson Road trunk sanitary sewer. Sanitary drainage cannot be conveyed to the Dickenson Road trunk sanitary sewer via a gravity sewer on Miles Road due to a conflict with the existing 2.93 m high by 2.67 m wide concrete box culvert crossing of Twenty Mile Creek, approximately 650 m south of Dickenson Road. Sanitary Drainage from approximately 99 ha is proposed to drain via gravity to the Homestead sanitary pump station. Additional analysis is required to confirm the residual capacity in the Homestead sanitary pump station, and the downstream existing sanitary sewer system which will convey the sanitary flows to the Dickenson Road trunk sanitary sewer at Upper James Street. Potential upgrades to the existing sanitary pump station and sanitary sewer system will be confirmed.

The preliminary layout for the proposed sanitary sewer within the Subject Lands is provided on **Figure 3.1**.

The sanitary sewers within the proposed development will have slopes ranging between 0.5% and 2% (typically). The critical trunk sanitary sewer routes have proposed slopes

of 0.35% to minimize the depth of the sanitary sewer and the pump stations. The maximum depth of the trunk sanitary sewer will be approximately 15 m deep.

The sanitary sewer system will be designed in accordance with the Hamilton and MECP criteria, including but not limited to:

- Residential Sanitary Generation Rate: 360 l/c/d,
- Population Density:
  - Single detached 60 ppha
  - Semi-detached 75 ppha
  - Townhouses and Maisonettes (30 upha) 110 ppha
  - Medium Density apartments (60 upha) 250 ppha
  - High Density apartments (100 upha) varies (subject to detailed plans) Parks 12 to 25 ppha
  - Schools and Institutional Uses 75 to 125 ppha
  - Commercial varies 125 to 750 ppha
- Peaking Factor: Harmon (Min. 2.0 Max. 5.0),
- Infiltration Rate: 0.40 L/s/ha where the weeping tiles of the dwelling are designed to be drained by gravity, 0.6 L/s/ha where there are no storm sewers or shallow storm sewers,
- Sanitary sewers shall be designed to flow at maximum 75% full up to 450 mm diameter, maximum 60% full for 525 mm diameter and above;
- Minimum Pipe Size: 250 mm diameter (200 mm diameter may be permitted on the last run);
- Minimum Pipe Cover: 2.75 m,
- Minimum Full Flow Velocity: 0.75 m/s, and
- Maximum Velocity: 2.75 m/s.

Preliminary sanitary populations are calculated in **Appendix D**.

Water Supply and Distribution

3.3 Existing Water Distribution

Per the Hamilton Airport Employment Growth District - Phase 2 Water and Wastewater Master Plan (December 2016), Pressure District 6 (PD6) consists of land between ground elevations of approximately 205 m and 240 m and is serviced by pumping station HD06A and HD06B. The White Church Secondary Plan lands are located within Pressure District 6 (PD6), with existing ground elevations ranging from approximately 218 m to 230 m.

Adjacent to the proposed development, an existing 500 mm diameter watermain is located on Upper James Street, which feeds Caledonia to the south. Existing 400 mm diameter watermains are located on Upper James Street north of Airport Road and on Airport Road west of Upper James Street. An existing 300 mm diameter watermain is located north of the proposed development on Airport Road East. The existing watermain system is illustrated on **Figure 4.1**.

3.4 Proposed Water System

The proposed development will be serviced via connections to the existing water distribution system on Upper James Street and Airport Road East. A watermain hydraulic analysis will be completed to confirm that there is sufficient domestic and fire flows to service the development, confirm watermain sizing and to identify an external infrastructure requirements. The preliminary layout for the proposed watermain system is provided on **Figure 3.1.**

The watermain system will be designed in accordance with the Hamilton and MECP criteria including:

- Domestic demand design flows shall conform to the latest edition of the Ontario Ministry of the Environment's "Guidelines for the Design of Water Storage Facilities, Water Distribution Systems, Sanitary Sewer Systems and Storm Sewers",
- Fire flows shall be determined in accordance with the Fire Underwriters Survey (FUS 1999),
- Maximum operating pressure shall not exceed 700 Kpa,
- Under simultaneous maximum day and fire flow demands, the pressure shall not drop below 140 Kpa;
- Minimum Residential Pipe Size: 150 mm diameter (50 mm dia copper around cul-de-sac),
- Minimum Employment Pipe Size: 200 mm,
- Minimum Pipe Depth: 1.6 m,
- Maximum Pipe Depth: 3.0 m, and

- Maximum Hydrant Spacing: Generally 150 m on streets with low density development, and 110 m on collector streets, high density residential streets, commercial and industrial streets. On cul-de-sacs, the fire hydrant shall be located within 75 m of the dwelling lot furthest from the street entrance.

4.0 Grading

4.1 Existing Grading Conditions

Under existing conditions, the majority of the subject lands in the western and southern portion of the study area generally slope toward the south. The northeast portion of the site generally slopes toward the northeast. The existing topography has slopes in the range of 0.5% to 10%. The ground surface elevations through the study area range from approximately 230 m in the north to approximately 218 m in the south.

4.2 Proposed Grading Concept

In general, the proposed development will be graded in a manner which will satisfy the following goals:

- Satisfy the Hamilton lot and road grading criteria including:
  - Minimum Road Grade: 0.75%
  - Maximum Road Grade: 6.0% (5.0% for Major Collector)
  - Maximum Road Grade for Through Roads at Intersections: 3.5% (3.0% for Major Collector)
  - Maximum Road Grade for Stop Roads at Intersections: 2.5% (2% for Major Collector)
  - Maximum Lot Grade: 5%
- Provide continuous road grades for overland flow conveyance;
- Minimize the need for retaining walls;
- Minimize the volume of earth to be moved and minimize cut/fill differential;
- Minimize the need for rear lot catchbasins; and
- Achieve the stormwater management objectives required for the proposed development.

A preliminary grading plan is provided on **Figure 5.1**.

The proposed grades generally match to existing grades at the existing pipelines and the boundary roads. Due to grading constraints associated with the pipeline and boundary roads, 0.5% road slopes are proposed in some critical areas.

At the detailed design stage, the preliminary grading shown on **Figure 5.1** will be subject to a more in-depth analysis in an attempt to balance the cut and fill volumes and minimize slopes and walls.

5.0 Rights-of-way and Sidewalks

The proposed development will include 26 m Connector Streets and 20 m Neighbourhood Streets per the Hamilton Complete Streets Guidelines (June 2022).

6.0 Cost Sharing

The cost of infrastructure which benefits multiple properties, such as trunk storm sewers, trunk sanitary sewers, sanitary pumping stations, watermains, collector roads, and stormwater management facilities, should be shared by the benefiting landowners. It is recommended that the landowners within the White Church Secondary Plan enter into a cost sharing agreement to set out the principles in which these costs can be equitably shared. It is further recommended that the Secondary Plan policies include a requirement for implementation of the Cost Sharing Agreement and measures to ensure all parties in good standing with the Agreement prior to registration of any plans of subdivision or approval of any Site Plan Applications.

7.0 Erosion and Sediment Control During Construction

During the detailed design stage, erosion and sediment control measures will be designed with a focus on erosion control practices (such as stabilization, track walking, staged earthworks, etc.) as well as sediment controls (such as fencing, mud mats, catchbasin sediment control devices, rock check dams and temporary sediment control ponds). These measures will be designed and constructed as per the "Erosion and Sediment Control Guide for Urban Construction" document (NCPA, 2006). A detailed erosion and sediment control plan will be prepared for review and approval by the Municipality and Conservation Authority prior to any proposed grading being undertaken. This plan will address phasing, inspection and monitoring aspects of erosion and sediment control. All reasonable measures will be taken to ensure sediment loading to the adjacent watercourses and properties are minimized both during and following construction.

8.0 Summary

This Water, Wastewater and Stormwater Master Servicing Plan has been prepared in support of the Official Plan Amendment application for the proposed White Church Secondary Plan, in the City of Hamilton. This report outlines the means by which the proposed development can be graded and serviced in accordance with the Hamilton, NPCA, and the Ministry of Environment, Conservation and Parks design criteria and policies.

General Information

- The existing land use is primarily agricultural and an existing golf course;
- The proposed development is located in the Twenty Mile Creek and Upper Welland River subwatersheds;
- The proposed development consists of residential, park, natural open space, institutional (school), mixed-use – medium density, utility (SWMF blocks), pipeline/recreational trail, and proposed road rights-of-way.

Stormwater Management and Storm Servicing

- Quality Control: MECP Normal (Level 2) water quality protection can be provided through the use of seven SWMF and low impact development techniques;
- Erosion Control: The runoff volume from a 25 mm rainfall event will be detained over 25 hours by the SWMF;
- Quantity Control: Quantity control will be provided via seven SWMFs to control proposed runoff rates in the 2 through 100 year storm events;
- On-site quality, quantity and quality controls will be provided for Catchment 207 (park) and the “panhandle” lands north of Airport Road East;
- Water Budget: Low impact development measures will be implemented, where feasible, to maintain or increase existing infiltration rates;
- Storm Servicing:
  - Storm runoff will be conveyed by storm sewers designed in accordance with Municipality and MECP criteria;
  - Storm sewers will generally be designed for the 5 year storm event; and
  - Adequate 100 year overland flow routes will be provided.
- Existing external drainage will be accommodated through the proposed development via a municipal storm sewer.

Sanitary Servicing

- A sanitary pump station is proposed in the northeast corner of the subject lands to service the majority of the proposed development. The sanitary pump station will pump the sanitary flows north via a proposed forcemain on Miles Road to the Dickenson Road trunk sanitary sewer.
- The southwest portion of the subject lands is proposed to drain via gravity to the Homestead sanitary pump station, which will convey flows north to the Dickenson Road trunk sanitary sewer.

Water Supply and Distribution

- The proposed development will be serviced via connections to the existing watermains on Upper James Street and Airport Road East; and
- A watermain hydraulic analysis will be completed to confirm that there is sufficient domestic and fire flows to service the development, confirm watermain sizing and to identify an external infrastructure requirements.

Grading

- The proposed development grading has been developed to match to the existing surrounding grades, and provide conveyance of stormwater runoff; and
- The site grading will be subject to further grading design at the detailed design stage.

Rights-of-Way

- The proposed development will include 26 m Connector Streets and 20 m Neighbourhood Streets per the Hamilton Complete Streets Guidelines (June 2022).

Cost-Sharing

- It is recommended that the landowners within the White Church Secondary Plan enter into a cost sharing agreement.

Erosion and Sediment Control during Construction

- An erosion and sediment control plan will be prepared at the detailed engineering stage, in accordance with the “Erosion and Sediment Control Guideline for Urban Construction” document (December 2006).

Respectfully Submitted:

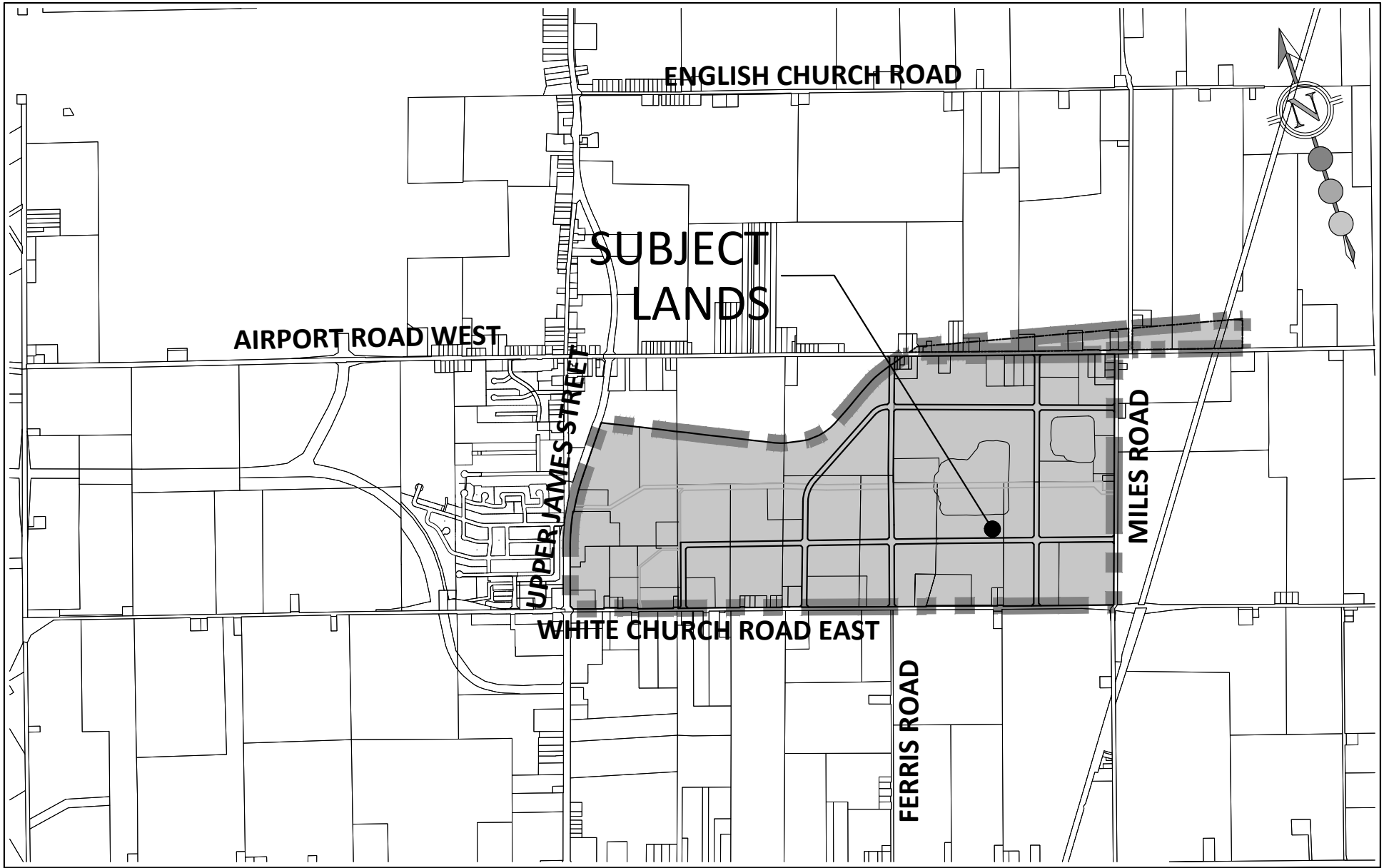
SCS Consulting Group Ltd.

Lindsay Moore,P.Eng.
Associate
lmoore@scsconsultinggroup.com

Melanie Hehn
mhehn@scsconsultinggroup.com

P:\2600 White Church Road Secondary Plan\Design\Reports\FSR\2600 Report - FSSR (subdivision).docx

Figures



WHITE CHURCH ROAD SECONDARY PLAN - MESP

SITE LOCATION PLAN

scs consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DESIGNED BY: M.H.	CHECKED BY: L.C.M.	PROJECT No: 2600	FIGURE No: 1.1
SCALE: 1:1000	DATE: DECEMBER 2023		

File: P:\2600 White Church Road Secondary Plan\Drawings\MESP\Fig\Report Figures\2600P-LOCT-1.1.dwg – Revised by <SOZDEMIR> : Sat, Dec 02 2023 – 6:32pm

AIRPORT ROAD EAST

UPPER JAMES STREET

MILES ROAD

FERRIS ROAD

WHITE CHURCH ROAD EAST

EXISTING SOUTHERN PINES GOLF & COUNTRY CLUB

SIGNIFICANT WOODLAND

TWENTY MILE CREEK SUBWATERSHED

UPPER WELLAND RIVER SUBWATERSHED

PIPELINE

2.62ha 119 | 1%

3.81ha 120 | 0%

17.87ha 101 | 13%

32.00ha 102 | 2%

4.32ha 103 | 2%

57.94ha 104 | 1%

27.82ha 105 | 1%

13.22ha 106 | 3%

14.58ha 107 | 1%

6.80ha 108 | 3%

2.51ha 110 | 1%

23.26ha 109 | 1%

13.53ha 111 | 1%

7.83ha 112 | 1%

1.79ha 113 | 0%

4.35ha 114 | 25%

7.59ha 115 | 4%

41.78ha 116 | 1%

13.40ha 117 | 8%

63.51ha 118 | 1%

7.97ha 214 | 0%

7.70ha 215 | 0%

EX. 600mm Ø CULVERT U/S INV. 225.98 D/S INV. 225.93

EX. 800mm Ø CULVERT U/S INV. 219.77 D/S INV. 219.60

EX. 600mm Ø CULVERT U/S INV. 219.28 D/S INV. 218.96

EX. 600mm Ø CULVERT U/S INV. 218.69 D/S INV. 218.51

EX. 900mm Ø CULVERT U/S INV. 222.78 D/S INV. 221.85

EX. 381mm Ø CSP CULVERT U/S INV. ~221.70

EX. 1200mm Ø OPEN BOTTOM CONCRETE CULVERT INV 219.80

EX. 1000mm Ø CULVERT U/S INV. 216.49 D/S INV. 216.46

EX. 1000mm Ø CULVERT U/S INV. 217.19 D/S INV. 216.99

EX. 900mm Ø CULVERT U/S INV. 216.81 D/S INV. 216.73

EX. 750mm Ø CULVERT U/S INV. 218.32 D/S INV. 218.07

EX. 1000mm Ø CULVERT U/S INV. 220.05 D/S INV. 220.06

EX. CULVERT (FILLED) APPROX U/S INV. 221.81 D/S INV. 221.61

EX. 500mm Ø CULVERT U/S INV. 222.47

EX. 400mm Ø CULVERT U/S INV. 222.70 D/S INV. 223.05

EX. 700mm Ø CULVERT U/S INV. 222.66 D/S INV. 222.56

EX. 700mm Ø CULVERT U/S INV. 223.10 D/S INV. 222.79

EX. 600mm Ø CULVERT U/S INV. 222.97 D/S INV. 222.89

EX. 600mm Ø CULVERT U/S INV. 223.02 D/S INV. 222.93

EX. 600mm Ø CULVERT U/S INV. 224.49 D/S INV. 224.42

EX. 750mm Ø CULVERT U/S INV. 224.25 D/S INV. 224.17

EX. 600mm Ø CULVERT U/S INV. 218.69 D/S INV. 218.51

EX. 600mm Ø CULVERT U/S INV. 222.39 D/S INV. 222.31

EX. 600mm Ø CULVERT U/S INV. 225.01 D/S INV. 224.91

EX. 900mm Ø CULVERT U/S INV. 226.19 D/S INV. 225.93

EX. 900mm Ø CULVERT U/S INV. 226.19 D/S INV. 225.93

NORTH EAST LIMIT OF DEVELOPMENT AREA DETAIL

SCALE: 1:4000

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- LIMIT OF SECONDARY PLAN
- EXISTING CONTOUR AND ELEVATION
- EXISTING STORM DRAINAGE BOUNDARY
- L=XXXm TIME OF PEAK FLOW PATH AND LENGTH
- 17.87ha 101 | 13% DRAINAGE AREA (HECTARES), PERCENT (%) IMPERVIOUS, CATCHMENT ID
- NATURAL OPEN SPACE (PER URBAN SOLUTIONS LAND USE PLAN, 2023)
- MAJOR SYSTEM - OVERLAND FLOW
- SUBWATERSHED DIVIDE

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

WHITE CHURCH ROAD SECONDARY PLAN - MSP

EXISTING STORM DRAINAGE PLAN

DESIGNED BY: M.H. | CHECKED BY: L.C.M.

SCALE: 1:4000 | DATE: DECEMBER 2023

PROJECT No: 2600 | FIGURE No: 2.1

File: P:\2600 White Church Road Secondary Plan\Drawings\MESP\Fig\Report Figures\2600P-STRM-EXST-2.1.dwg – Revised by <SOZDEMIR> : Tue, Dec 05 2023 – 3:54pm

AIRPORT ROAD EAST

WHITE CHURCH ROAD EAST

MILES ROAD

FERRIS ROAD

UPPER JAMES STREET

PIPELINE

0.51ha | 305 | 0%

9.65ha | 301 | 19%

1.05ha | 302 | 0%

23.12ha | 303 | 3%

18.28ha | 304 | 1%

7.70ha | 215 | 77%

7.97ha | 214 | 77%

60.70ha | 206 | 71%

6.46ha | 208 | 29%

3.27ha | 207 | 7%

55.23ha | 202 | 70%

35.03ha | 205 | 79%

31.79ha | 201 | 86%

56.96ha | 203 | 69%

57.64ha | 204 | 69%

0.61ha | 86% | 212

0.25ha | 99% | 213

1.38ha | 209 | 99%

ON-SITE CONTROLS

COMMUNITY PARK

PARK

SCHOOL

MIXED USE - MEDIUM DENSITY

SWMF 1 NWL 221.90

SWMF 2 NWL 217.00

SWMF 3 NWL 217.00

SWMF 4 NWL 218.60

SWMF 5 NWL 223.25

SWMF 6 NWL 222.60

SWMF 7 NWL 220.00

EX. 600mm Ø CULVERT U/S INV. 225.98 D/S INV. 225.93

EX. 800mm Ø CULVERT U/S INV. 219.77 D/S INV. 219.60

EX. 600mm Ø CULVERT U/S INV. 219.28 D/S INV. 218.96

EX. 600mm Ø CULVERT U/S INV. 218.69 D/S INV. 218.51

EX. 600mm Ø CULVERT U/S INV. 218.69 D/S INV. 218.51

EX. 600mm Ø CULVERT U/S INV. 222.39 D/S INV. 222.31

EX. 600mm Ø CULVERT U/S INV. 225.01 D/S INV. 224.91

EX. 900mm Ø CULVERT U/S INV. 226.19 D/S INV. 225.93

EX. 900mm Ø CULVERT U/S INV. 226.19 D/S INV. 225.93

EX. 900mm Ø CULVERT U/S INV. 222.78 D/S INV. 221.85

EX. 381mm Ø CSP CULVERT U/S INV. ~221.70

EX. 1200mm Ø OPEN BOTTOM CONCRETE CULVERT INV 219.80

EX. 1000mm Ø CULVERT U/S INV. 216.49 D/S INV. 216.46

EX. 1000mm Ø CULVERT U/S INV. 217.19 D/S INV. 216.99

EX. 900mm Ø CULVERT U/S INV. 216.81 D/S INV. 216.73

EX. 750mm Ø CULVERT U/S INV. 218.32 D/S INV. 218.07

EX. 1000mm Ø CULVERT U/S INV. 220.09 D/S INV. 220.06

EX. CULVERT (FILLED) APPROX U/S INV. 221.81 D/S INV. 221.61

EX. 500mm Ø CULVERT U/S INV. 222.70 D/S INV. 222.47

EX. 400mm Ø CULVERT U/S INV. 223.05 D/S INV. 222.98

EX. 700mm Ø CULVERT U/S INV. 222.66 D/S INV. 222.56

EX. 700mm Ø CULVERT U/S INV. 223.10 D/S INV. 222.79

EX. 600mm Ø CULVERT U/S INV. 222.97 D/S INV. 222.89

EX. 600mm Ø CULVERT U/S INV. 223.02 D/S INV. 222.93

EX. 600mm Ø CULVERT U/S INV. 224.49 D/S INV. 224.42

EX. 750mm Ø CULVERT U/S INV. 224.25 D/S INV. 224.17

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- LIMIT OF SECONDARY PLAN
- PROPOSED DRAINAGE BOUNDARY
- NATURAL OPEN SPACE (PER URBAN SOLUTIONS LAND USE PLAN, 2023)
- 0.04ha | 104 | 79% — DRAINAGE AREA (Ha); PERCENT (%) IMPERVIOUS; CATCHMENT ID
- EXTERNAL STORM DRAINAGE BOUNDARY
- AREA | ID | % — EXTERNAL STORM DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED FLOW DIRECTION OUT OF POND

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

WHITE CHURCH ROAD SECONDARY PLAN - MSP

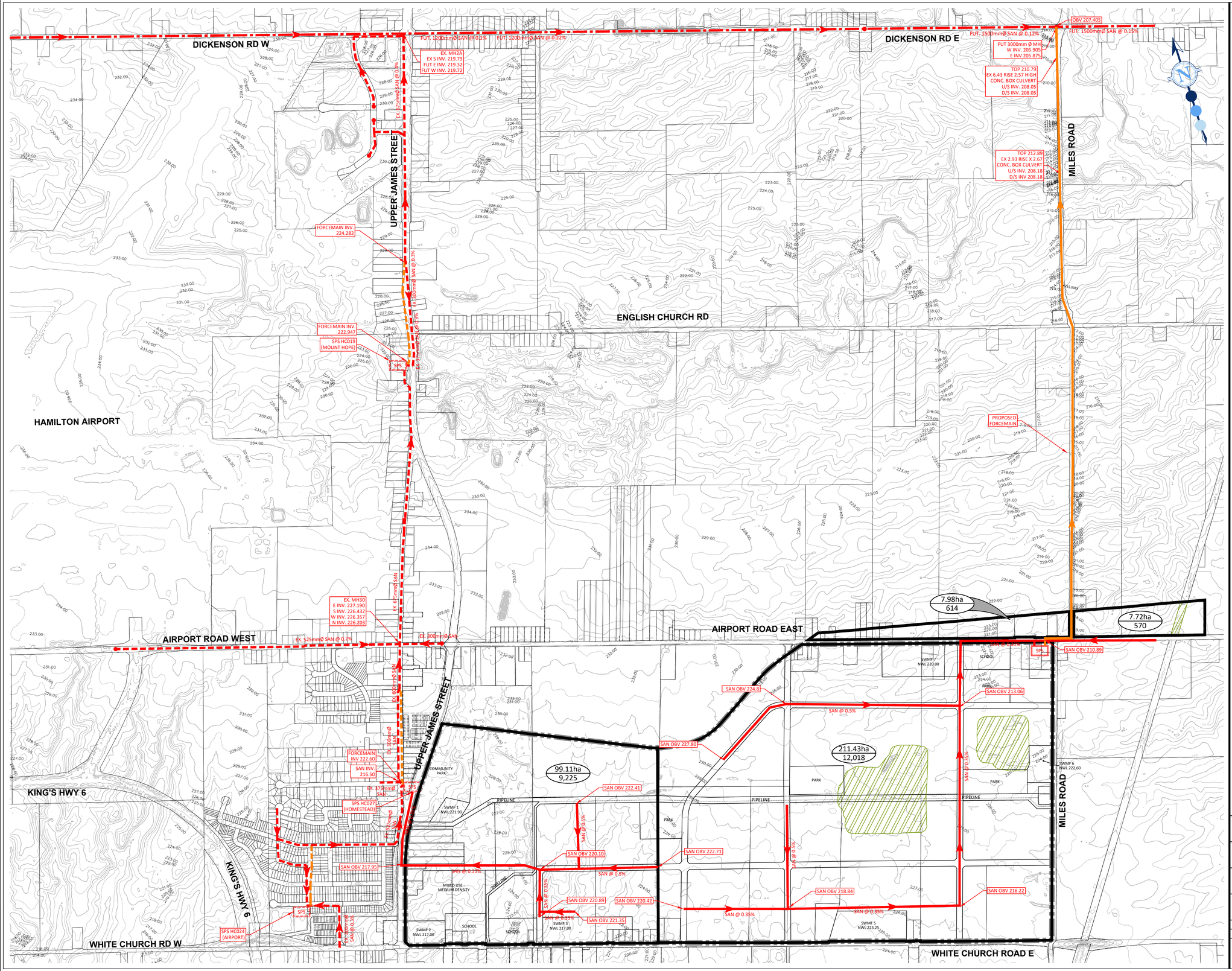
PRELIMINARY PROPOSED DRAINAGE PLAN

DESIGNED BY:	M.H.	CHECKED BY:	L.C.M.
SCALE:	1:4000	DATE:	DECEMBER 2023

PROJECT No: 2600

FIGURE No: 2.2

File: P:\2600 White Church Road Secondary Plan\Drawings\MESP\Fig\Report Figures\2600P-STRM-PROP-2.2-preferredponds.dwg – Revised by <SOZDEMIR> : Tue, Dec 05 2023 – 3:54pm



LEGEND:

- LIMIT OF SECONDARY PLAN
- SANITARY DRAINAGE BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- FUTURE SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- SPS — PROPOSED SANITARY PUMPING STATION
- SPS — EXISTING SANITARY PUMPING STATION
- PROPOSED SANITARY FORCEMAIN
- EXISTING SANITARY FORCEMAIN
- NATURAL OPEN SPACE (PER URBAN SOLUTIONS LAND USE PLAN, 2023)
- 0.20ha / 100 — DRAINAGE AREA (HECTARES) / POPULATION

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

WHITE CHURCH ROAD SECONDARY PLAN - MESP

PROPOSED SANITARY DRAINAGE PLAN

DESIGNED BY:	M.M.H.	CHECKED BY:	L.C.M.
SCALE:	1:7500	DATE:	DECEMBER 2023
PROJECT No:	2600	FIGURE No:	3.1

File: P:\2600 White Church Road Secondary Plan\Drawings\MESP\Fig\Report Figures\2600P-SANI-PROP-3.1.dwg – Revised by <SOZDEMIR> : Tue, Dec 05 2023 – 3:53pm

AIRPORT ROAD EAST

EX. 300Ø WATERMAIN

UPPER JAMES STREET

COMMUNITY PARK

SWMF 1
NWL 221.90

MIXED USE -
MEDIUM DENSITY

PIPELINE

SCHOOL

SCHOOL

SWMF 2
NWL 217.00

SWMF 3
NWL 217.00

PARK

PARK

SWMF 7
NWL 220.00

SCHOOL

PARK

PARK

SWMF 6
NWL 222.60

PIPELINE

PIPELINE

MILES ROAD

SWMF 5
NWL 223.25

WHITE CHURCH ROAD E

FERRIS ROAD

SWMF 4
NWL 218.60

FUT. 300Ø WATERMAIN PER
HAMILTON AEGD STUDY

BY 300Ø WATERMAIN

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- LIMIT OF SECONDARY PLAN
- 300Ø EXISTING WATERMAIN
- 400Ø EXISTING WATERMAIN
- 500Ø EXISTING WATERMAIN
- 300Ø FUTURE WATERMAIN
- PROPOSED WATERMAIN

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

WHITE CHURCH ROAD SECONDARY PLAN - MSP

PROPOSED WATER DISTRIBUTION PLAN

DESIGNED BY:	M.H.	CHECKED BY:	L.C.M.	PROJECT No:	FIGURE No:
SCALE:	1:4000	DATE:	DECEMBER 2023	2600	4.1

File: P:\2600 White Church Road Secondary Plan\Drawings\MESP\Fig\Report Figures\2600P-WTRM-4.1.dwg – Revised by <SOZDEMIR> : Tue, Dec 05 2023 – 3:54pm

AIRPORT ROAD EAST

WHITE CHURCH ROAD EAST

UPPER JAMES STREET

MILES ROAD

FERRIS ROAD

EX. 600mm Ø CULVERT
U/S INV. 225.98
D/S INV. 225.93

EX. 800mm Ø CULVERT
U/S INV. 219.77
D/S INV. 219.60

EX. 600mm Ø CULVERT
U/S INV. 219.28
D/S INV. 218.96

EX. 600mm Ø CULVERT
U/S INV. 218.69
D/S INV. 218.51

SWMF 7
NWL 220.00

SCHOOL

PARK

EX. 600mm Ø CULVERT
U/S INV. 222.39
D/S INV. 222.31

SWMF 6
NWL 222.60

COMMUNITY PARK

EX. 900mm Ø CULVERT
U/S INV. 222.78
D/S INV. 221.85

EX. 381mm Ø CSP CULVERT
U/S INV. ~221.70

EX. 1200mm Ø OPEN BOTTOM CONCRETE CULVERT
INV 219.80

SWMF 1
NWL 221.90

PIPELINE

WESTOVER EXPRESS (LINE) APPROX. TOP OF PIPELINE = TBD

APPROX. TOP OF EX. 508mmØ ENBRIDGE PIPELINE = 226.41m (ENBRIDGE LINE 11 DRAWING 11-WS-NN-013, SEP 2022)

WESTOVER EXPRESS (LINE) APPROX. TOP OF PIPELINE = TBD

APPROX. TOP OF EX. 508mmØ ENBRIDGE PIPELINE = 225.68m (ENBRIDGE LINE 11 DRAWING 11-WS-NN-013, SEP 2022)

WESTOVER EXPRESS (LINE) APPROX. TOP OF PIPELINE = TBD

APPROX. TOP OF EX. 508mmØ ENBRIDGE PIPELINE = 218.16m (ENBRIDGE LINE 11 DRAWING 11-WS-NN-013, SEP 2022)

MIXED USE MEDIUM DENSITY

SWMF 2
NWL 217.00

SCHOOL

SCHOOL

SWMF 3
NWL 217.00

CL 218.00

SWMF 5
NWL 223.25

EX. 700mm Ø CULVERT
U/S INV. 222.66
D/S INV. 222.56

EX. 1000mm Ø CULVERT
U/S INV. 216.49
D/S INV. 216.46

EX. 1000mm Ø CULVERT
U/S INV. 217.19
D/S INV. 216.99

EX. 900mm Ø CULVERT
U/S INV. 216.81
D/S INV. 216.73

EX. 750mm Ø CULVERT
U/S INV. 218.32
D/S INV. 218.07

EX. 1000mm Ø CULVERT
U/S INV. 220.09
D/S INV. 220.06

EX. CULVERT (FILLED)
APPROX U/S INV. 221.81
D/S INV. 221.61

EX. 500mm Ø CULVERT
U/S INV. 222.70
D/S INV. 222.47

EX. 400mm Ø CULVERT
U/S INV. 223.05
D/S INV. 222.98

EX. 700mm Ø CULVERT
U/S INV. 223.10
D/S INV. 222.79

EX. 600mm Ø CULVERT
U/S INV. 222.97
D/S INV. 222.89

EX. 600mm Ø CULVERT
U/S INV. 223.02
D/S INV. 222.93

EX. 600mm Ø CULVERT
U/S INV. 224.49
D/S INV. 224.42

EX. 750mm Ø CULVERT
U/S INV. 224.25
D/S INV. 224.17

EX. 600mm Ø CULVERT
U/S INV. 225.01
D/S INV. 224.91

EX. 900mm Ø CULVERT
U/S INV. 226.19
D/S INV. 225.93

EX. 900mm Ø CULVERT
U/S INV. 226.19
D/S INV. 225.93

CL 223.00

CL 222.00

CL 221.00

SWMF 4
NWL 218.60

SWMF 7
NWL 220.00

SCHOOL

PARK

NORTH EAST LIMIT OF DEVELOPMENT AREA DETAIL
SCALE: 1:4000

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

LEGEND:

- LIMIT OF SECONDARY PLAN
- × 194.98 PROPOSED ELEVATION
- × 189.94EX EXISTING ELEVATION
- 0.5% ROAD SLOPE
- DRAINAGE FEATURE
- PROPOSED HIGH POINT
- PROPOSED LOW POINT
- NATURAL OPEN SPACE (PER URBAN SOLUTIONS LAND USE PLAN, 2023)

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

WHITE CHURCH ROAD SECONDARY PLAN - MSP

PRELIMINARY GRADING PLAN

DESIGNED BY: M.H.	CHECKED BY: L.C.M.	PROJECT No: 2600	FIGURE No: 5.1
SCALE: 1:4000	DATE: DECEMBER 2023		

File: P:\2600 White Church Road Secondary Plan\Drawings\MESP\Fig\Report Figures\2600P-GRAD-5.1.dwg – Revised by <SOZDEMIR> : Tue, Dec 05 2023 – 3:53pm

Appendix A Concept Plan

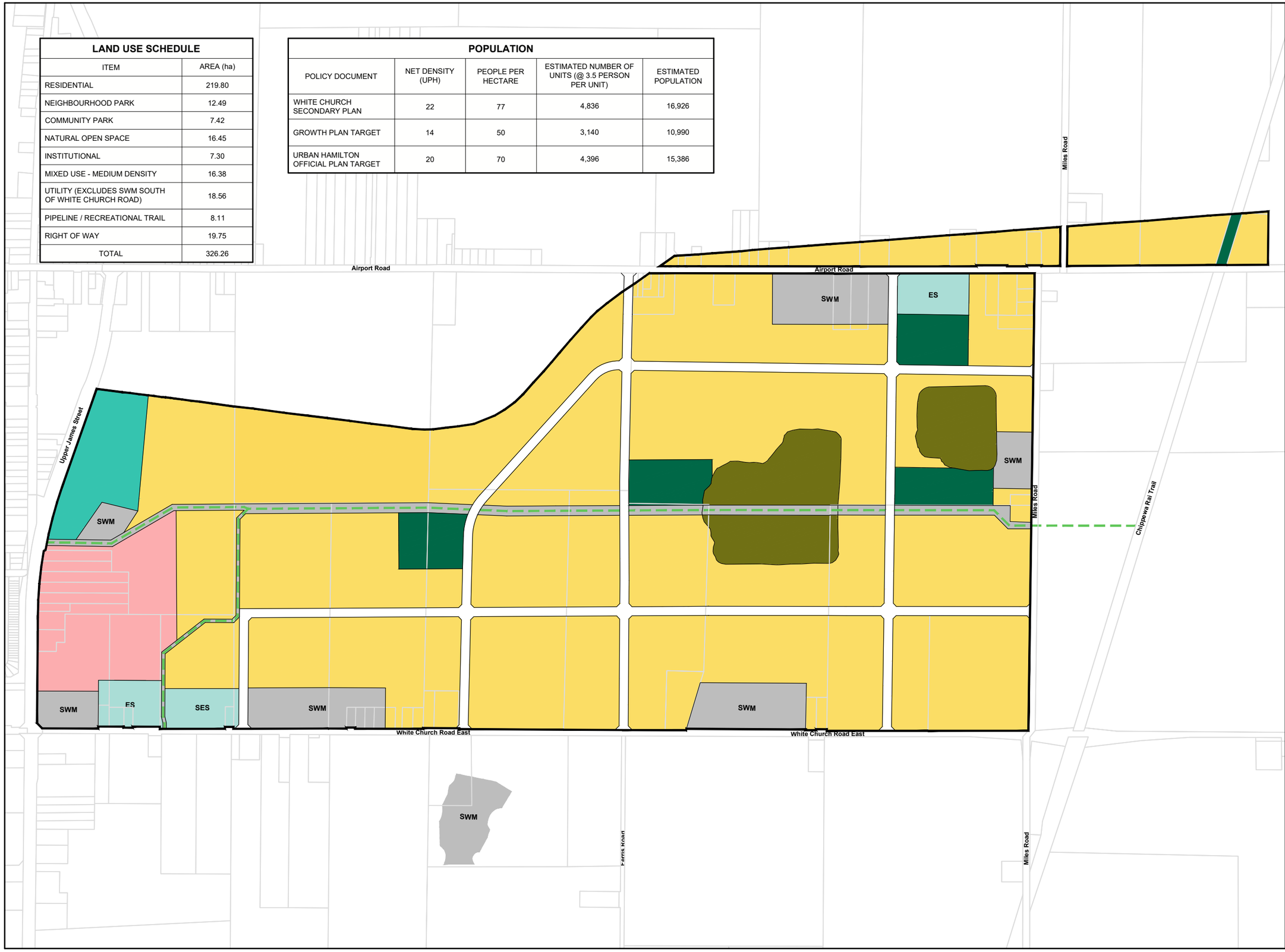
SCS consulting group ltd

LAND USE SCHEDULE

ITEM	AREA (ha)
RESIDENTIAL	219.80
NEIGHBOURHOOD PARK	12.49
COMMUNITY PARK	7.42
NATURAL OPEN SPACE	16.45
INSTITUTIONAL	7.30
MIXED USE - MEDIUM DENSITY	16.38
UTILITY (EXCLUDES SWM SOUTH OF WHITE CHURCH ROAD)	18.56
PIPELINE / RECREATIONAL TRAIL	8.11
RIGHT OF WAY	19.75
TOTAL	326.26

POPULATION

POLICY DOCUMENT	NET DENSITY (UPH)	PEOPLE PER HECTARE	ESTIMATED NUMBER OF UNITS (@ 3.5 PERSON PER UNIT)	ESTIMATED POPULATION
WHITE CHURCH SECONDARY PLAN	22	77	4,836	16,926
GROWTH PLAN TARGET	14	50	3,140	10,990
URBAN HAMILTON OFFICIAL PLAN TARGET	20	70	4,396	15,386



Legend

Residential Designations

- Residential

Parks and Open Space Designations

- Neighbourhood Park
- Community Park
- Natural Open Space

Other Designations

- Institutional
- Mixed Use - Medium Density
- ES — Elementary School
- SES — Separate Elementary School
- Utility
- Pipeline / Recreational Trail
- SWM — Storm Water Management

Other Features

- Secondary Plan Boundary

Urban Hamilton Official Plan
White Church Secondary Plan
Map B.5.5-1 - Land Use Plan

Not to Scale

Date: November 2023

Hamilton

Appendix B Relevant Excerpts

City of Hamilton
Airport Employment Growth District - Phase 2

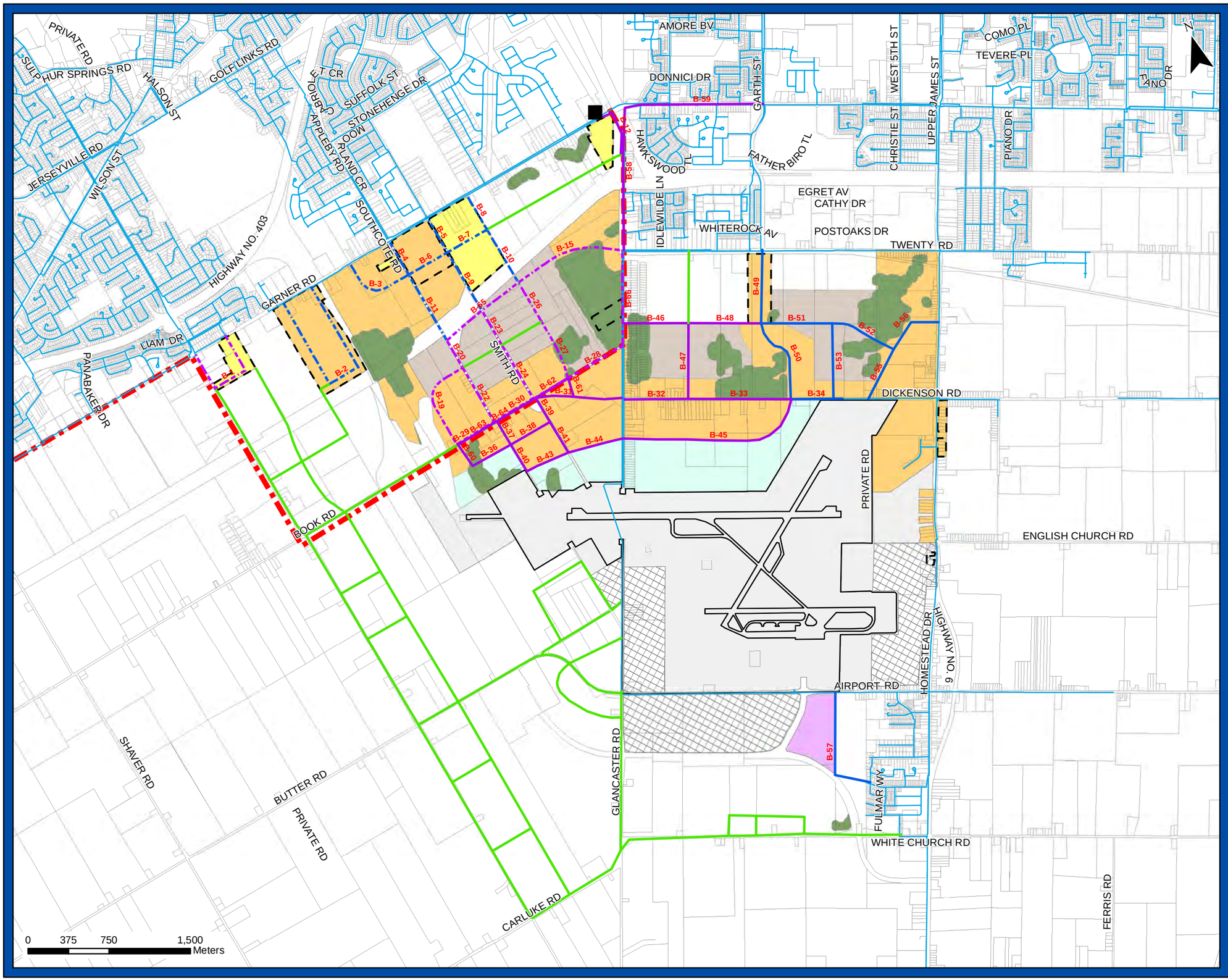
Water & Wastewater Servicing Master Plan

UPDATE

December 2016

GM BluePlan

Aquafor Beech



Hamilton

Hamilton AEGD Study

Preferred Water Servicing - Update

Legend

Existing Infrastructure

- Reservoir & Pumping Station

Water Infrastructure 2016

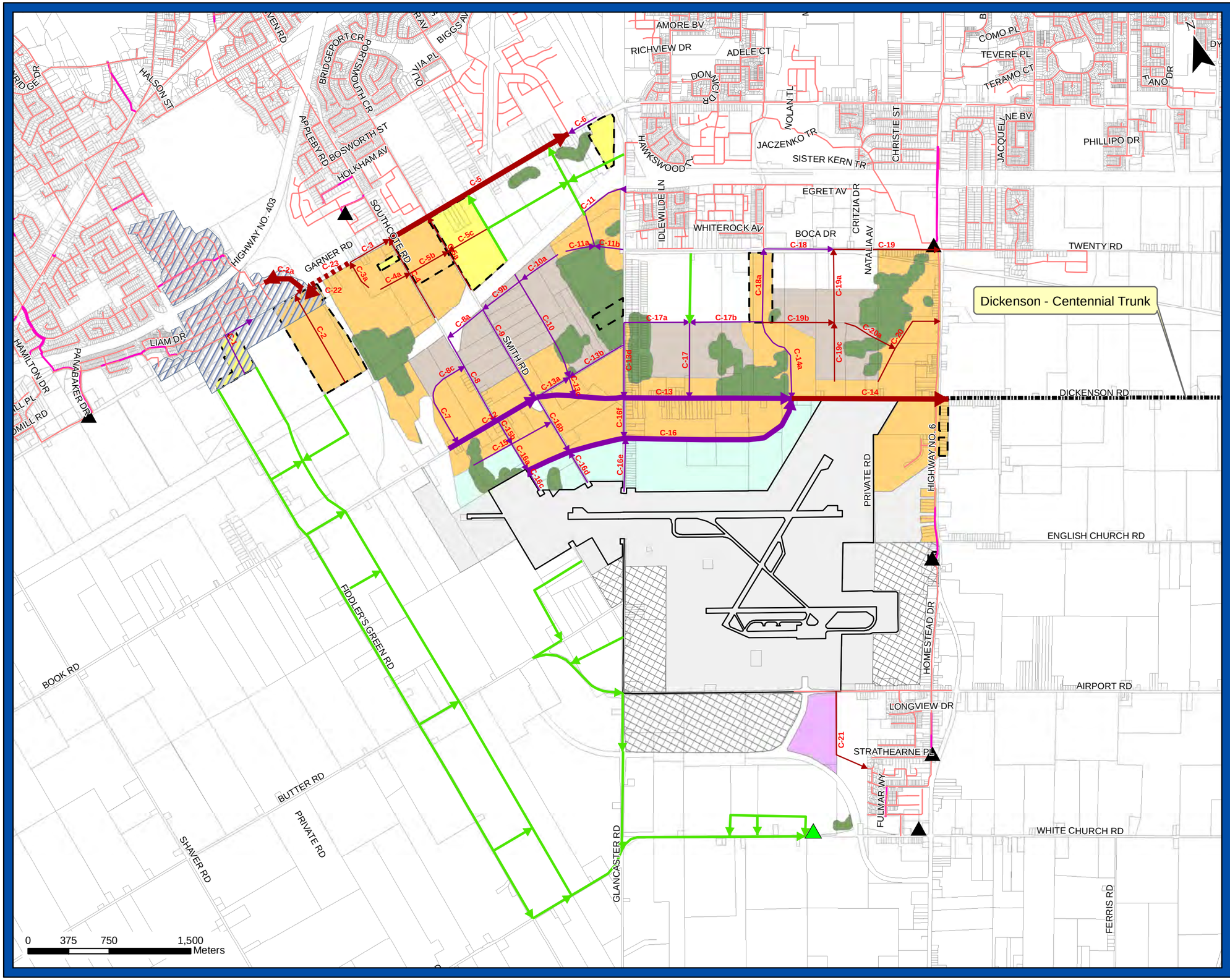
- PD 18 Servicing Phase 1
- PD 6 Servicing Phase 1
- PD 18 Servicing Phase 2
- PD 6 Servicing Phase 2
- Post 2031 Water Servicing
- Existing Watermain
- Water Pressure District

AEGD Land Use

- Airport Boundary
- Airport Light Industrial
- Airport Prestige Industrial
- Airport Related Business
- Airport Reserve
- Airside Industrial
- Institutional
- Parcel Fabric
- Natural Open Space
- Site Specific Policy

BluePlan ENGINEERING

715013-5-W
December 2016
Data Source: City of Hamilton
Scale: 1:34,000 | NAD 1983 UTM Zone 17N



Hamilton AEGD Study

Preferred Wastewater Servicing - Update

Legend

Existing Wastewater Infrastructure

- Sewage Pumping Station
- Forcemain
- Sanitary Sewer

Wastewater Infrastructure 2016

- Sub-Trunk- Phase 1
- Sub-Trunk- Phase 2
- Trunk- Phase 1
- Trunk- Phase 2
- Sewer Post 2031
- Forcemain, Post 2031
- Proposed SPS
- Proposed Forcemain
- Original Planned Catchment Area Boundary

AEGD Land Use

- Airport Boundary
- Airport Light Industrial
- Airport Prestige Industrial
- Airport Related Business
- Airport Reserve
- Airside Industrial
- Institutional
- Parcel Fabric
- Natural Open Space
- Site Specific Policy

BluePlan ENGINEERING

715013-3-WW
December 2016
Data Source: City of Hamilton
Scale: 1:34,000 | NAD 1983 UTM Zone 17N

8.0 Existing Water System

Drinking water is currently treated at the Woodward Ave Water Treatment Plant located on Woodward Ave North in the City of Hamilton. Treated water is supplied to the AEGD and Hamilton Mountain by being pumped up the escarpment by two trunk feedermains; a 1,050 mm pipe near Upper Ottawa St and a 1,500 / 1,200 mm pipe near Greenhill Ave. Servicing for the AEGD area is provided by two different pressure districts; Pressure District 18 (PD18) and Pressure District 6 (PD6). Additional water system details can be found in the Water and Wastewater Infrastructure Phase 1 report in Appendix A

8.1 Pressure District PD18

Pressure District 18 is generally made up of the former Town of Ancaster and services areas within the ground elevations of approximately 220 m and 260 m. This pressure district is fed via separate 400 mm and 750 mm pipes on Garner Rd via Pumping Station HD018 and Reservoir HDR18 located near the intersection of Garner Rd and Glancaster Rd. These watermains on Garner Rd are the main feeds for the northwest PD 18 area within the AEGD.

8.2 Pressure District PD6

Pressure District 6 consists of areas within the south Hamilton Mountain, the Hamilton International Airport itself and Haldimand County with ground elevations ranging from approximately 205 m to 240 m.

PD6 is serviced by pumping station HD06A in the west on Stone Church Rd and Garth St and HD06B in the east located at Stone Church Rd and Turnbridge Cres. These stations operate together to provide servicing for the Pressure District. There are several existing PD6 watermains that surround and traverse the AEGD and provide servicing for the area. A 600 mm watermain runs along Glancaster Rd from Twenty Rd, under runway 12-30, and continues along Glancaster Rd to Airport Rd where it connects to a 500 mm watermain. This 500 mm watermain runs east on Airport Rd to the Airport entrance where it joins a 400 mm pipe that continues east to Upper James St and north on Homestead Dr / Upper James St to Twenty Rd. An existing 300 mm watermain runs from Twenty Rd to Sunibel Dr then increases to a 400 mm to Garth St. From Garth St, a 300 mm and 600 mm watermain continue to Glancaster Rd. Along Glancaster Rd a 200 mm watermain runs from the Airport boundary to Rymal Rd. At the

southern end of the AEGD, a 500 mm watermain travels on Homestead Dr / Upper James St from Airport Rd to Haldibrook Rd with a parallel 300 mm watermain from Airport Rd to White Church Rd.

City of Hamilton
Water and Wastewater Master Plan
Class Environmental Assessment Report

Prepared by:

KMK Consultants Limited
220 Advance Blvd.
Brampton, ON, L6T 4J5

Telephone: 905-459-4780
Fax: 905-459-7869

November 22, 2006

KMK Project No. 2590.01

KMK Consultants Limited

City of Burlington

Lake Ontario

Haldimand County

Region of Niagara

1
2
3
4
5
6
7
9
10
11
12
13
14
16
17
18
19
20
21
22

Legend

- Pump
- Reservoir
- Plant
- Watermain
- Rural Settlement Area
- Intensification Area
- Niagara Escarpment
- Greenbelt
- Urban Boundary

Hamilton

Integrated Water & Wastewater Master Plan

Water Servicing

Water Distribution System

Nov 22, 2006
1:125,000
2590-D-77

system maintained. Currently, there is elevated storage in Pressure District 10, though with limited capacity.

Dundas

Dundas is serviced through Pressure Districts 11 and 12, and is adjacent to and supplied through Pressure District 2. The storage located in Pressure District 11 is sufficient for both Pressure Districts.

Pressure District 12 is supplied from Pressure District 11 through Pumping Station HD12A. This district is also supplied through Pressure District 22, which receives its supply through a PRV from District 18. The elevated tank within Pressure District 12 provides equalization but has limited capacity to provide security in an event of an emergency.

The properties located south of the Spring Creek Conservation Area are fed by a single 300 mm diameter watermain located on Bridlewood Drive. In the event that this supply is interrupted, pumping station HD012 can be used to service this area from Pressure District 11. Station HD012 has to be operated manually, and it does not have sufficient capacity to supply the required fire flows.

Pressure District 22, which services the higher lands in north west Dundas, is supplied through a single connection from Pressure District 18. The elevated tank within Pressure District 22 provides equalization but has limited capacity to provide security in an event of an emergency.

Waterdown

Waterdown is located within Pressure District 16, which has an elevation range from 210 m to 250 m. District 16 is supplied through Pressure District 2. The Pleasantview neighbourhood is serviced through pressure-relief valves from District 16.

Local pressure for the Waterdown area is provided by Pumping Station HD016 located below the escarpment at York and Valley Road in Dundas. Water is distributed from Pump Station HD016 up the escarpment through a single 600 mm trunk watermain. There is limited storage capacity within Waterdown, and there is some limited capacity for an emergency supply through a maintained interconnection with the Region of Halton.

Mountain

The Mountain area is located above the Niagara Escarpment, within Pressure Districts 5 and 6. Pressure District 5 is fed from Pressure District 1 through two pumping stations, HD005 and HD05A. Pressure District 6 is in turn fed from District 5 through two additional pumping stations, HD006 and HD06A.

Currently, there are two supply feedermains up the Escarpment, and approximately half of the City's population resides on the Mountain.

There is sufficient pumped storage for the area, and operational equalization is provided from the reservoir located in Pressure District 18.

Legend

- Pump
- Reservoir
- Plant
- Watermain
- Watermain Upgrades

Hamilton

Integrated Water & Wastewater Master Plan

Water Servicing

Preferred Water Servicing Alternatives

KMK Consultants Limited

Nov 22, 2006
1:125,000
2590-D-73

City of Burlington

Lake Ontario

Haldimand County

Region of Niagara

Sewer Upgrades

New Dickenson Road Trunk Sewer

Legend

- Pumping Station
- New SPS
- SPS Upgrades Required
- Existing Sewer
- New or Upgraded Gravity Sewer
- New or Upgraded Forcemain
- Rural Settlement Area
- Potential Urban Boundary Expansion
- Potential New Business Park
- Intensification Area
- Niagara Escarpment
- Greenbelt
- Urban Boundary

Hamilton

Integrated Water & Wastewater Master Plan

Wastewater Servicing

Recommended Preferred Solution

KMK Consultants Limited

Figure 24

Nov 22, 2006

1:125,000

2590-D-69

APPENDIX C

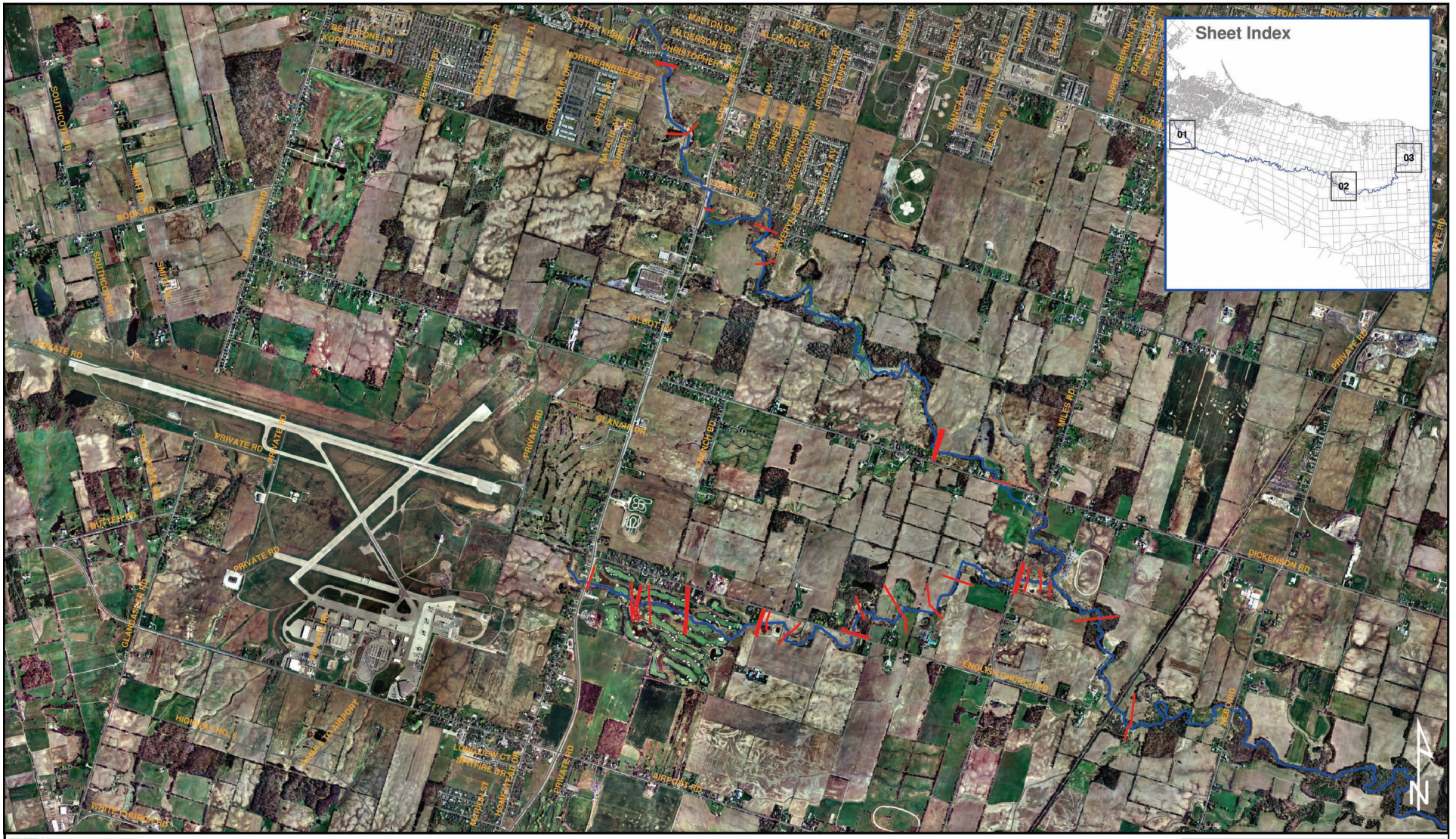


Figure 17: Twenty Mile Creek - Sheet 1 of 3

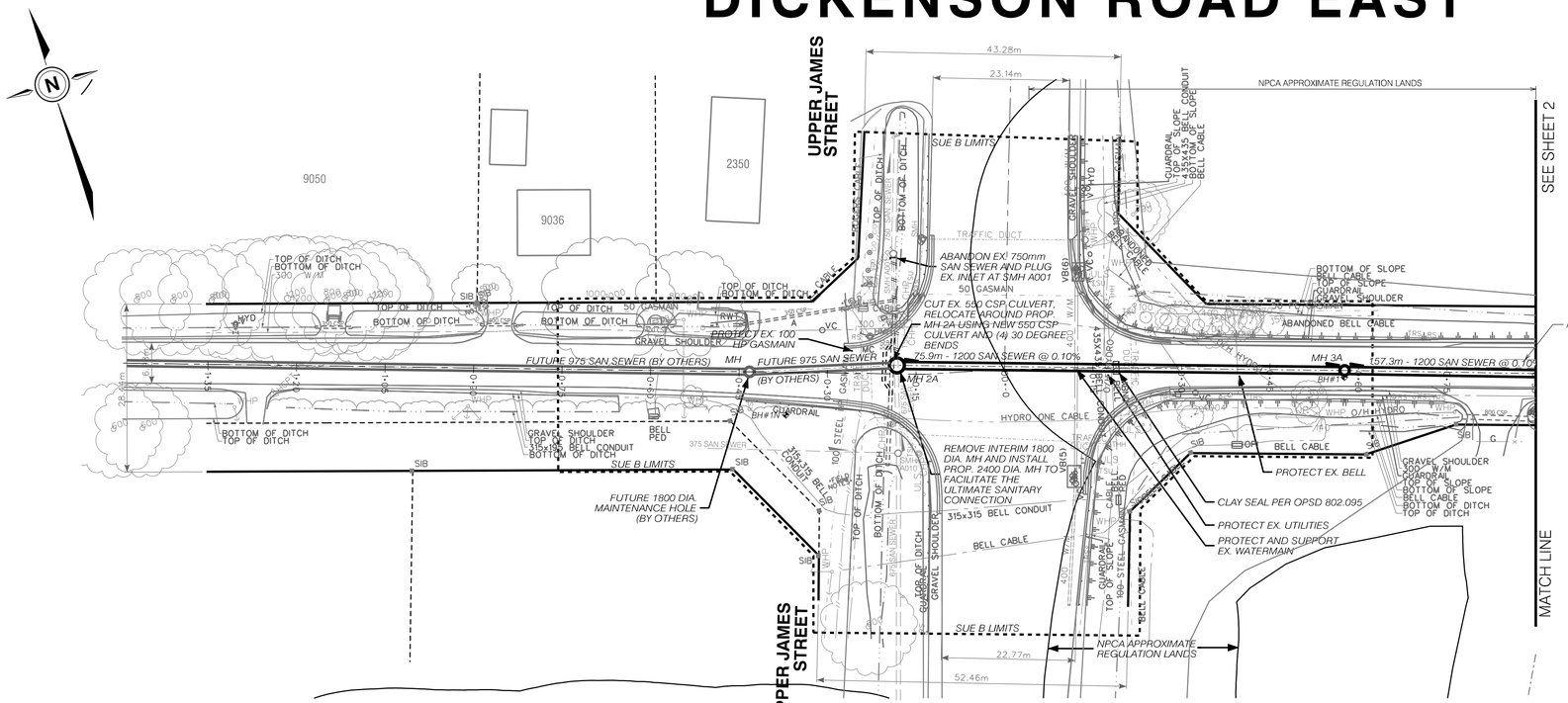
Shear Stress Sites in the Twenty Mile Creek Watershed

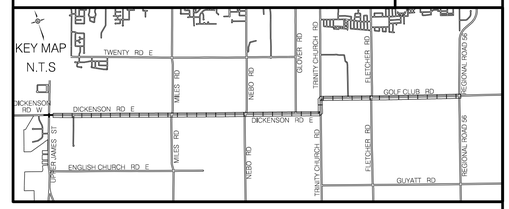
DICKENSON ROAD EAST

DICKENSON ROAD EAST

CONTRACT No. C15-11-22 (HSW)
DRAWING No. 18-H-01

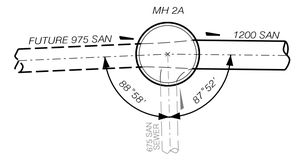
SHEET No. 1 OF 108



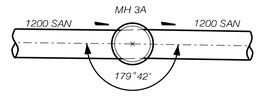


LEGEND

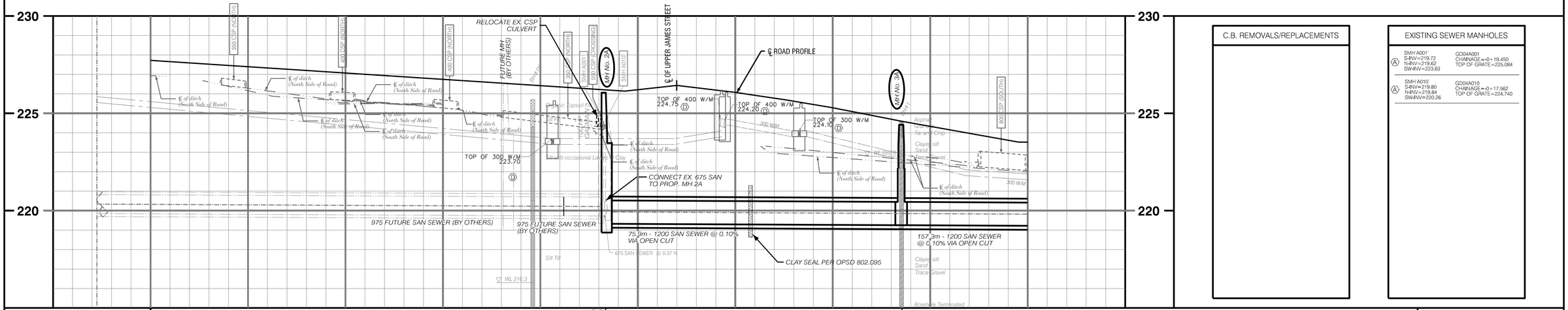
SUE B LIMITS



MH2A SCHEMATIC



MH3A SCHEMATIC



C.B. REMOVALS/REPLACEMENTS

EXISTING SEWER MANHOLES

(A)	SMH A001 S-INV=219.72 N-INV=219.62 SW-INV=223.63	GD04A001 CHAINAGE =-0+19.450 TOP OF GRATE=225.084
(A)	SMH A010 S-INV=219.80 N-INV=219.84 SW-INV=220.26	GD04A010 CHAINAGE =-0+17.562 TOP OF GRATE=224.740

PROPOSED SANITARY SEWER								2400mm DIA. MH FUT. N 219.724 EX. N 219.574	E 219.326 EX. S 219.79 (CALCU-LATED)				TEE MH 1500 DIA. W 219.249 E 219.249		*PROPOSED SANITARY SEWER*
EXISTING ℄ OF ROAD PROFILE ELEVATIONS 227.72	227.52	227.33	227.14	226.94	226.75	226.55	226.36	226.16	226.43	226.07	225.62	225.09	224.51	223.97	223.52		EXISTING ℄ OF ROAD PROFILE ELEVATIONS
EXISTING ℄ OF ROAD ALLOWANCE CHAINAGE -1+35	-1+20	-1+05	-0+90	-0+75	-0+60	-0+45	-0+30	-0+15	00+0	0+15	0+30	0+45	0+60	0+75	0+90		EXISTING ℄ OF ROAD ALLOWANCE CHAINAGE

No.	REVISIONS	INITIAL	DATE
	Issued for Tender	F.S.	03/02/22

REFERENCE MATERIAL

Road Plan : 99-H-39, 00-H-40
Sewer Plans : 07-S-41, 14-S-11
Water Plans : 80-W-28, 80-W-38, 82-W-5, 82-W-13, 82-W-18, 83-W-19, 88-W-3, 89-W-17

Geodetic Bench Mark Index No. 65U161 Elevation=222.640m
Borehole Report - GTR_1932

ACTIVITIES	
Surveyed By:	J.P./D.O.
Survey Date:	13-03-18
Drawn By:	O.S.
Drawn Date:	09-04-18
Design By:	F.S.
Design Date:	22-07-19

Q/C IN ACCORDANCE WITH ASCE STANDARD 38-02
All Utilities depicted are at (C) unless otherwise noted.
(D) information derived from existing records
(C) information obtained from field survey combined with (D) information
(B) information obtained in field and indicates horizontal position of subsurface utility
(A) precise horizontal and vertical location of utility obtained by exposure and measurement

SCALES
HORIZONTAL 1:500 (0, 5m, 10m, 20m)
VERTICAL 1:100 (0, 1m, 2m, 4m)
Dimensions shown on this plan are in millimetres unless otherwise noted

IBI

LICENSED PROFESSIONAL ENGINEER F. SHWEIHAT 100073055 Feb. 03, 2022 PROVINCE OF ONTARIO

Project Manager (Design)
Feb 9, 2022
Tauseek Ameer, P. Eng.

Manager of Design
Susan Jacob, P. Eng.

Hamilton
Public Works Department

DICKENSON ROAD EAST

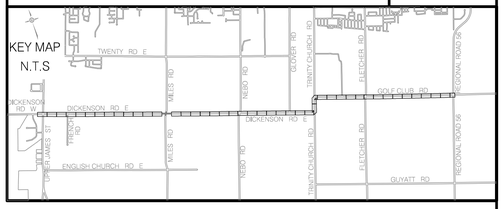
Sanitary Sewer Installation
From STA. -0+20 to STA. 0+90
From : Upper James Street
To : Trinity Church Road

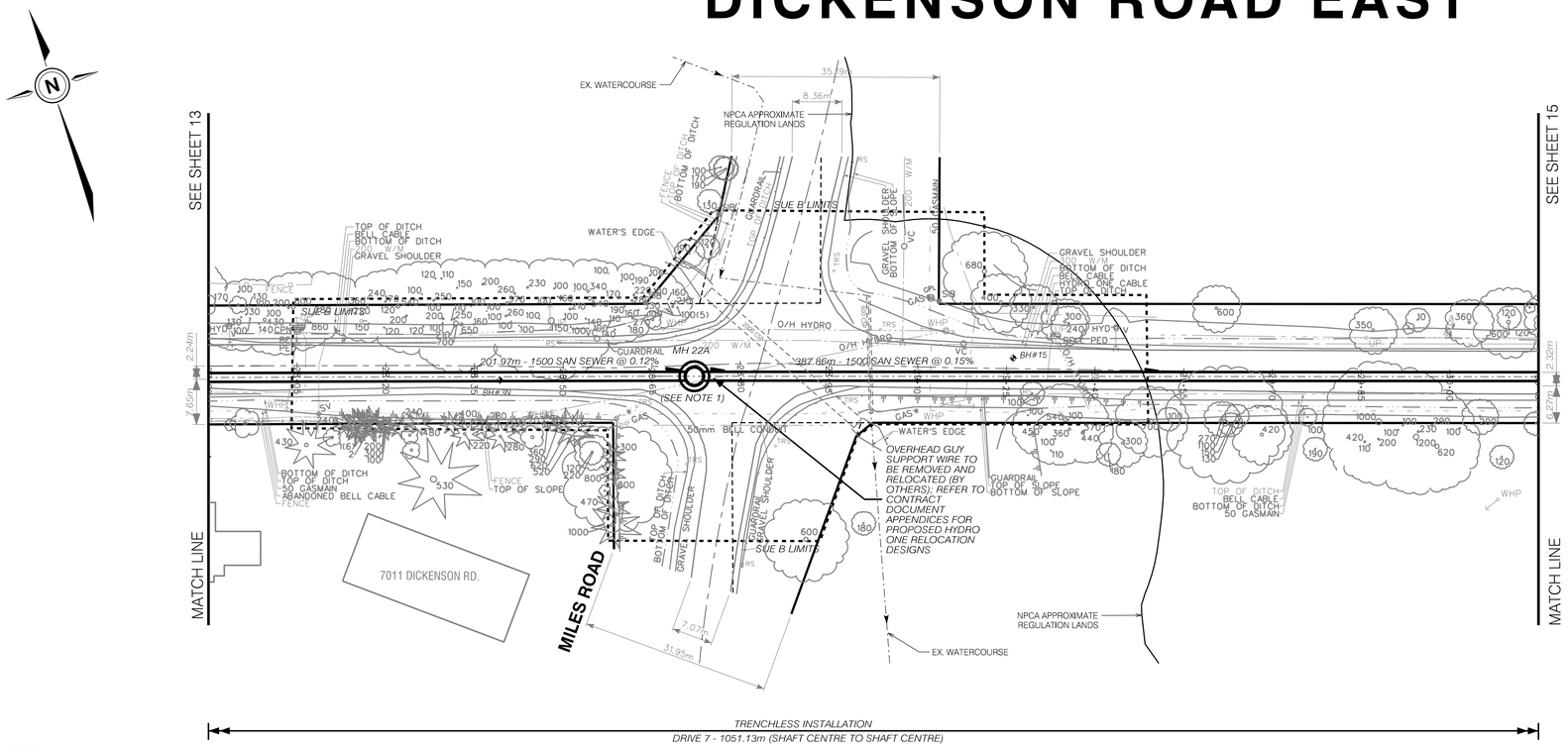
18-H-01

DICKENSON ROAD EAST

DICKENSON ROAD EAST

CONTRACT No. C15-11-22 (HSW)
DRAWING No. 18-H-01
SHEET No. 14 OF 108



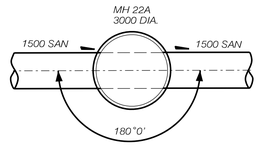


LEGEND

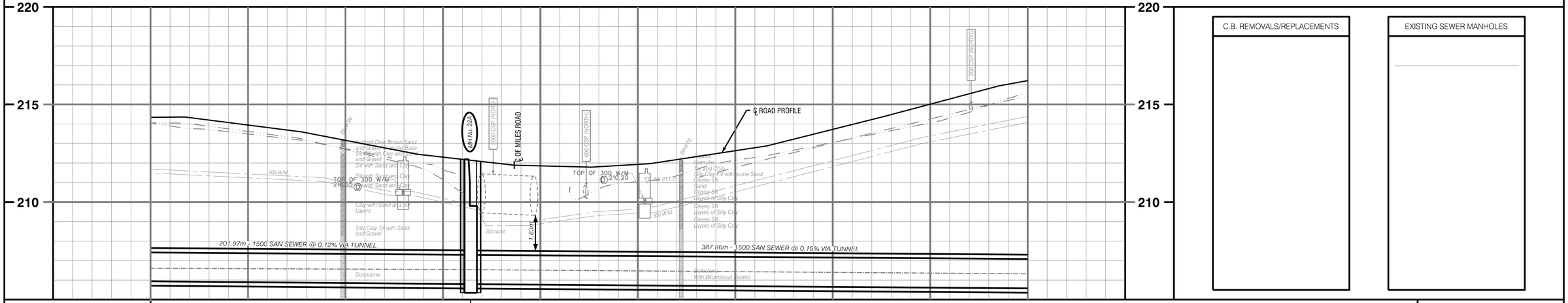
SUE B LIMITS

NOTE:

1. CONTRACTOR TO MAINTAIN VEHICLE ACCESS TO AND FROM 7011 DICKENSON RD TO MILES ROAD AT ALL TIMES.



MH 22A SCHEMATIC



C.B. REMOVALS/REPLACEMENTS	EXISTING SEWER MANHOLES

PROPOSED SANITARY SEWER																	*PROPOSED SANITARY SEWER*
						3000mm DIA. MH W 205.905 E 205.875											
EXISTING ℄ OF ROAD PROFILE ELEVATIONS	214.34	214.20	213.82	213.36	212.78	212.30	211.96	211.83	211.87	212.18	212.63	213.23	213.98	214.75	215.55	216.22	EXISTING ℄ OF ROAD PROFILE ELEVATIONS
EXISTING ℄ OF ROAD ALLOWANCE CHAINAGE	27+90	28+05	28+20	28+35	28+50	28+65	28+80	28+95	29+10	29+25	29+40	29+55	29+70	29+85	30+00	30+15	EXISTING ℄ OF ROAD ALLOWANCE CHAINAGE

No.	REVISIONS	INITIAL	DATE
	Issued for Tender	F.S.	03/02/22

REFERENCE MATERIAL

Road Plan : 99-H-39, 00-H-40
Sewer Plans : 07-S-41, 14-S-11
Water Plans : 80-W-28, 80-W-38, 82-W-5, 82-W-13, 82-W-18, 83-W-19, 88-W-3, 89-W-17

Geodetic Bench Mark Index No. 65U161 Elevation=222.640m
Borehole Report - GTR_1932

ACTIVITIES	
Surveyed By:	J.P./D.O.
Survey Date:	13-03-18
Drawn By:	O.S.
Drawn Date:	09-04-18
Design By:	F.S.
Design Date:	22-07-19

Q/C IN ACCORDANCE WITH ASCE STANDARD 38-02
All Utilities depicted are at Ⓒ unless otherwise noted.
Ⓓ information derived from existing records
Ⓒ information obtained from field survey combined with Ⓓ information
Ⓑ information obtained in field and indicates horizontal position of subsurface utility
precise horizontal and vertical location of utility
Ⓐ obtained by exposure and measurement

SCALES
HORIZONTAL 1:500 (0, 5m, 10m, 20m)
VERTICAL 1:100 (0, 1m, 2m, 4m)
Dimensions shown on this plan are in millimetres unless otherwise noted

IBI

LICENSED PROFESSIONAL ENGINEER F. SHWEIHAT 100073055 Feb. 03, 2022 PROVINCE OF ONTARIO

Project Manager (Design)
Feb 9, 2022
Taufeek Ameer, P. Eng.
Manager of Design
Susan Jacob, P. Eng.

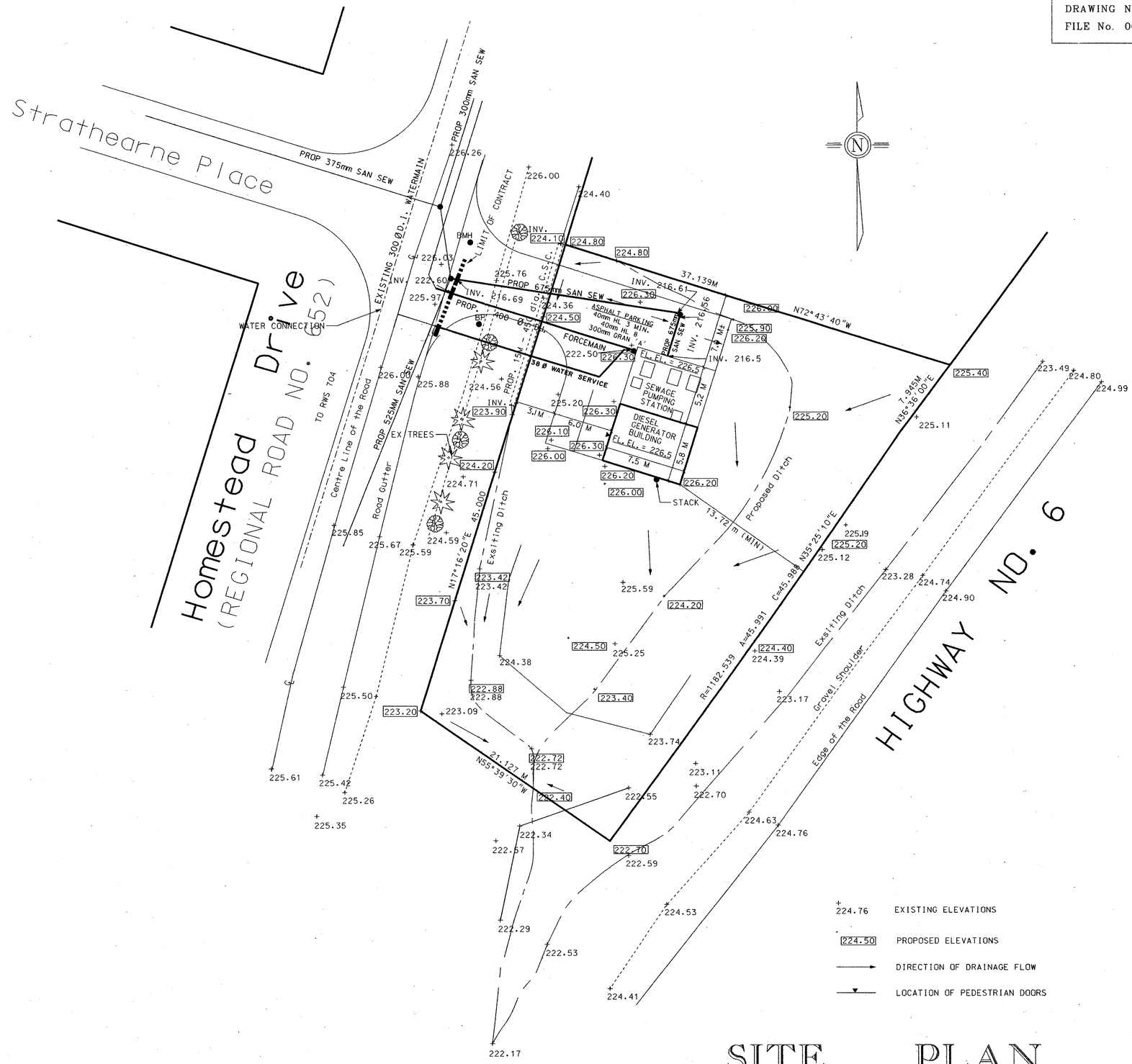
Hamilton
Public Works Department

DICKENSON ROAD EAST

Sanitary Sewer Installation
From STA. 27+90 to STA. 30+15
From : Upper James Street
To : Trinity Church Road

18-H-01

CONTRACT No. RHW-95-20 (S)	SHEET No.
DRAWING No. 95-S-45	1 of 10
FILE No. 000-00	



SITE PLAN

1 : 200

No.	REVISIONS	INITIAL	DATE

DRAWN BY: T. HO | DATE: MARCH, 1995

REFERENCE MATERIAL:

DIRECTOR

COMMISSIONER OF TRANSPORTATION AND ENVIRONMENTAL SERVICES

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

TRANSPORTATION AND ENVIRONMENTAL SERVICES GROUP

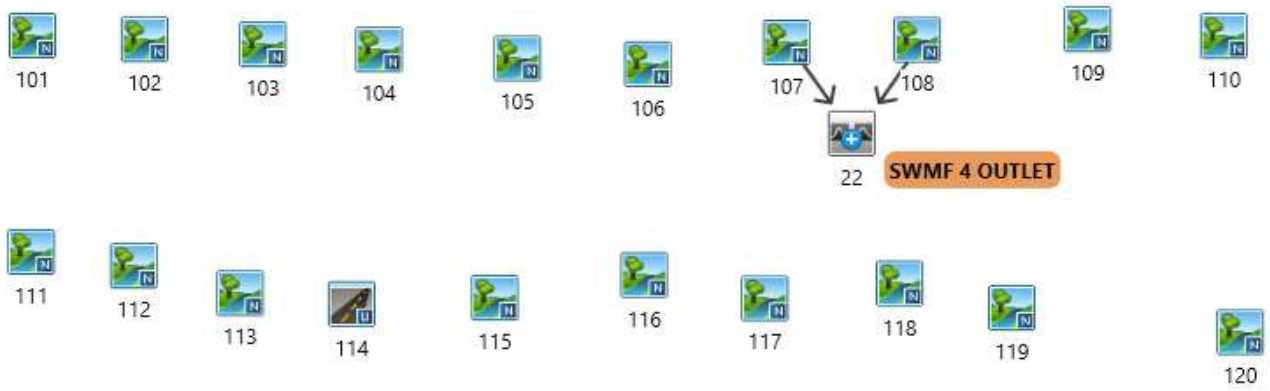
PROP SEWAGE PUMPING STATION S-H27
HWY.6 & HOMESTEAD DRIVE
SITE PLAN

Appendix C Hydrology Modelling

SCS consulting group ltd

Existing Conditions VO Schematic

Project Name: White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer: F.Y



Existing Conditions
VO2 Parameter Summary

White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer Initials: D.V.

NASHYD

Number	101	102	103	104	105	106	107	108	109	110	111	112	113	115	116	117	118	119	120
Description																			
DT(min)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Area (ha)	17.87	32.00	4.32	57.94	27.82	13.22	14.58	6.80	23.26	2.51	13.53	7.83	1.79	7.59	41.78	13.40	63.51	2.62	3.81
CN*	75.0	72.0	75.0	78.0	78.0	78.0	78.0	77.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	77.0	78.0	75.0	77.0
IA(mm)	7.2	7.9	7.9	7.9	8.0	7.5	8.0	6.9	8.2	7.4	7.8	7.6	8.0	7.7	8.0	8.9	7.8	6.6	9.2
TP Method	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands	Uplands
TP (hr)	0.34	0.58	0.18	1.27	1.08	0.79	0.89	0.31	1.47	0.22	0.40	0.45	0.45	0.60	1.44	0.46	1.63	0.21	0.12

STANDHYD

Number	114
Description	
DT(min)	1
Area (ha)	4.35
XIMP[1,2]	0.01
TIMP[2]	0.25
CN*	84.0
IA(mm)	6.5
SLPP(%)	2
LGP(m)	40
MNP	0.25
DPSI (mm)	1.0
SLPI(%)	1
LGI(m)	170.29
MNI	0.013

[1]Note that where there is NO directly connected area (ie: roof runoff to grassed areas), the hydrology program does not accept XIMP=0%, therefore, XIMP = 1% has been used
[2]Note that where there is NO pervious area, the hydrology program does not accept TIMP and XIMP=100%, therefore, TIMP and XIMP = 99% has been used

Existing Conditions
CN Calculations

White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer Initials: D.V.

Site Soils: (per PH1 and PH2 ENVIRONMENTAL SITE ASSESSMENT BY LANDTEK)

Soil Type	Hydrologic Soil Group
Silt to Silty Clay	C

TABLE OF CURVE NUMBERS (CN's)**

Land Use		Hydrologic Soil Type							Manning's 'n'	Source
		A	AB	B	BC	C	CD	D		
Meadow	"Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot	"Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel		76	80.5	85	87	89	90	91	0.30	USDA
Lawns	"Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop		66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)		77	82	86	89	91	93	94	0.05	MTO
Low Density Residences		57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved		98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. USDA (1986), Urban Hydrology for Small Watersheds, Table 2.2-Runoff Curve Numbers for Urban Areas

HYDROLOGIC SOIL TYPE (%)

Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
102	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
103	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
104	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
105	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
106	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
107	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
108	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
109	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
110	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
111	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
112	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
113	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
115	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
116	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
117	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
118	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
119	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
120	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
114	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100

LAND USE (%)

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101	86.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	100.0
102	81.4	0.0	0.0	0.0	16.6	0.0	0.0	0.0	2.0	100.0
103	42.4	0.0	0.0	0.0	55.3	0.0	0.0	0.0	2.3	100.0
104	1.2	0.4	0.0	0.0	97.2	0.0	0.0	0.0	1.2	100.0
105	0.0	0.8	0.0	0.1	98.3	0.0	0.0	0.0	0.7	100.0
106	0.0	0.0	0.0	10.3	86.3	0.0	0.0	0.0	3.4	100.0
107	0.0	0.0	0.0	0.0	99.7	0.0	0.0	0.0	0.3	100.0
108	0.0	0.0	0.0	31.0	65.6	0.0	0.0	0.0	3.4	100.0
109	0.0	15.0	0.0	3.1	81.3	0.0	0.0	0.0	0.6	100.0
110	0.0	0.0	0.0	18.7	80.1	0.0	0.0	0.0	1.2	100.0
111	0.0	0.0	0.0	3.5	95.6	0.0	0.0	0.0	1.0	100.0
112	0.0	0.0	0.0	9.3	89.3	0.0	0.0	0.0	1.4	100.0
113	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
115	0.0	0.0	0.0	0.0	95.8	0.0	0.0	0.0	4.2	100.0

116	0.0	0.0	0.0	0.0	99.6	0.0	0.0	0.0	0.4	100.0
117	16.1	69.6	0.0	0.0	6.2	0.0	0.0	0.0	8.1	100.0
118	0.0	0.0	0.0	4.3	94.5	0.0	0.0	0.0	1.2	100.0
119	0.0	0.0	0.0	45.8	53.4	0.0	0.0	0.0	0.8	100.0
120	0.0	62.2	0.0	0.0	37.8	0.0	0.0	0.0	0.0	100.0
114	0.0	0.0	0.0	0.0	74.9	0.0	0.0	0.0	25.1	100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
101	61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	75
102	57.8	0.0	0.0	0.0	12.6	0.0	0.0	0.0	2.0	72
103	30.1	0.0	0.0	0.0	42.0	0.0	0.0	0.0	2.3	74
104	0.9	0.3	0.0	0.0	73.9	0.0	0.0	0.0	1.2	76
105	0.0	0.6	0.0	0.1	74.7	0.0	0.0	0.0	0.7	76
106	0.0	0.0	0.0	7.6	65.6	0.0	0.0	0.0	3.3	77
107	0.0	0.0	0.0	0.0	75.8	0.0	0.0	0.0	0.3	76
108	0.0	0.0	0.0	23.0	49.8	0.0	0.0	0.0	3.3	76
109	0.0	11.0	0.0	2.3	61.8	0.0	0.0	0.0	0.6	76
110	0.0	0.0	0.0	13.9	60.9	0.0	0.0	0.0	1.2	76
111	0.0	0.0	0.0	2.6	72.6	0.0	0.0	0.0	0.9	76
112	0.0	0.0	0.0	6.9	67.8	0.0	0.0	0.0	1.4	76
113	0.0	0.0	0.0	0.0	76.0	0.0	0.0	0.0	0.0	76
115	0.0	0.0	0.0	0.0	72.8	0.0	0.0	0.0	4.1	77
116	0.0	0.0	0.0	0.0	75.7	0.0	0.0	0.0	0.4	76
117	11.4	50.8	0.0	0.0	4.7	0.0	0.0	0.0	8.0	75
118	0.0	0.0	0.0	3.2	71.8	0.0	0.0	0.0	1.2	76
119	0.0	0.0	0.0	33.9	40.6	0.0	0.0	0.0	0.7	75
120	0.0	45.4	0.0	0.0	28.7	0.0	0.0	0.0	0.0	74
114	0.0	0.0	0.0	0.0	57.0	0.0	0.0	0.0	24.6	82

** AMC II assumed

Existing Conditions
CN Calculations

White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer Initials: D.V.

Step	Input Values																					
	Subcatchment:	101		102	103	104	105	106	107	108	109	110	111	112	113	115	116	117	118	119	120	114
1	**CN (AMC II):**	**75**		**72**	**74**	**76**	**76**	**77**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**77**	**76**	**75**	**76**	**75**	**74**	**82**
2	CN (AMC III) =	88		86	88	89	89	89	89	89	89	89	89	89	89	89	89	88	89	88	88	92
3	100 Year Precipitation, P =	126.5	mm	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5	126.5

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \frac{(P - Ia)^2}{Q} - (P - Ia)$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254} \qquad S = \frac{25400}{CN} - 254$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

	Output Values																					
	Subcatchment:	101		102	103	104	105	106	107	108	109	110	111	112	113	115	116	117	118	119	120	114
	S_{III} =	34.64	mm	41.35	34.64	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	34.64	31.39	34.64	34.64	22.09
	SCS Assumption of 0.2 S = Ia =	6.93	mm	8.27	6.93	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.93	6.28	6.93	6.93	4.42
4	Q_{III} =	92.72	mm	87.60	92.72	95.33	95.33	95.33	95.33	95.33	95.33	95.33	95.33	95.33	95.33	95.33	95.33	92.72	95.33	92.72	92.72	103.38
	Preferred Initial Abstraction, Ia =	7.2	mm	7.9	7.9	7.9	8.0	7.5	8.0	6.9	8.2	7.4	7.8	7.6	8.0	7.7	8.0	8.9	7.8	6.6	9.2	6.5
5	S^*_{III} =	34.20	mm	42.02	33.17	28.90	28.85	29.57	28.83	30.50	28.55	29.75	29.04	29.35	28.80	29.18	28.84	31.56	29.10	35.19	31.04	19.30
6	CN^*_{III} =	88.13	mm	85.81	88.45	89.78	89.80	89.57	89.81	89.28	89.90	89.52	89.74	89.64	89.81	89.70	89.80	88.95	89.72	87.83	89.11	92.94
	CN^*_{III}=	**88**	Rounded	**86**	**88**	**90**	**90**	**90**	**90**	**89**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**89**	**90**	**88**	**89**	**93**
7	**CN^*_{II}=**	**75**	convert	**72**	**75**	**78**	**78**	**78**	**78**	**77**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**77**	**78**	**75**	**77**	**84**

Explanation of Procedure

1 Determine CN based on typical AMC II conditions (attached)
2 Convert CN from AMC II to AMC III conditions (standard SCS tables)
3 Get precipitation depth P for 100 year storm
4 Using CN_{III} with Ia = 0.2S, compute Q_{III} for 100 year precipitation
5 For the same Q_{III}, compute S^*_{III} using Ia=1.5mm (or otherwise determined)
6 Compute CN^*_{III} using S^*_{III}
7 Calculate CN^*_{II} using SCS conversion table

Existing Conditions
IA Calculations

White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer Initials: D.V.

LAND USE (%) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101	86.7								13.3	100.0
102	81.4				16.6				2.0	100.0
103	42.4				55.3				2.3	100.0
104	1.2	0.4			97.2				1.2	100.0
105		0.8		0.1	98.3				0.7	100.0
106				10.3	86.3				3.4	100.0
107					99.7				0.3	100.0
108				31.0	65.6				3.4	100.0
109		15.0		3.1	81.3				0.6	100.0
110				18.7	80.1				1.2	100.0
111				3.5	95.6				1.0	100.0
112				9.3	89.3				1.4	100.0
113					100.0					100.0
115					95.8				4.2	100.0
116					99.6				0.4	100.0
117	16.1	69.6			6.2				8.1	100.0
118				4.3	94.5				1.2	100.0
119				45.8	53.4				0.8	100.0
120		62.2			37.8					100.0
114					74.9				25.1	100.0

IA VALUES (mm) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
101	6.9								0.3	7.2
102	6.5				1.3				0.0	7.9
103	3.4				4.4				0.0	7.9
104	0.1	0.0			7.8				0.0	7.9
105		0.1		0.0	7.9				0.0	8.0
106				0.5	6.9				0.1	7.5
107					8.0				0.0	8.0
108				1.6	5.2				0.1	6.9
109		1.5		0.2	6.5				0.0	8.2
110				0.9	6.4				0.0	7.4
111				0.2	7.6				0.0	7.8
112				0.5	7.1				0.0	7.6
113					8.0					8.0
115					7.7				0.1	7.7
116					8.0				0.0	8.0
117	1.3	7.0			0.5				0.2	8.9
118				0.2	7.6				0.0	7.8
119				2.3	4.3				0.0	6.6
120		6.2			3.0					9.2
114					6.0				0.5	6.5

* IA values based on TRCA guidelines

Existing Conditions
Percent Impervious Calculations

			StandHyd IDs	
			114	
Catchment Area (ha)			4.35	
Land Use Areas	Timp	Ximp	Land Use Areas	Total
Existing Impervious Area	100%	0%	1.09	1.09
Grass	0%	0%	3.26	3.26
		Total Land Use =	4.35	4.35
		Timp =	25%	25%
		Ximp =	0%	0%

scs consulting group ltd

Existing Conditions
Time to Peak Calculations

White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer Initials: D.V.

Uplands Method:

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Land Cover Type	Velocity (m/s)	Time of Concentration (s)	Time of Concentration (hr)	Time to Peak (hr)
101a	232.47	230.57	189	1.01	Cultivated Straight Row	0.28	673.7	0.19	0.13
101b	230.57	230.27	54	0.55	Small Upland Gullies and Paved Areas	0.45	119.0	0.03	0.02
101c	230.27	225.63	342	1.36	Cultivated Straight Row	0.33	1051.0	0.29	0.20
101									**0.34**
102a	230.09	217.53	980	1.28	Cultivated Straight Row	0.32	3098.2	0.86	0.58
102									**0.58**
103a	225.18	219.12	270	2.24	Pasture	0.33	825.9	0.23	0.15
103b	219.12	217.53	52	3.06	Pasture	0.38	135.9	0.04	0.03
103									**0.18**
104a	233.34	217.97	1501	1.02	Pasture	0.22	6822.2	1.90	1.27
104b	217.97			#DIV/0!	Pasture	#DIV/0!	#DIV/0!	#DIV/0!	0.00
104									**1.27**
105a	230.93	228.30	304	0.87	Pasture	0.20	1504.2	0.42	0.28
105b	228.30	228.17	119	0.11	Waterway	0.16	727.5	0.20	0.14
105c	228.17	218.91	821	1.13	Pasture	0.23	3554.8	0.99	0.66
105									**1.08**
106a	230.38	222.75	784	0.97	Pasture	0.21	3656.0	1.02	0.68
106b	222.75	220.99	173	1.02	Cultivated Straight Row	0.28	613.5	0.17	0.11
106									**0.79**
107a	229.67	222.13	933	0.81	Pasture	0.20	4778.9	1.33	0.89
107									**0.89**
108a	227.29	225.52	201	0.88	Pasture	0.20	986.1	0.27	0.18
108b	225.52	223.38	197	1.09	Cultivated Straight Row	0.29	676.3	0.19	0.13
108									**0.31**
109a	229.80	228.93	171	0.51	Pasture	0.16	1103.2	0.31	0.21
109b	228.93	228.22	279	0.25	Woodland	0.08	3662.1	1.02	0.68
109c	228.22	223.45	604	0.79	Pasture	0.19	3129.3	0.87	0.58
109									**1.47**
110a	226.88	224.01	264	1.09	Pasture	0.23	1164.6	0.32	0.22
110									**0.22**
111a	228.18	226.05	313	0.68	Pasture	0.18	1749.0	0.49	0.33
111b	226.05	224.90	114	1.01	Cultivated Straight Row	0.28	406.3	0.11	0.08
111									**0.40**

112a	227.85	224.85	434	0.69	Pasture	0.18	2406.7	0.67	0.45
112									**0.45**
113a	227.81	226.52	329	0.39	Pasture	0.14	2430.7	0.68	0.45
113									**0.45**
115a	227.84	225.40	493	0.49	Pasture	0.15	3235.8	0.90	0.60
115									**0.60**
116a	229.03	228.83	71	0.28	Pasture	0.11	620.7	0.17	0.12
116b	228.83	226.21	388	0.67	Woodland	0.12	3123.7	0.87	0.58
116c	226.21	223.25	530	0.56	Pasture	0.16	3269.2	0.91	0.61
116d	223.25	223.21	73	0.05	Waterway	0.11	637.4	0.18	0.12
116e	223.21	223.13	14	0.56	Pasture	0.16	86.0	0.02	0.02
116									**1.44**
117a	227.70	220.32	594	1.24	Pasture	0.24	2448.7	0.68	0.46
117									**0.46**
118a	232.81	223.00	1525	0.64	Pasture	0.17	8764.9	2.43	1.63
118									**1.63**
119a	231.66	229.47	279	0.78	Cultivated Straight Row	0.25	1125.5	0.31	0.21
119									**0.21**
120a	228.56	226.76	75	2.41	Forest (Heavy Litter)	0.12	644.0	0.18	0.12
120									**0.12**

RUNOFF COEFFICIENT CALCULATIONS

Catchment 201		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
2.43	0.75	0.06
16.41	0.90	0.46
10.00	0.74	0.23
1.05	0.25	0.01
1.90	0.55	0.03
31.79	-	0.80

Catchment 202		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
3.30	0.25	0.01
4.65	0.55	0.05
2.43	0.75	0.03
44.51	0.74	0.60
0.34	0.60	0.00
55.23	-	0.69

Catchment 203		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
6.81	0.25	0.03
50.15	0.74	0.65
56.96	-	0.68

Catchment 204		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
4.31	0.55	0.04
5.15	0.25	0.02
48.18	0.74	0.62
57.64	-	0.68

Catchment 205		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
16.98	0.25	0.12
1.72	0.55	0.03
16.33	0.74	0.34
35.03	-	0.75

Catchment 206		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
3.00	0.25	0.01
4.89	0.55	0.04
50.38	0.74	0.61
2.43	0.75	0.03
60.70	-	0.70

Catchment 207		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
3.27	0.25	0.25
3.27	-	0.25

Catchment 208		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
2.00	0.25	0.01
1.09	0.55	0.01
3.37	0.74	0.39
6.46	-	0.40

Catchment 209		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
1.38	0.90	0.90
1.38	-	0.90

Catchment 212		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
0.24	0.90	0.35
0.37	0.74	0.45
0.61	-	0.80

Catchment 213		
Area (ha)	**Runoff Coefficient**	**Weighted Runoff Coefficient**
0.25	0.90	0.90
0.25	-	0.90

***TIMP is assumed to be (RC - 0.2)/0.7. RCs are referenced from the 2019 Hamilton Design Standards.**

DIGITAL REPORT AND MODELLING FILES

The following secure link is being provided by **SCS Consulting Group** to share White Church Secondary Plan related digital data:
https://filesafecloud.scsconsultinggroup.com/url/bpzyvh2wnut6kdry

Please click on the link and download all files from this location.
This file transfer link will not expire.

- Visual Otthymo modelling
- Visual Otthymo Output for the 2-100yr 12hr AES Storm

SCS consulting group ltd

Appendix D Sanitary Population Calculation

SCS consulting group ltd

Sanitary Populations

White Church Secondary Plan
Project Number: 2600
Date: December 2023
Designer Initials: D.V.

West Lands

Land Owner/Land Use	Land Use Area (ha)	Persons per Hectare	Total Population (Persons)
Residential Lands	55.89	77	4304
Neighbourhood Park	8.70	25	218
Institutional	4.87	125	609
Mixed Use - Medium Density	16.38	250	4095
SWM Facility Blocks	7.66	-	-
Pipeline	3.36	-	-
Right of Way	2.25	-	-
		Total =	9225

East Lands

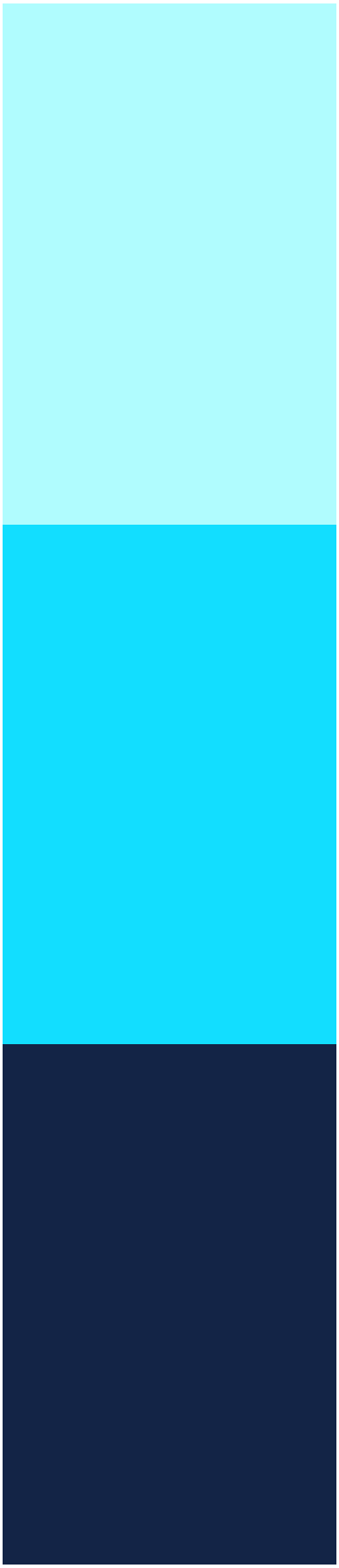
Land Owner/Land Use	Land Use Area (ha)	Persons per Hectare	Total Population (Persons)
Residential Lands	148.65	77	11446
Neighbourhood Park	10.74	25	269
Institutional	2.43	125	304
SWM Facility Blocks	10.90	-	-
Pipeline	4.75	-	-
Natural Open Space	16.45	-	-
Right of Way	17.51	-	-
		Total =	12018

Panhandle West Lands

Land Owner/Land Use	Land Use Area (ha)	Persons per Hectare	Total Population (Persons)
Residential Lands	7.98	77	614
		Total =	614

Panhandle East Lands

Land Owner/Land Use	Land Use Area (ha)	Persons per Hectare	Total Population (Persons)
Residential Lands	7.25	77	558
Neighbourhood Park	0.47	25	12
		Total =	570



SCS Consulting Group Ltd
30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8
Phone 905 475 1900
Fax 905 475 8335