

8.0 Municipal Services

8.1 Introduction

The municipal services component of the EIR/FSS addresses the servicing (water, wastewater, and stormwater) and grading requirements to develop the FSS Study Area. The servicing design is intended to work in conjunction with the SWM plan and other considerations as detailed in Section 7.0.

The municipal servicing design for the EIR/FSS has been conceptually developed utilizing the land use concept plan as its basis. The land use concept plan illustrates natural features, the pattern of major roads and the land uses. The proposed municipal servicing design generally follows the proposed road layout while considering the natural features and topography of the site. This is appropriate at the EIR/FSS level.

To develop the municipal servicing design the Region's Water and Wastewater Master Plan (WWMP) and the SWM Plan in Section 7.0 were reviewed and utilized. The design and documentation has been developed in conjunction with the 407 West Employment Lands – Area Servicing Plan (ASP) prepared by WSP (formerly MMM Group), which was approved by the Region (June 2014). The ASP generally covers the lands bounded by Dundas Street West, Bronte Road, the Highway 407 and Tremaine Road. The EIR/FSS is consistent with the ASP and does not create undue constraints on the servicing of other lands within or external to the ASP boundary. The Region's WWMP indicates that the servicing of the lands to the east and west are to be self-contained. Specifically, the lands to the west known as the Evergreen Secondary Plan (formerly Tremaine and Dundas Secondary Plan, are currently in the Public Consultation Phase. A draft Land Use Plan and Secondary Plan was prepared for consultation in June of 2018. WSP have reviewed the Water and Wastewater Servicing Assessment prepared by AECOM (September 2009) for the lands. This report indicates that water servicing is to be provided from the proposed watermain on Tremaine Road, sanitary servicing is tributary to the trunk sewer on Dundas Street West, and the Secondary Plan options included in the report indicate that SWM will be provided onsite. This is generally in conformance with the servicing strategy outlined in the ASP and in this EIR/FSS.

In the WWMP and the subsequent update, the Region considered a wide variety of possible strategies to service the expected growth throughout the entire Region for both water and wastewater servicing. The conclusions of the Region's work with respect to treatment and conveyance (including conveyance options) as it affects the FSS Study Area are summarized in the following Wastewater and Water Sections.

The SWM Plan for the 407 West Employment Area is generally consistent with NOCSS. NOCSS sets the standards and requirements for the treatment of stormwater throughout North Oakville.

8.2 Conceptual Wastewater Servicing Strategy

8.2.1 General

The Region provides the Town with Wastewater Treatment, Sewage Pumping Stations and Wastewater collection services. The wastewater infrastructure requirements are outlined below.

8.2.2 Treatment

Wastewater treatment for Oakville is provided at three Wastewater Treatment Plants (WWTP). These plants are Mid-Halton, Oakville South East, and Oakville South West. The recommended alternative in the WWMP proposed that all wastewater treatment for growth in Oakville and Milton be at the Mid-Halton WWTP.

The first phase of Mid-Halton WWTP was constructed in 1991 with a rated capacity of 20,000 m³/d. It was subsequently re-rated to 25,000m³/d. The Region completed an expansion of the plant to 50,000 m³/d in 2003 and has subsequently completed the next expansion to 75,000 m³/d to service anticipated growth within Milton and Oakville. A subsequent expansion to 125,000 m³/d is currently underway; and construction is expected to be completed soon.

The Region has planned the Mid-Halton Wastewater plant and has sufficient land to allow it to be expanded in an orderly and predictable fashion. These expansions would be timed so that the capacity is available when required by development throughout the region. Expansion of capacity will trigger the need for various other changes or improvements such as biosolids handling and a new outfall (currently underway).

8.2.3 Collection System

Figure 8.1 is a representation of the portion of the Region's proposed wastewater collection and pumping system that are intended to service the 407 West Employment Area, the lands to their east and a portion of the expected growth in Milton.

The 407 West Employment Area generally slopes from north to south and towards the centre of the lands, approximately 180 m to the east of Colonel William Parkway at Dundas Street. The WWMP provides for a series of local sewers that will drain from north to south connecting to a new Trunk Sewer System on Dundas Street. The Region's WWMP does not show the sewers within the 407 West Employment Area. One of the purposes of this report is to apply the WWMP concept to the Land Use Plan road and development scheme and recommend a specific plan for the sewer system. At Dundas Street, a trunk system which directs the flows to the existing system at Colonel William Parkway is proposed. The existing system will intercept flow and divert it south towards the Mid-Halton Plant in a manner that minimizes impact to the existing residents of the Town of Oakville.

More specifically, the lands to the west of the western natural heritage system (NHS) and east of Tremaine Road will be conveyed south by an internal wastewater sewer along an internal Avenue 2 to the Trunk Sewer on Dundas Street West which will then connect to the existing wastewater system at Colonel William Parkway.

The external area from the lands west of Tremaine Road can connect to the system at the future Burnhamthorpe Road Extension, Avenue 3 or on Dundas Street West. The wastewater flows from the lands between the two natural heritage areas will be conveyed south along an internal Avenue 3 and discharged to the existing wastewater system on the south side of Dundas Street at Colonel William Parkway. The lands east of the Fourteen Mile Creek NHS and west of Bronte Road will be conveyed south along Avenue 3 and will connect to the Trunk Sewer on Dundas Street West which will then discharge to the existing system at the south side of Dundas Street at Colonel William Parkway. The trunk sewer and downstream system on Colonel William Parkway has been designed to accommodate an external area of 362 ha and an equivalent

residential population of 8,145 people. Please refer to the design calculations and drainage plan for the Bronte Creek Community completed by Stantec in Appendix 8.1.

There is the possibility for the flows from a portion of the lands between the Fourteen Mile Creek NHS and Bronte Road to discharge to the existing system at Valleyridge Drive. The Region has advised that the sewers on Valleyridge Drive were designed to accommodate an external area of 80 ha with an equivalent population of 10,000 people. As shown on Figure 8.2, the 407 West Employment Area lands that would be tributary to this sewer have an area of approximately 40 ha and an equivalent population of 4,500 people. This alternative servicing option would require extending the existing sewer to Dundas Street and would eliminate the need for a sewer on Dundas crossing the Fourteen Mile Creek NHS. This is shown on Figure 8.2 as an alternative wastewater sewer alignment.

The existing system eventually discharges to the Mid-Halton WWTP and Pumping Station (PS). No upgrades to the existing wastewater sewers are anticipated to accommodate future development. The need for a local or regional pumping station appears not to be required.

8.2.4 Region's Timing of Required Wastewater Infrastructure

A Sanitary Trunk Sewer (Regional project 6911) along Dundas Street is required to service the FSS Study Area. This project can be completed as development requires. The connection point at Colonel William Parkway is in place with available capacity to service the FSS Study Area.

8.2.5 Expected Sewage Generation

Sewage generated in the 407 West Employment Area Land Use Plans has been assessed and compared to the WWMP. The design criteria that the Region has utilized in the WWMP are used in this analysis. To develop the estimated sewage generation, the system design criteria is first set out and then applied to the proposed development statistics from Figure 3.1.

The Region's wastewater system criteria are as follows in Table 8.1:

Table 8.1 – Average Day Wastewater Flow

Land Use	Unit	Collection System	Treatment
Residential	L/cap/d	275	365
Commercial	m ³ /ha/d	24.75	26.00
Industrial	m ³ /ha/d	34.38	17.63
Institutional	m ³ /ha/d	10.94	10.94

The modified Harmon Peaking Factor equation is used to determine the peak flows for the collection system. The average day wastewater flow criteria for wastewater treatment include an allowance for infiltration. An infiltration allowance of 0.286 L/s/ha is added to the peak system flows for designing the collection system.

The treatment capacity flow generated by the 407 West Employment Area is illustrated in Table 8.2. Commercial land use demands have been applied to the entire site to provide a conservative estimate and to allow for flexibility with respect to the ultimate land use mix.

Table 8.2 – Generated WWTP Flows: 407 West Employment Area Land Use Plan Projections

	Residential ML/d	Commercial ML/d	Industrial ML/d	Institutional ML/d	Total ML/d
Average Daily Flow	0.0	4.1	0.0	0.0	4.0

Pumping stations and sewers are designed based upon peak flows. Flows will increase as various sub-catchment areas are connected to the Trunk Sewer. Table 8.3, estimates the peak flow to the existing wastewater sewer on Colonel William Parkway. This is the full flow from the 407 West Employment Area.

The difference in the peak flows between the Region's projections and from those generated from the 407 West Employment Area Land Use Plan combined with the proposed increase in pipe slope in some instances will impact the sizing of the Dundas Street trunk sewer by one pipe size in some locations. Industrial land use demands have been applied to the entire site to provide a conservative estimate and to allow for flexibility with respect to the ultimate land use mix.

Table 8.3 – Peak Generated Collection System at Colonel William Parkway Trunk Sewer: 407 West Employment Area Only

	Residential L/s	Commercial L/s	Industrial L/s	Institutional L/s	Sub total L/s
Average Flow	0.0	0.0	57.76	0.0	57.76
Peaking Factor	4.3	4.3	2.631	4.3	
K	0.80	0.80	0.80	0.80	0.80
Peak Flow	0.0	0.0	121.57	0	121.57
Infiltration	0.0	0.0	41.52	0.0	41.52
Sub total	0.0	0.0	163.1	0.0	163.1

8.2.6 Region's Concept Plan Applied to the FSS Study Area

The proposed sewer system to service the FSS Study Area is described in this section and the proposed drainage boundaries are illustrated on Figure 8.2.

8.2.6.1 Dundas Street Wastewater Sewer

As discussed in the above sections, the Region proposes that all wastewater flows from the FSS Study Area drain to a trunk wastewater sewer system along Dundas Street West. As plans were being developed for the FSS Study Area, alternative locations for this wastewater sewer were considered. At this stage it has been determined that Dundas Street West would be a feasible alignment for the wastewater sewer.

The WWMP recommends that the Dundas Street West gravity wastewater sewer directing flows from the entire 407 West Employment Area to the gravity wastewater sewer on Dundas Street West and ultimately to the existing wastewater sewer on Colonel William Parkway. This study generally supports that conclusion.

A conceptual design has been undertaken for the trunk wastewater sewer on Dundas Street West, which is presented on the attached drawings, P1-P17.

8.2.6.2 Internal Collection Systems

To convey wastewater drainage from the Subject Property to the Dundas Street West sewer collection system, various alternative system layouts were evaluated. The common elements of the system layouts were:

- All sewers are located on proposed road alignments; and
- All crossings of watercourses on natural features follow proposed road alignments.

Several factors were considered that would influence the proposed alternatives. The factors include environmental features, existing topography, proposed road patterns, SWM facilities, and relative ease of sewer construction.

While Figure 8.2 shows the preferred alignment for the internal sewers, there is flexibility in the location of these sewers and the corresponding drainage boundaries. The sizing of the Dundas Street sewer has considered this flexibility, and as such, will allow the plan to evolve as it moves forward over time. The costs for local sewers are not considered to be DC recoverable.

A local or regional pumping station appears to be unnecessary.

8.2.6.3 External Drainage Areas

Two other tributary areas will connect to the Dundas Street trunk sewer at various locations. Due to their shorter lengths and smaller tributary areas they are considered to be local sewers. Together they service an approximate area of 69 ha of developable lands with an estimated equivalent population of 3,805 people. These local sewers allow the Dundas Street trunk to be kept at a nominal depth.

The adjacent Tremaine and Dundas Secondary Plan Area, City of Burlington will discharge wastewater flows to the Dundas Street Trunk system. A Secondary Plan is currently being prepared for the area to determine the preferred land use concept. According to the City of Burlington, the Secondary Plan has been adopted by the City but is pending acceptance from the Region. At present there are 3 land use options proposed which include approximately 56 ha of developable land. For the purpose of this study the most conservative approach was assumed to evaluate the downstream wastewater sewer. It was assumed that the entire lands would develop as residential. The wastewater flows generated by the Tremaine-Dundas Community are shown in Table 8.4.

Table 8.4 – Peak Generated Collection System Flows to Dundas Trunk Sewer: Tremaine Dundas Community

	Residential L/S	Commercial L/S	Industrial L/S	Institutional L/S	Sub Total L/S
Average Flow	6.9	0.0	0.0	0.0	6.9
Peaking Factor	3.560	3.560	3.560	3.560	3.560
Harmon Peaking Factor (K)	1.0	1.0	1.0	1.0	1.0
Peak Flow	24.56	0.0	0.0	0.0	24.56
Infiltration	16.0	0.0	0.0	0.0	16.0
Sub Total	40.6	0.0	0.0	0.0	40.6

The Region has expressed concerns relating to the servicing of the lands on the east side of Old Bronte Road, north of Dundas. This area includes approximately 13 ha of existing residential development with an equivalent population of 715 people, and is currently serviced by septic systems. In servicing these lands in the future, it is expected that wastewater flows cannot be conveyed to the trunk sewer on Grand Oak Trail, as this would require a crossing of the NHS to the east. As such, it is proposed that a new wastewater sewer be constructed on Old Bronte Road connecting to the existing 825mm trunk sewer on Old Bronte Road north of Dundas Street West. Construction of this local sewer will have to be coordinated with the Region. The wastewater flows generated by the existing Old Bronte Road residential development are shown in Table 8.5.

Table 8.5 – Peak Generated Collection System Flows to Dundas Trunk Sewer – Existing Old Bronte Road Residential Development

	Residential L/S	Commercial L/S	Industrial L/S	Institutional L/S	Sub Total L/S
Average Flow	2.3	0.0	0.0	0.0	2.3
Peaking Factor	3.89	4.3	4.3	4.3	
K	1.0	1.0	1.0	1.0	1.0
Peak Flow	8.95	0.0	0.0	0.0	8.95
Infiltration	4.1	0.0	0.0	0.0	4.1
Sub Total	13.1	0.0	0.0	0.0	13.1

It is expected that the Sixteen Hollow Lands to the east of the 407 West Employment Lands will be serviced by the existing wastewater sewer located at approximately Third Line and Dundas Street West and will not impact any of the sewers utilized by the 407 West Employment Lands.

8.2.7 Sewer Sizing and Technical Analysis

Flows and sewer sizes were developed using Regional design criteria. Detailed design sheets are provided in Appendix 8.1. The existing system along Colonel William Parkway from Dundas Street West to the south limit of the Bronte Creek Community has been designed to accommodate 362 ha of development with an equivalent population of 8,145. The design sheet and drainage plan for the Bronte Creek Community are available in Appendix 8.1.

The Bronte Creek Community design sheets have been used to assist with the analysis of the proposed development of the 407 West Employment Area. The proposed 407 West Employment Area and the external contributors (Tremaine Neighbourhood and the Old Bronte Road properties) that contribute to the Colonel William Parkway collect from a total area of 202.6 ha and an equivalent population of 19,131 people with a combined wastewater flow of approximately 194 L/s at the Colonel William Parkway and Dundas Street West manhole and 223 L/s at the south limit of the Bronte Creek Community. In contrast, the Bronte Creek Community analysis completed by Stantec shows a total flow contribution of approximately 180 L/s at the Colonel William Parkway and Dundas Street West manhole and 210 L/s at the south limit of the Bronte Creek Community. This does represent an increase of approximately 14 L/s at the Colonel William Parkway and Dundas Street West manhole, and 13 L/s at the south limit of the Bronte Creek Community; however, at no point is the capacity of any leg of sewer greater than 75%. It should also be noted that the wastewater generation values used for both the Tremaine Subdivision and the 407 West Employment Area are the highest values possible. This wastewater analysis is a worst-case scenario.

Conceptual Plan-Profiles of the Wastewater Sewer design are provided in Appendix 8.3.

8.2.8 Mitigation Measures for Wastewater Crossings of Watercourses and Natural Heritage

To provide a service connection to Blocks P1 and P3, it will be necessary for the wastewater sewer to cross watercourses and the NHS at two locations. Wherever possible, the wastewater sewer alignment will be kept within the proposed right-of-way (ROW) and will go over the culvert structure.

In circumstances where a bridge will be used or where going over the culvert is not possible, the wastewater sewer will be installed using a trenchless technology, such as, jack and bore or directional drilling below the watercourse or natural feature preferably within the ROW. The sewer should be installed using a steel liner or another acceptable form of protective casing, with the launching and receiving pits positioned as far as practically possible from the watercourse or natural feature. All crossings should be a minimum of 3.0 m below the watercourse or natural feature and must follow all geotechnical recommendations. This will have a carry through effect of lowering the entire wastewater sewer system and therefore, needs to be taken into consideration during the early stages of detail design.

Where the culvert or bridge structure requires piles or other deep foundations and the use of trenchless construction is not feasible within the ROW, the wastewater sewer alignment will be moved outside of the ROW to a point where it will not influence the structure foundation. The launching and receiving pits will be located as far as practically possible from the watercourse or natural feature. The alternative alignments and

profiles of the proposed wastewater collection system with respect to the crossings are shown on Drawings P1-17.

Should the existing culverts along Dundas Street be replaced with bridges, Option 2 will be implemented, as indicated on Exhibit 3.6 and the Plan-Profiles in Appendix C. In Option 2, the sanitary drainage area from Avenue 5 will be directed to the existing system on Valleyridge Drive to avoid the crossing of the watercourse. The sanitary sewer along Dundas Street between Avenue 3 and Avenue 5 will be routed around the bridge structure and installed using trenchless technology with a minimum depth of 3.0 m below the existing watercourse.

The crossing of any Redside Dace habitat watercourse will require review and approval from the Ministry of Environment, Conservation and Parks (MECP) prior to the construction of the crossing infrastructure. Each crossing permit will have specific requirements; however, for the crossings within the 407 West Employment Lands, it should be expected that the following will be required:

- Construction will be during the permissible Redside Dace in-water construction window of July 1 to September 15;
- Construction will utilize trenchless construction methods;
- Utilities will be installed at a depth of at least 3 m below the bottom of a Redside Dace habitat watercourse;
- A specific contingency plan will need to be prepared for each crossing to address all concerns of the construction methodology proposed;
- All disturbed soils will need to be stabilized using a methodology approved by the MNRF; and
- Erosion and sediment control measures will remain in place until final restoration has been completed.

8.3 Conceptual Water Servicing Strategy

The Region's 'Sustainable Halton Water and Wastewater WWMP' dated September 2011 set out a strategy for the long term and orderly development of the Region's infrastructure. This report was prepared in response to the new Official Plan (ROPA 38) and Phasing (ROPA 39). In the case of water, this report addressed supply, pressure districts, storage and distribution. This report also addresses timing and provides conceptual information on the location of proposed infrastructure; however, this is subject to more detailed review when considering the servicing corridors available through the road network that is proposed as part of the Land Use Plan for the 407 West Employment Area.

This EIR/FSS report has been prepared to develop on and complement the Region's plans by providing more specific information on how it can be implemented in the context of the specific plans for the FSS Study Area. Therefore, to provide appropriate context, the Region's Plan as it relates to the FSS Study Area is summarized in this section.

8.3.1 Supply

Historically water supply for South Halton has come from three main sources, the Burlington Water Purification Plant, the Oakville Water Purification Plant, and wells within Milton (to service specific areas of Milton).

The 2002 WWMP concluded that the long-term growth of Halton would require the construction in stages of a new water treatment plant that will have an ultimate capacity of 220 ML/d. The first stage of this new plant (Burloak) is now complete and commissioned.

This new supply is critical to meet the Region's medium and long-term growth projections for both the 407 West Employment Area and the Region.

8.3.2 Pressure Districts

The Subject Property, consistent with Section 8.2.6, is located within the Oakville pressure district identified as Zone 3 or O-3. Zone 3 in Oakville includes all lands with an elevation of 128 to 166 m. The zone boundary is generally parallel to Sixteen Mile Creek on the east, along Highway 407 to the north, along Tremaine Road to the west, and generally in between Upper Middle Road and the Q.E.W. to the south as shown on Figure 8.3.

Supply for Zone 3 is currently via a booster pumping station at Eighth Line and Upper Middle Road and the Kitchen Reservoir and Pump Station at Regional Road 25 and Upper Middle Road. Storage is provided at the Moore Reservoir on Sixth Line north of Burnhamthorpe Road (north of Dundas Street).

The Region has recently constructed a 1200 mm watermain on Dundas Street from Tremaine Road to Bronte Road. This watermain will directly supply the 407 West Employment Area. We understand that the supply to Zone 3 has been augmented via a 1200 mm watermain connection on Dundas Street from 400 m east of Bronte Road to Neyagawa Boulevard. This supply is connected to the existing Zone 3 water supply (Moore Reservoir on Sixth Line) via the existing 600 mm watermain on Dundas Street connecting to the existing Sixth Line main which links the Eighth Line Water Booster Pumping Station (WBPS) with the Moore Reservoir. The 407 West Employment Area will also receive supply from the Burlington Zone B3 via a 900 mm watermain on Dundas Street from Appleby Line to Tremaine Road.

8.3.3 Storage

Storage for Oakville Zone 3 is currently provided at the R.J. Moore Reservoir on Sixth Line. Until 2002, Zone 3 also provided the storage for Zone 4, where it was pumped to Zone 4 on an as required basis. In 2002, an elevated storage tank was constructed in Zone 4 on Trafalgar Road north of Burnhamthorpe Road.

The existing storage available in Oakville Zone 3 is sufficient for long term build-out of the FSS Study Area, and all other lands serviced by Zone 3.

8.3.4 Distribution

Development in Oakville is currently serviced via a series of trunk watermains that connect sources of supply, pumping, and storage to a local distribution network.

To support growth, the Region proposes a series of new trunk watermains that interconnect with and expand the existing system and connect to the new proposed sources of supply, pumping and storage as described above. The FSS Study Area will connect to the existing Zone 3 system at Dundas Street and Bronte Road, looped along Tremaine Road and internally through the FSS Study Area to ultimately connect to the future

watermain (Regional Project #5854) in the adjacent Sixteen Hollow Lands. Water service will be distributed to the local network from the Dundas Street and the internal regional watermain.

8.3.5 Region's Timing

The infrastructure described above will be constructed on an as-required basis for each phase of development. In many instances works such as the treatment plants, storage, and pumping stations will be constructed incrementally. In the case of linear infrastructure, it will be extended incrementally to provide local service connectivity and looping.

8.3.6 Expected Water Demand

In this section, water demands under various conditions have been assessed using the design criteria that the Region has utilized in the WWMP and supplemented with the Region's Design Criteria as required. To develop the estimated demands, the system design criteria is first set out and then applied to the proposed development statistics from Figure 3.1.

The flow demand, storage volume requirements, and pumping station capacities are similar to those used by the Region in developing the WWMP. Any difference in the demand estimated in the WWMP is due to an increase of undevelopable natural heritage areas throughout the 407 West Employment Area.

Table 8.6 sets out the system unit demands. Table 8.7 summarizes the Water System Design Criteria.

Table 8.6 – System Unit Demands

	Residential L/cap/day	Commercial m³/ha/day	Industrial m³/ha/day	Institutional m³/ha/day
Average Day Demand	314	26.00	17.63	10.94
Maximum Day Peaking Factor	1.9	1.9	1.9	1.9
Peak Hour Peaking Factor	3.00	3.00	3.00	3.00

Table 8.7 – Water System Design Criteria

Component	Condition/Description	Criteria
Pumping Stations	With adequate zone storage available	Maximum day flow to zone and all subsequent zones
	Without adequate storage available	The greater of peak hour flow or maximum day plus fire to the zone and the maximum day flow to all subsequent higher zones
Storage	Balancing storage	25% of maximum day demand
	Fire storage	Largest expected fire zone (based on land use)
	Total	125% of Balancing + Fire (allows for 25% Emergency Storage)

Fire flow	Minimum flow (single family residential)	5,500 L/min for 2 hours @ minimum 140 kPa (20 psi)
	Minimum flow (industrial/commercial/institutional)	15,000 L/min for 3 hours @ minimum 140 Pa (20 psi)
System pressure	Normal operating conditions	280 kPa (40 psi) to 700 kPa (100 psi)

Table 8.8 summarizes the projected demands under various conditions for the 407 West Employment Area at build-out by applying the above criteria to the development statistics described in Figure 3.1. Commercial land use demands have been applied to the entire site to provide a conservative estimate and to allow for flexibility with respect to the ultimate land use mix.

Table 8.8 – Flow Demands: Linear Infrastructure (407 West Employment Area Land Use Plan Population Projections)

	Residential (ML/d)	Commercial (ML/d)	Industrial (ML/d)	Institutional (ML/d)	Total (ML/d)
Average Day Demand	0.0	4.1	0.0	0.0	4.1
Maximum Day	0.0	7.7	0.0	0.0	7.7
Peak Hour	0.0	12.2	0.0	0.0	12.2

8.3.7 Region's Concept Plan Applied to the FSS Study Area

One of the important purposes of this report is to apply the Region's WWMP Update water distribution concept to the approved Secondary Plan for the FSS Study Area. As stated at the outset of this Report, the Report's purpose is to adapt the Region's servicing concept to the approved Secondary Plan, not to modify it. As a result of this principle, and because the estimated demand based upon the approved Secondary Plan is similar to the demand assumed by the Region, no changes are recommended to the Region's proposed supply, pumping, or storage system network.

The development of a community plan has; however, created the opportunity, and in fact the need, for a 'plan specific' trunk water main distribution network to be developed to replace the generic one that the Region applied in the absence of a Secondary Plan.

The proposed ASP water distribution network is illustrated in Figure 8.4. To address environmental sensitivities and minimize impact, all mains are proposed to be located on existing or proposed road allowances.

The proposed ASP water distribution system is essentially the same as the distribution from the Region's Master Plan Update (MPU) with minor changes based on the outcome of land uses proposed by the approved Secondary Plan. The following key elements of the proposed distribution network that are the same as the Region's MPU water system include:

- The 1200 mm PD3 supply main on Dundas Street from Bronte Road to Tremaine Road (completed); and

- The 600 mm PD3 watermain on Tremaine Road from Dundas Street to the proposed East-West Collector through the FSS Study Area (Region Project #5853).

Changes to the network to respond to the proposed Secondary Plan and road pattern include the following minor changes to the Region's MPU.

- A slight relocation of the east-west 600 mm watermain to better match the proposed road alignment (Region Project # 5627).

Finally, to maintain required fire flows and adequate pressure during all phases of development, the local north-south watermain should connect to the 1200 mm diameter watermain on Dundas Street.

The proposed changes to the distribution system will have no change to the development charge projects.

8.3.8 Water Distribution Modeling Analysis

The Region provided a copy of the Region's Water Distribution Model dated August 12, 2008 to assist WSP in modeling the proposed ASP watermain system. The following recommendations are based on the update of the Region's model to include the proposed ASP watermain system shown in Figure 8.4.

8.3.9 Water Distribution Modeling Results for Peak Hour and Maximum Day

The proposed FSS Study Area system was incorporated into the Region's Water Distribution Model to determine if the proposed FSS Study Area water system would be adequate to service the FSS Study Area. Table 8.9 summarizes the results of the distribution modeling. Copies of the Peak Hour and Maximum Day model results have been included in Appendix 8.2.

Table 8.9 – Results of Water Distribution Modeling for Proposed ASP Water System

	Peak Hour	Maximum Day
Minimum HGL	190.27 m	196.00 m
Node for Minimum HGL	WJ-1152-O	NO-248
Maximum HGL	190.97 m	196.24 m
Node for Maximum HGL	NO-245, 246, 251, 252, 253 WJ-3114-O, & WJ-3116-O	NO-241, 245, 246, 251, 252, 253, WJ-1150-O, WJ3114-O, & WJ-3116-O
Minimum System Pressure (psi)	41.16 psi	48.66 psi
Node for Minimum System Pressure	NO-239	NO-239
Maximum System Pressure (psi)	62.51 psi	70.00 psi

Node for Maximum System Pressure	NO-252	NO-252
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The results of the distribution modeling show that the proposed ASP water system will provide adequate flow and pressure to all locations in the ultimate development condition. It should be noted that the maximum head loss in the proposed system is only 0.08 m during a maximum day demand and 0.18 m during a peak hour demand. The low head loss in the overall system indicates that the watermains are adequately sized and that increasing the watermain sizes from the proposed 1200/600 mm trunk watermains and the 300 mm distribution watermains is not required.

During the initial phases of development, all attempts will be made to provide full looping of the internal water distribution systems; this may require interim or temporary watermains. In cases where looping is not possible, a regular flushing program will be required at all dead ends.

8.3.10 Water Distribution Modeling Results for Maximum Day plus Fire

The proposed system was also modeled to determine if the proposed water distribution system could meet the Region's fire requirements of 5,500 L/minute for residential development and 15,000 L/minute for commercial/institutional/industrial development.

The results of the maximum day plus fire modeling indicates that the fire flow of 15,000 L/minute at a residual pressure of 20 psi is available at all nodes within the FSS Study Area. Therefore, it can be concluded that the proposed ASP water system is adequately sized for the maximum day plus fire demands. All office towers and large scale industrial buildings will likely require boosters to provide proper fire protection; this needs to be evaluated at the detailed design stage on a case-by-case basis.

8.3.11 Additional Design Considerations

8.3.11.1 Local Service Watermains

The 407 West Employment Area Land Use Plan proposes developments that front onto external roads such as Dundas Street, Tremaine Road, and Bronte Road where Regional DC watermains are proposed. These proposed developments will require water services and in some cases may require local watermains to service these developments. The FSS primarily addresses the watermain sizes for the transmission and major distribution watermains. Local distribution mains have been conceptually sized in this study but will need to be addressed in more detail through the Functional Servicing Reports supporting the various Draft Plans of Subdivision and Site Plan Applications and will be in accordance with the Region's published standards for water connections. Each proposed building will need to be evaluated at the detailed design stage to determine if a booster is required for that development to meet the water demand and fire service requirements.

As part of this development, the connections to the 1200mm diameter trunk watermain on the south side of Dundas Street will be constructed at the cost of the proponent.

All service connections will be in designed in accordance with the Region's published standards for water connections.

8.3.11.2 Mitigation Measures for Single Feed Watermain Supplies

The ultimate water distribution is a well-designed network of interconnected watermains with multiple loops to ensure security and flexibility in servicing the full build out of the proposed FSS Study Area and the rest of the FSS Study Area. While it is a priority to loop systems where possible and as soon as the opportunity is available, it may be necessary to service development areas with single feed watermains during various phases of development until the future watermain loops can be constructed. The phasing will likely move to the north from Dundas Street West, which may create circumstances where there are single feed, dead-end watermains. During the interim condition, although dead-end watermains will be minimized, single feed watermains may occur on an interim basis. In these limited situations, a regular flushing practice will be required to maintain water quality. Autoflushers or a manual flushing program will be utilized on all interim single feed watermains. The flushing location will be selected to ensure that adequate water quality is maintained until full looping of watermains occurs. The flushing program, including the flushing frequency and discharge locations, will be determined in conjunction with Region staff. The flushing program will be completed and funded by the developer in accordance with Halton Region requirements. The current interim design does not require a flushing program. In the current interim design does not require a flushing program for any of the phases with no active dead end watermains. Any dead end watermains will be for the connection of future phases and will be inactive by use of a closed valve until such time as the next phase is operational. Periodic flushing of any dead end watermains can be completed if necessary.

Wherever possible during interim conditions, interim watermain loops will be utilized. This may include the use of private watermains to close the loop. Any watermains on private property will require a Regional Easement. Upon completion of the full water distribution system, any private watermains used exclusively for looping will be decommissioned in accordance with Region's requirements.

During the development process, each phase will be evaluated on a case by case basis to determine how adequate water quality will be maintained in the water distribution system.

8.3.11.3 Mitigation Measures for Watermain Crossings of Watercourses and Natural Heritage

In order to provide a robust water distribution system with complete looping, it will be necessary for the watermain to cross watercourses and the NHS. Wherever possible, the watermain alignment will be kept within the proposed ROW and will go over the culvert structure or hung on a bridge structure if a bridge is utilized.

In circumstances where going over the culvert or hanging the watermain on a bridge is not possible, the watermain will be installed using a trenchless technology such as jack and bore or directional drilling below the watercourse or natural feature preferably within ROW. The watermain should be installed using a steel liner or another acceptable form of protective casing, with the launching and receiving pits positioned as far as practically possible from the watercourse or natural feature. All crossings should be a minimum of 3.0 m below the watercourse or natural feature and must follow all geotechnical recommendations.

Where the culvert or bridge structure requires piles or other deep foundations and the use of trenchless construction is not feasible within the ROW, the watermain alignment will be moved outside of the ROW to a point where it will not influence the structure foundation. The launching and receiving pits will be located as

far as practically possible from the watercourse or natural feature. The alternative alignments and profiles of the proposed water distribution system with respect to the crossings are shown on Drawings P1-17.

The crossing of any Redside Dace habitat watercourse will require review and approval from the MECP prior to the construction of the crossing infrastructure. Each crossing permit will have specific requirements from the MECP; however for the crossings within the FSS Study Area, it should be expected that the following will be required:

- Construction will be during the permissible Redside Dace in-water construction window of July 1 to September 15;
- Construction will utilize trenchless construction methods;
- Utilities will be installed at a depth of at least 3 m below the bottom of a Redside Dace habitat watercourse;
- A specific contingency plan will need to be prepared for each crossing to address all concerns of the construction methodology proposed;
- All disturbed soils will need to be stabilized using a methodology approved by the MNRF; and
- Erosion and sediment control measures will remain in place until final restoration has been completed.

8.4 Stormwater

8.4.1 General

There are currently no storm sewers or SWM facilities to service the FSS Study Area. The existing conditions currently drain overland primarily by sheet flow into the existing watercourses onsite. These watercourses then drain offsite to the south under Dundas Street West via 3 culverts. There is currently no treatment of the stormwater from the Subject Property.

Both the minor and major storm systems have been designed to conform to the SWM Plan presented in Section 7.0.

8.4.2 Minor Storm System (Sewers)

The conceptual minor storm system has been designed to convey up to the 1:5 year storm event to the appropriate SWM facility. The intention of the minor storm system is to match as closely as possible with the existing drainage boundaries of each of the existing culverts. The minor storm system will consist of gravity sewers that will discharge to a SWM facility for treatment. The majority of the storm sewers are within the conceptual road network with some of the sewers discharging to the SWM facility within an easement on a development block.

The conceptual minor storm system is shown on Figure 8.5. The proposed storm sewer system has been designed to the current Town's design criteria. Please note that the storm drainage illustrated to the east of Avenue 3 within Subcatchments FM108, FM1109, FM1110 and FM1110.1 on Figure 8.5 is conceptual only and had not been evaluated by the review agencies with respect to feasibility and NHS impacts and as such, is subject to change. The storm design sheets are available in Appendix 8.3. The Plan-Profiles of the storm design are available in Appendix 8.4.

Wherever possible, the runoff from Regional roads will be directed to SWM facilities of adjacent developments for quantity and quality treatment. Due to grading constraints, many sections of Dundas Street are not able to drain to SWM facilities within the 407 West Area. The section of Dundas Street noted as Catchment 1502 in Section 7.8.2 will drain and be treated by proposed Pond 2.

8.4.3 Major Storm System (Overland Flow)

The proposed major storm system is in accordance with SWM plan as described in Section 7.0 of this report. The overland flow route will convey flows up to the 1:100 year storm event to the SWM facility containing the major flows within the road ROW. The overland flow route is shown on Figure 8.5.

8.5 Grading

The existing topography of the FSS Study Area generally slopes from north to south and towards the centre of the lands approximately 180 m to the east of Colonel William Parkway at Dundas Street West. The general philosophy of the conceptual grading plan is to match existing grades as closely as possible while still maintaining necessary elements of the SWM Plan in Section 7.0. Due to the relatively shallow bedrock in some locations it may be advantageous to increase the height of fill in some areas to provide less complicated construction of the municipal servicing.

The conceptual road grades all meet the Town of Oakville criteria, all road grades fall between 0.5% and 3.5%. The conceptual lot grading will generally slope towards the right of way so that the stormwater can be treated in the stormwater management facilities. Both the conceptual road grades and lot grading will be further refined as the development goes through the subdivision and site plan process. Final road and lot grading will be completed in accordance with the Town of Oakville's grading criteria. As noted in Section 4.0, at the detailed design stage, landscaped areas adjacent to natural features will be graded towards these features wherever possible.

The conceptual grading plan is illustrated in Figure 8.6. Please note that the grading illustrated to the east of Avenue Three within Subcatchments FM-1108, FM-1109, FM-1110 and FM-1110.1 on Figure 8.5 is conceptual only and had not been evaluated by the review agencies with respect to feasibility and Natural Heritage System impacts and as such is subject to change.

8.6 Phasing

Consideration has been given to the incremental installation of municipal services to coincide with the proposed phasing strategy. This may require the construction of temporary services within easements or temporary ROWs in the event that services cannot be installed in their ultimate alignments (i.e., on the lands of other owners). As noted previously, to ensure security and redundancy in the water distribution system, temporary private watermains will be required to provide looping. Conceptual phased servicing plans are illustrated in Figure 8.7.1, 8.7.2 and 8.7.3. Similarly, the site grading will be performed on a phased basis to coincide with the areas to be developed. Road crossings of the NHS systems will be installed only when required to service development. Conceptual phased grading plans are illustrated in Figure 8.8.1, 8.8.2 and 8.8.3. Further consideration for the phased construction of services and grading will be completed at the time of development of each phase.

In each phase of development the watermain will be constructed to have an available stub with a valve to allow for the construction of future watermain extensions to facilitate the ultimate build out in accordance with the ASP. The current design does not propose any dead end watermain. All phases will have interim watermain looping through private lands. These temporary watermain will be decommissioned as the development for the ASP service area progresses and redundant water feeds are provided through the municipal system and the temporary watermain are no longer required as agreed to by the Region of Halton. The design and construction of the watermain on adjacent lands will be coordinated with the adjacent landowners including the connection of the large watermain on Avenue 3 and Avenue 1, which will ultimately connect Region watermain on Bronte Road and Tremaine Road.

The development of Phase 2 will include a portion of the 600mm diameter Regional Watermain along Avenue 3 within the subject property which will require the installation of the remainder of the trunk watermain on the adjacent properties along Avenue 3 and Avenue 1 between Bronte Road and Tremaine Road to complete the water distribution system. The development of the adjacent lands is expected to be after development of the subject lands. The design and construction of the all watermain will allow for connection to the future watermain from adjacent properties and will be coordinated to the fullest extent possible and to the satisfaction of Halton Region. All watermain will be constructed within the future right of ways and the design of the subject property allows for flexibility in the road network and servicing design in the adjacent properties. It is noted that the works in the subdivision will not be assumed by the Region until the full watermain system is installed in accordance with the ASP.

8.7 Private Water Well and Septic System Decommissioning

There are private wells and septic systems located on the subject property for the farming activities on the subject property. Prior to construction, all private wells and septic systems onsite will be decommissioned in accordance with MECP requirements.

8.8 Summary

The Municipal Servicing section of the EIR/FSS provides a conceptual design of the wastewater, water and storm servicing, the road and lot grading and the overland flow route associated with the development of the FSS Study Area.

The wastewater design will incorporate a gravity sewer system within the conceptual road network that generally drains north to south and outlets into the proposed Dundas Street Trunk Sewer which in turn discharges to the existing wastewater sewer on Colonel William Parkway. The Wastewater design sheets are available in Appendix 8.1. The conceptual wastewater servicing design is illustrated on Figure 8.2.

The water distribution system will consist of a network of local and trunk watermain within the conceptual road network. A water distribution model of the proposed watermain was completed to size the watermain within the FSS Study Area. The results of the water model for the FSS Study Area are available in Appendix 8.2. The conceptual water servicing design is illustrated on Figure 8.4.

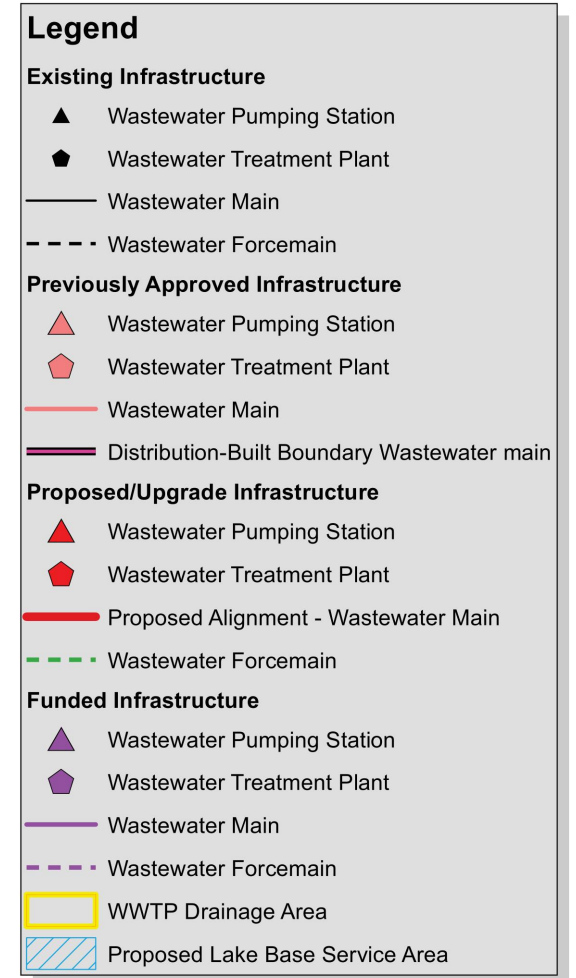
The minor storm system will consist of gravity sewers within the conceptual road network that will discharge to a SWM facility for treatment based on the catchment areas indicated in Section 7.0. The major storm system will convey the major storm flows via an overland flow route along the road ROWs to the designated

SWM facility. The storm design sheets are available in Appendix 8.3. The conceptual minor and major storm system design are illustrated on Figure 8.5.

The conceptual road and lot grading is designed with the intention of matching existing grades as closely as possible while still maintaining necessary elements of the SWM Plan detailed in Section 7.0. The conceptual grading plan is illustrated on Figure 8.6.

The overall servicing and grading design has considered the proposed phasing of the development. Municipal services, roads and grading works will be installed incrementally as needed to service development. Conceptual phasing of the servicing and grading are illustrated on Figures 8.7.1, 8.7.2, 8.7.3, 8.8.1, 8.8.2 and 8.8.3.

REGIONAL WASTEWATER PLAN



NTS

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1409222.001

FIGURE 8.1

SOURCE: SUSTAINABLE HALTON
WATER AND WASTEWATER
MASTER PLAN, AECOM 2011

Environmental Implementation
Report / Functional Servicing Study
for 14 Mile Creek West and the Lazy
Pat Farm Property

WASTEWATER DRAINAGE PLAN

LEGEND

- SANITARY SEWER
- SANITARY MANHOLE
- SANITARY DRAINAGE BOUNDARY
- ALTERNATIVE SANITARY SEWER ALIGNMENT
- EXTERNAL SANITARY SEWER (B.O.)
- EXISTING SANITARY SEWER
- 39.40
4533
- 13.0
715
- FUTURE CULVERT CROSSING
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
- The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.



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	FIGURE 8.2

FILE NAME: X:\DIV10\14-09222\MUN\ASP-FSS Exhibits\EX3.6-Fig8.2_Wastewater Drainage Plan.dwg, Fig 8.2

REGIONAL WATER PLAN



Scale

NTS

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FIGURE 8.3

SOURCE: SUSTAINABLE HALTON
WATER AND WASTEWATER
MASTER PLAN, AECOM 2013

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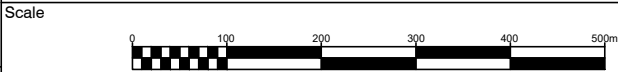
WATER DISTRIBUTION PLAN

LEGEND

- EXISTING REGIONAL WATERMAIN
- PROPOSED REGIONAL WATERMAIN
- PROPOSED LOCAL WATERMAIN
- FUTURE CULVERT CROSSING
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES

NOTES:

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FIGURE 8.4

Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

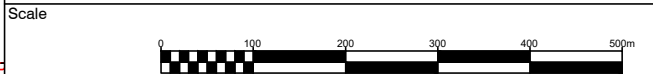
STORMWATER DRAINAGE PLAN

LEGEND

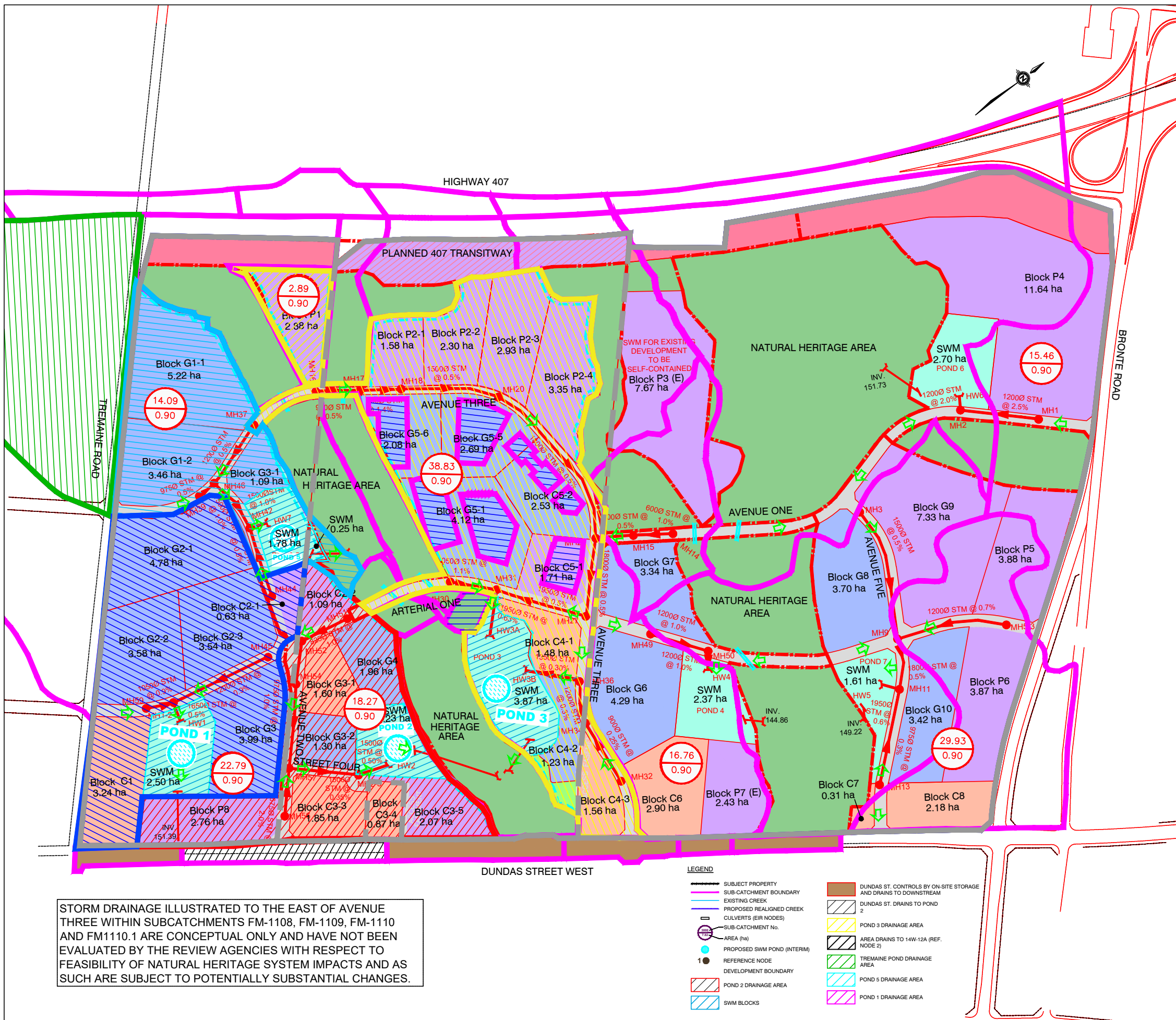
- STORM SEWER
- STORM MANHOLE
- STORM DRAINAGE BOUNDARY
- OVERLAND FLOW ROUTE
- TRIBUTARY AREA (Ha)
- RUN-OFF CO-EFFICIENT
- FUTURE CULVERT CROSSING
- PROPOSED INFILTRATION SWALE
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES

NOTES:

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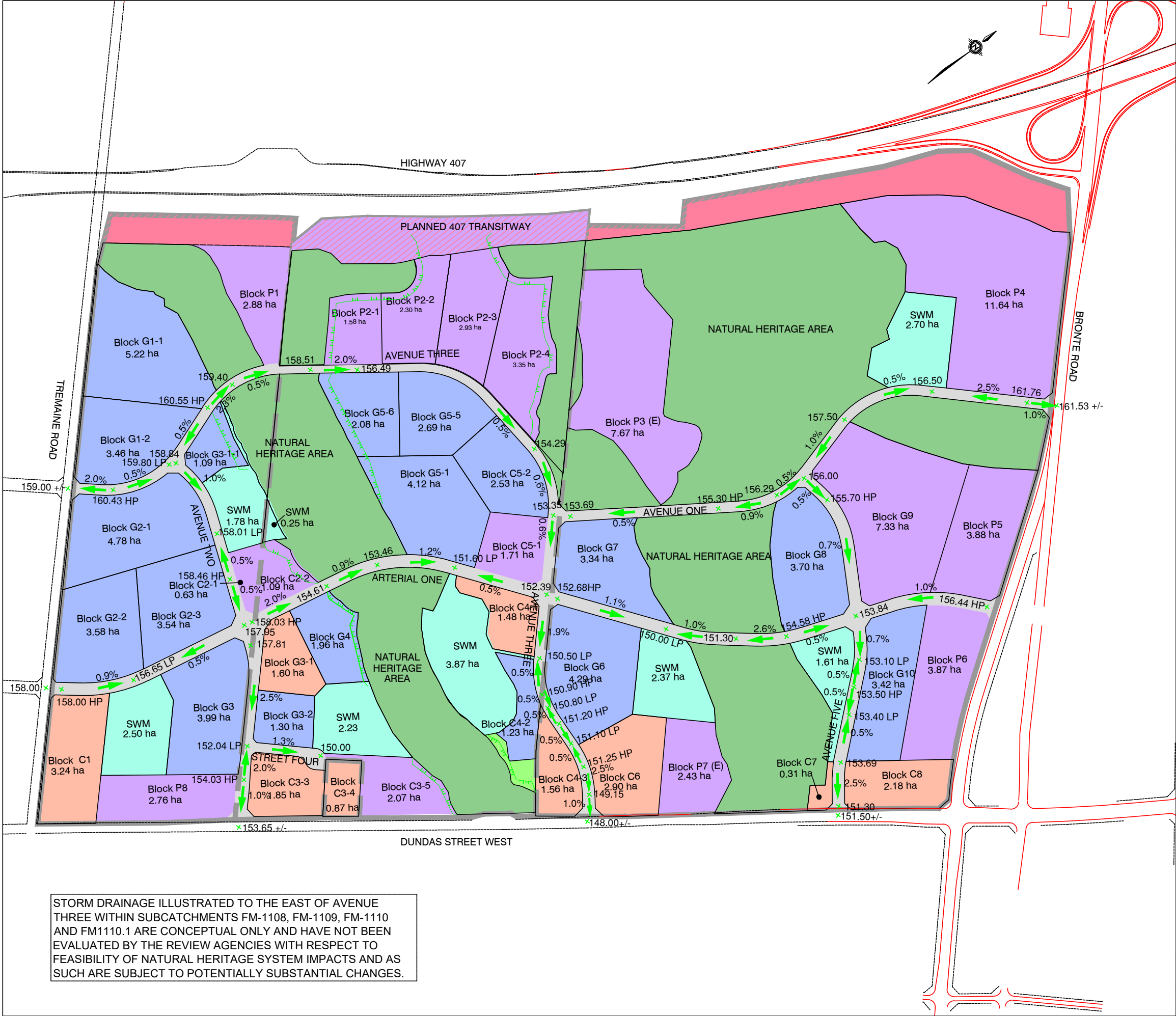
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FIGURE 8.5		



FILE NAME: X:\DIV10\14-09222\WUN\ASP-FSS Exhibits\FIG 8.5_Stormwater Drainage Plan.dwg_Fig 8.5

Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

CONCEPTUAL GRADING PLAN



- LEGEND**
- 2.0% PROPOSED ROAD GRADE
 - 240.70 PROPOSED ROAD ELEVATION
 - 407 WEST EMPLOYMENT AREA
 - PROPERTY BOUNDARIES
 - 3:1 SLOPING

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
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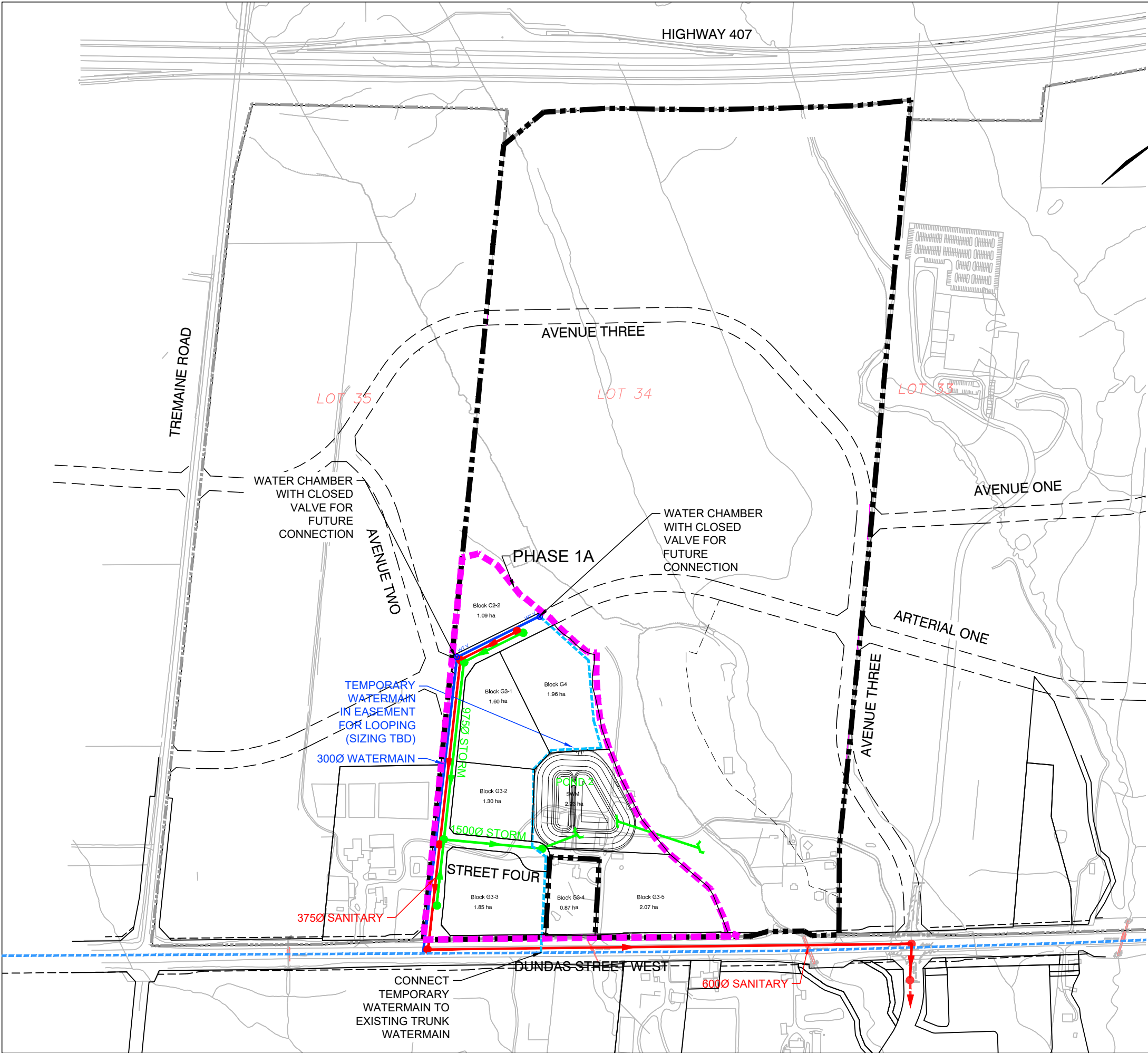


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STORM DRAINAGE ILLUSTRATED TO THE EAST OF AVENUE THREE WITHIN SUBCATCHMENTS FM-1108, FM-1109, FM-1110 AND FM1110.1 ARE CONCEPTUAL ONLY AND HAVE NOT BEEN EVALUATED BY THE REVIEW AGENCIES WITH RESPECT TO FEASIBILITY OF NATURAL HERITAGE SYSTEM IMPACTS AND AS SUCH ARE SUBJECT TO POTENTIALLY SUBSTANTIAL CHANGES.

FIGURE 8.6

FILE NAME: X:\DIV10\14-09222\MUN\ASP-FSS Exhibits\09022_Fig 8.7.1_2_3.dwg_Fig 8.7.1



Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

INTERIM SERVICING PLAN PHASE 1A

LEGEND

- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- TEMPORARY WATERMAIN
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES
- PHASE LIMITS

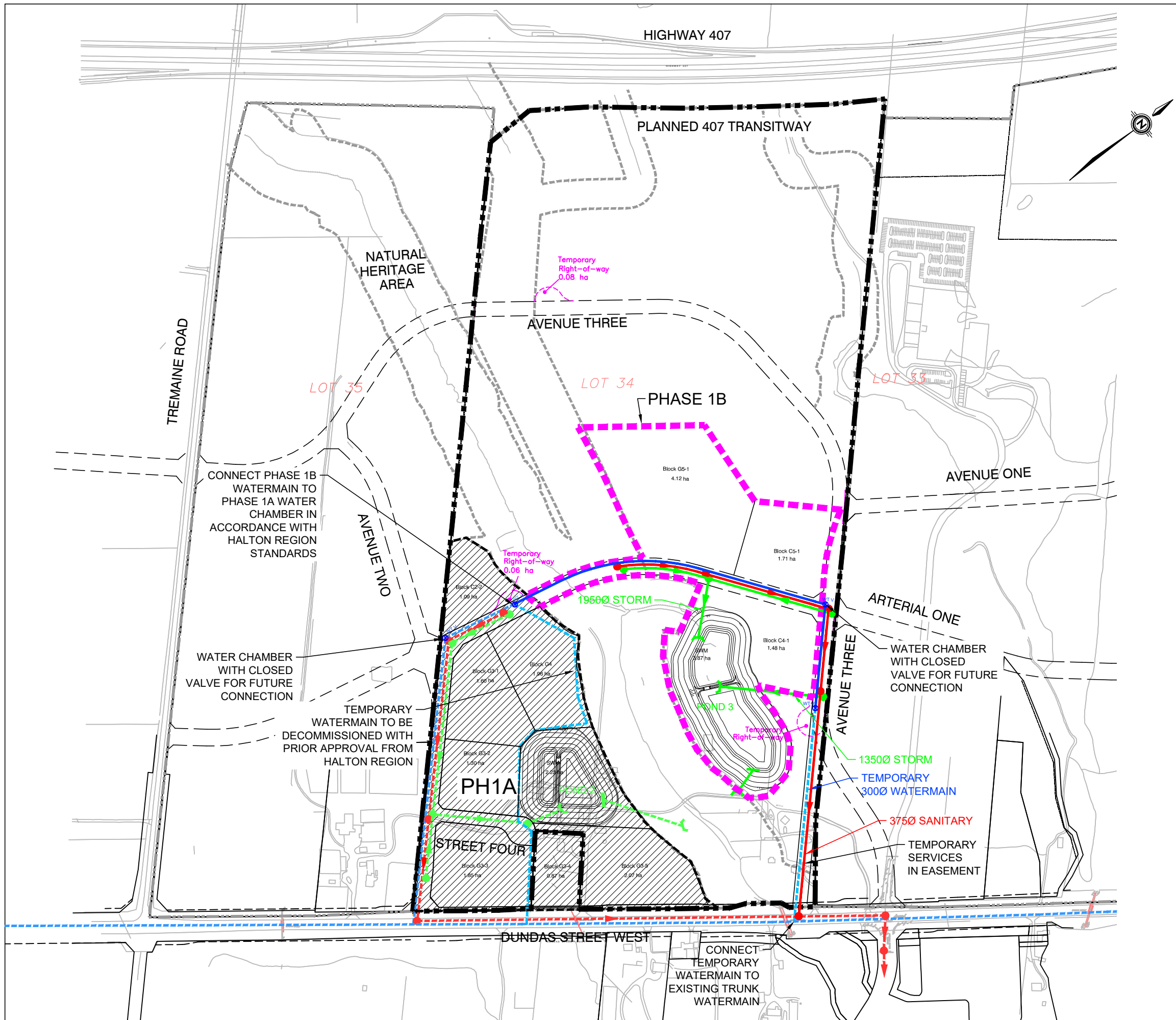
NOTES:

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	FIGURE 8.7.1

FILE NAME: X:\DIV10\14-09222\MUN\FSS Exhibits\09022_Fig 8.7.1_2_3.dwg_Fig 8.7.2



Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

INTERIM SERVICING PLAN PHASE 1B

LEGEND

- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- TEMPORARY WATERMAIN
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES
- PHASE LIMITS

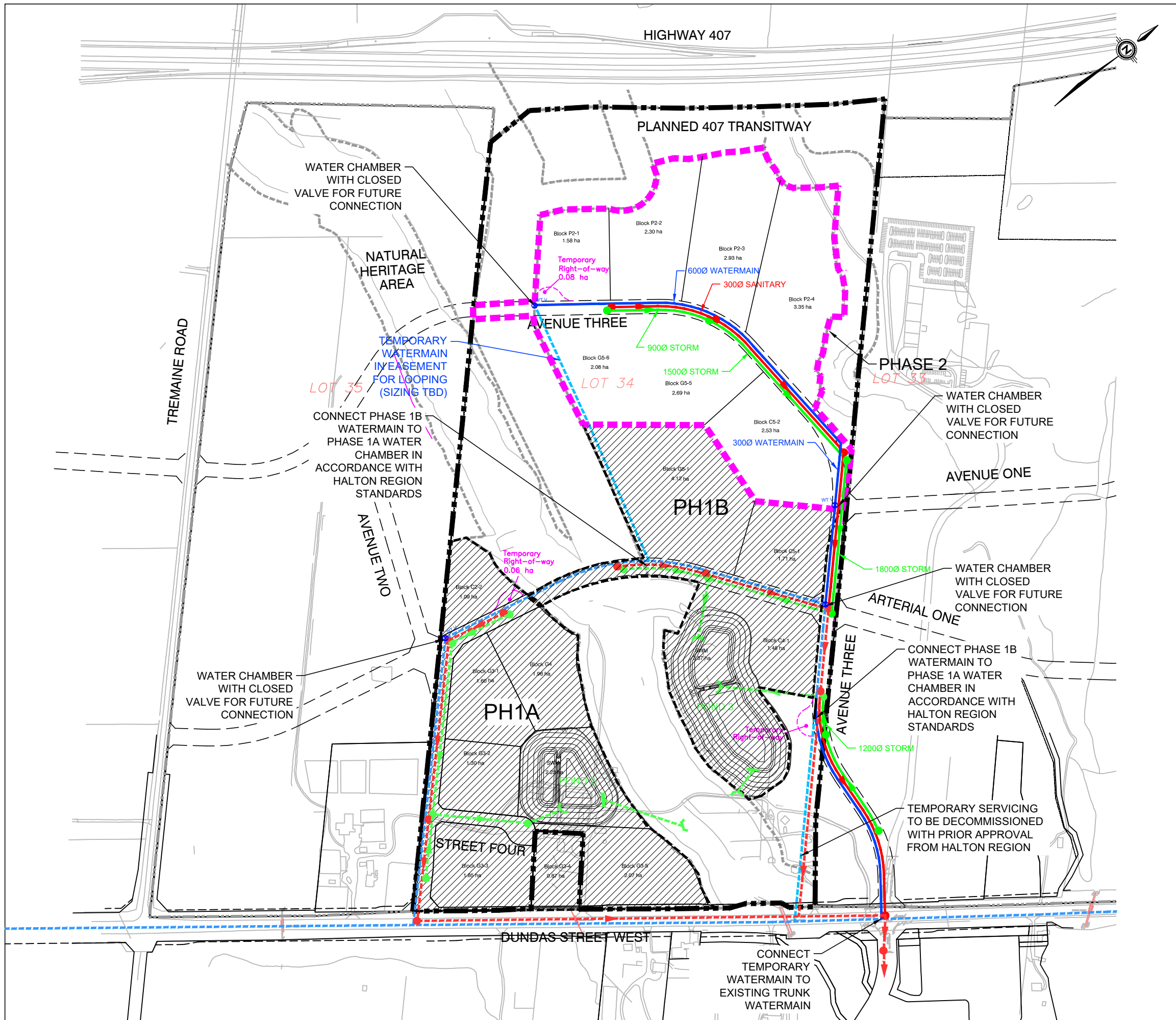
NOTES:

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FIGURE 8.7.2	

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Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

INTERIM SERVICING PLAN PHASE 2

LEGEND

- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- TEMPORARY WATERMAIN
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES
- PHASE LIMITS

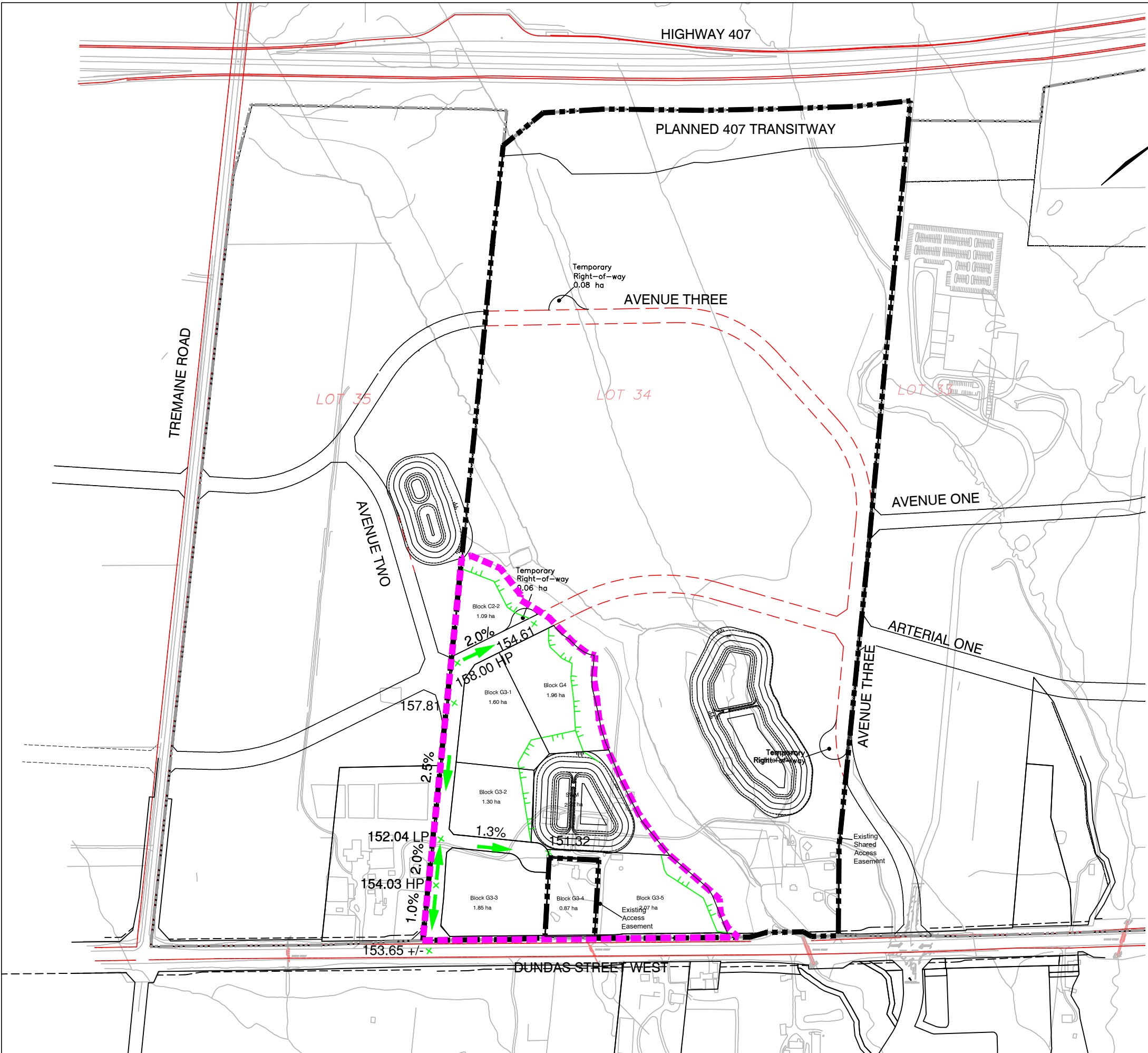
NOTES:

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- Right-of-way requirements for future 407 Transitway to be determined
- The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.



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	FIGURE 8.7.3

FILE NAME: X:\DIV\14-09222\MUN\ASP-FSS Exhibits\09022_Fig 8.8.1_2_3.dwg_Fig 8.8.1



Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

INTERIM GRADING PLAN PHASE 1A

LEGEND

- 2.0% PROPOSED ROAD GRADE
- 240.70 PROPOSED ROAD ELEVATION
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES
- 3:1 SLOPING

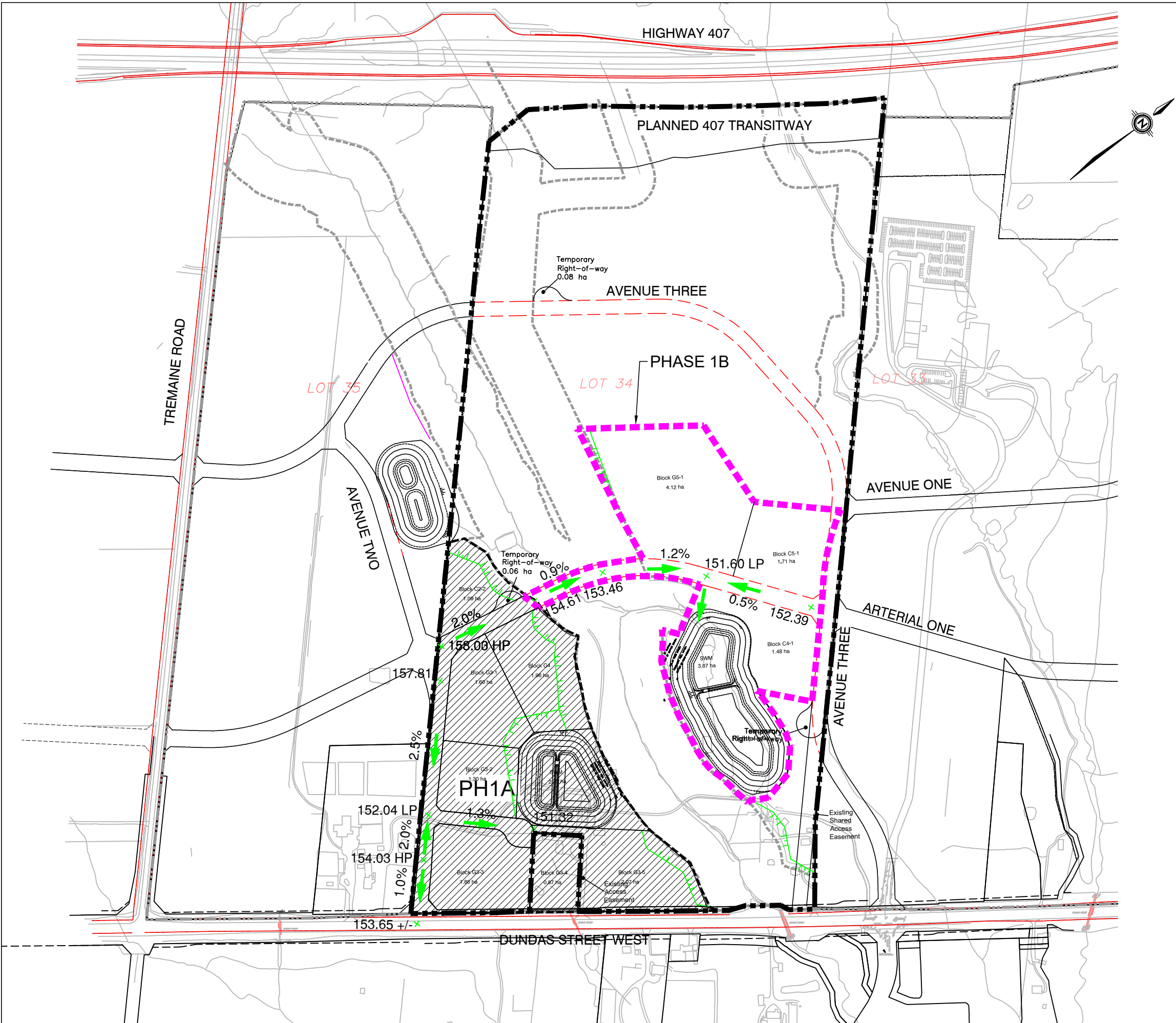
NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
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	FIGURE 8.8.1

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Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

INTERIM GRADING PLAN PHASE 1B

LEGEND

- 2.0% PROPOSED ROAD GRADE
- 240.70 PROPOSED ROAD ELEVATION
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES
- 3:1 SLOPING

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
- The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.

Scale



Client



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Date

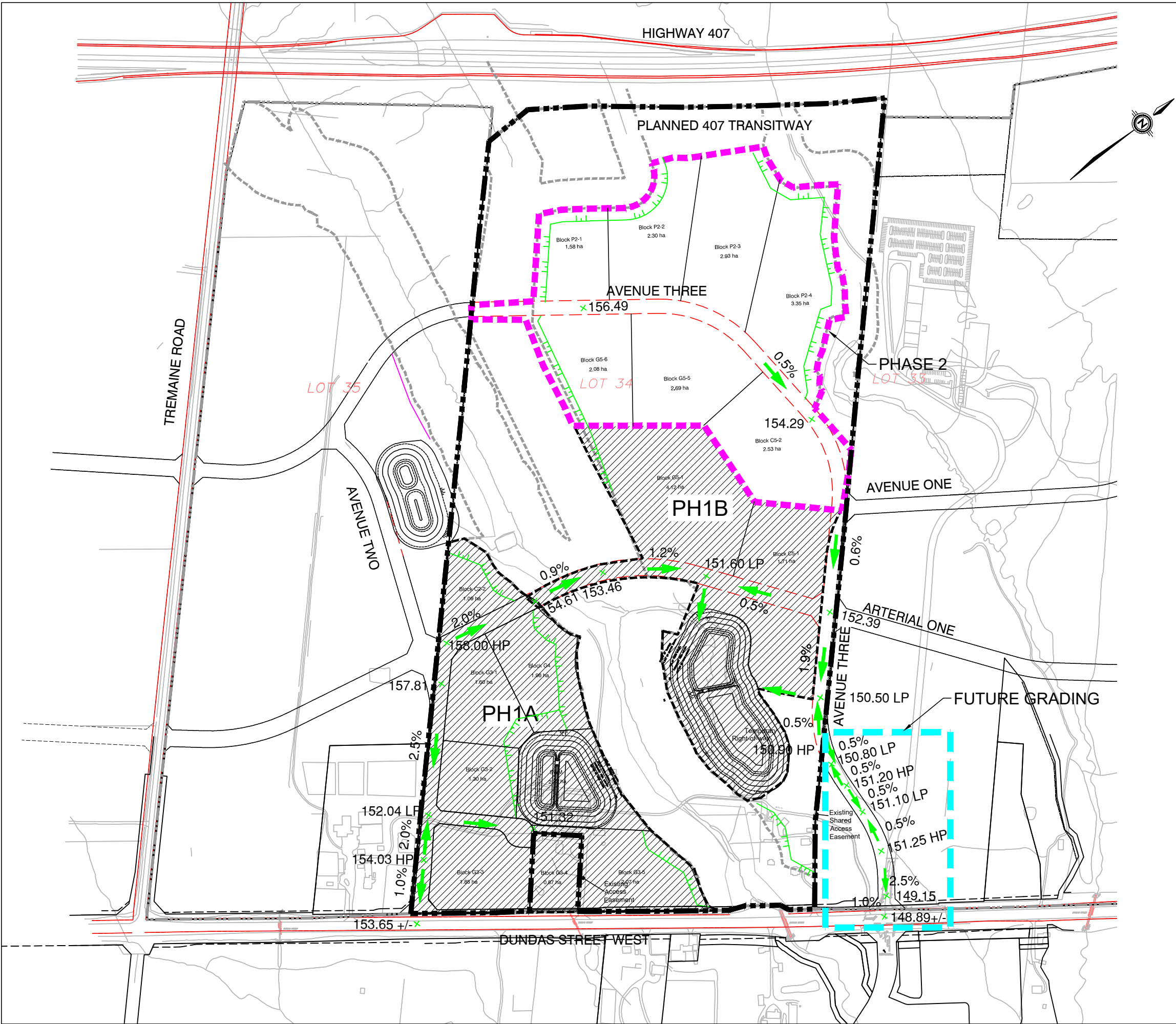
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FIGURE 8.8.2

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Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

INTERIM GRADING PLAN PHASE 2

LEGEND

- 2.0% PROPOSED ROAD GRADE
- 240.70 PROPOSED ROAD ELEVATION
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES
- 3:1 SLOPING

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
- The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.



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FIGURE 8.8.3	

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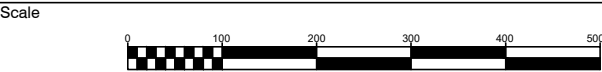
WASTEWATER ANALYSIS PLAN

LEGEND

- SANITARY SEWER
- SANITARY MANHOLE
- SANITARY DRAINAGE BOUNDARY
- ALTERNATIVE SANITARY SEWER ALIGNMENT
- EXTERNAL SANITARY SEWER (B.O.)
- EXISTING SANITARY SEWER
- 39.40
4533
- 13.0
715
- EXTERNAL TRIBUTARY AREA (Ha)
- EXTERNAL TRIBUTARY POPULATION
- FUTURE CULVERT CROSSING
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
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FIGURE A-8.1

Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

WATER ANALYSIS PLAN

LEGEND

- EXISTING REGIONAL WATERMAIN
- PROPOSED REGIONAL WATERMAIN
- PROPOSED LOCAL WATERMAIN
- WATER ANALYSIS NODE
- FUTURE CULVERT CROSSING
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
- The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.

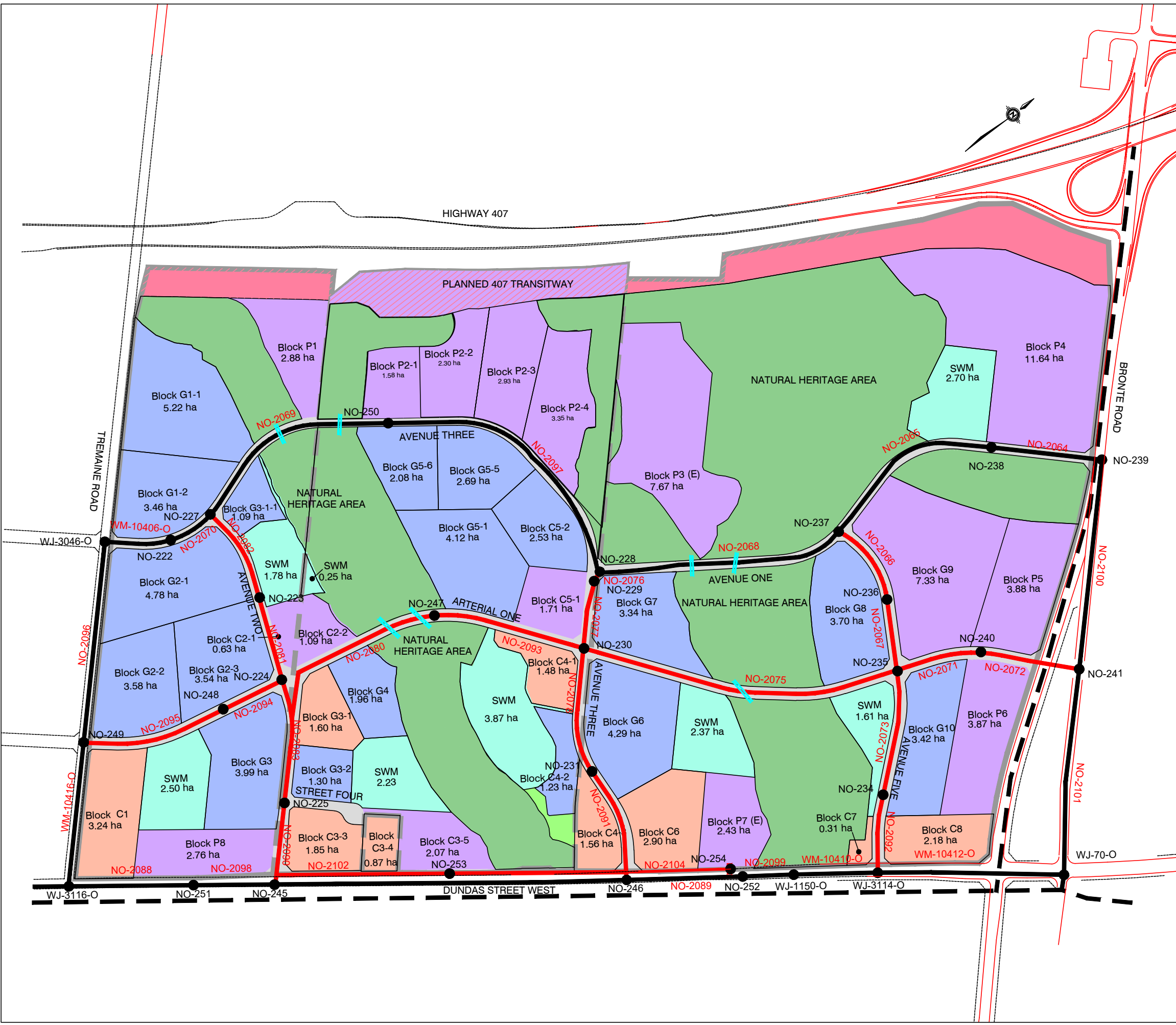


Date JANUARY 2022

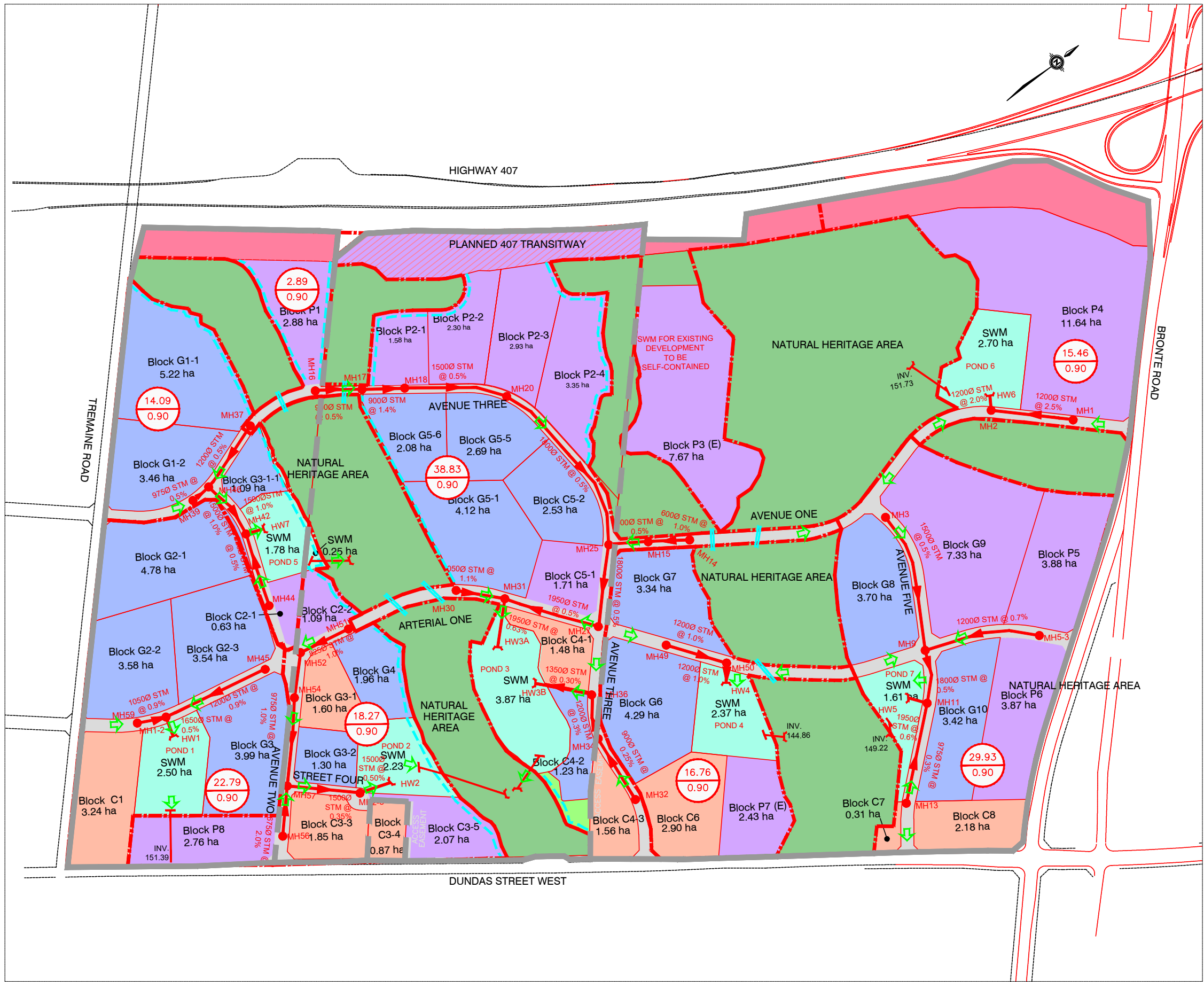
Project No. 1409222.001

FIGURE A-8.2

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FILE NAME: X:\DIV10\14-09222\MUN\ASP-FSS Stormwater Analysis.dwg_Fig A-8.3



Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

STORMWATER ANALYSIS PLAN

LEGEND

- STORM SEWER
- STORM MANHOLE
- STORM DRAINAGE BOUNDARY
- OVERLAND FLOW ROUTE
- TRIBUTARY AREA (Ha)
- RUN-OFF CO-EFFICIENT
- FUTURE CULVERT CROSSING
- PROPOSED INFILTRATION SWALE
- 407 WEST EMPLOYMENT AREA
- PROPERTY BOUNDARIES

NOTES:

- For the purposes of the analysis land use, natural heritage and storm water sizing and location assumptions have been made for the entire 407 West Employment Area
- Right-of-way requirements for future 407 Transitway to be determined
- The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.



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FIGURE A-8.3	

407 West Employment
Area Concept Plan
Trails Plan (Conceptual)

LEGEND

Major Trails

Multi-Use Trail (Off-Road / In Boulevard)

Regional Bicycle Facility

Signed Bicycle Route (On-Road)

Park

Open Space

Stormwater Management

Planned 407 Transitway

Roads

407 West Employment Area

Subject Lands

- Notes:
- For the purposes of our analysis we have made land use, natural heritage and storm water sizing and location assumptions for the entire 407 West Employment Area
 - Right-of-way requirements for future 407 Transitway to be determined
 - The Natural Heritage System on lands owned by others is conceptual, as shown in the North Oakville West Secondary Plan, and is subject to further study.

Scale
1 : 7500

Client



Prepared by



Date

November 26, 2021

Project No.

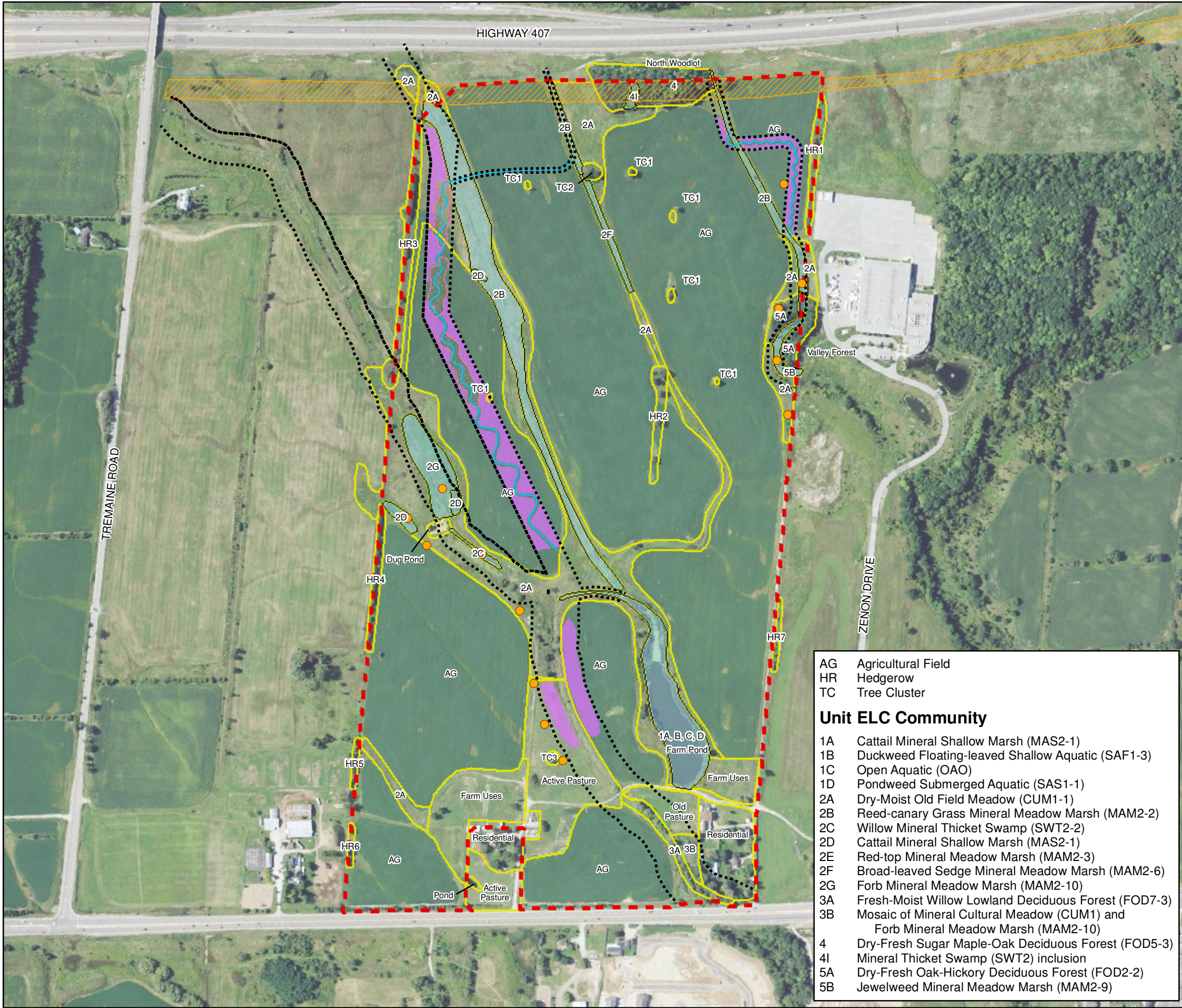
09M-00013-01
(1409222-001)

Aerial Photo

© DigitalGlobe 2010, Google 2009

Figure 3.3

D:\a\Projects\09M-00013-01\MXD\Figure 5-2 - Vegetation Communities.mxd



Environmental Implementation Report / Functional Servicing Study for 14 Mile Creek West and the Lazy Pat Farm Property

Vegetation Communities LEGEND

- Subject Property
- Transitway
- VegCommunitiesSD
- Online Wetland
- Wetland Communities
- Soil Auger Locations
- Re-aligned Creek
- Meander Belt
- Proposed Wetlands (2.443 ha)

AG Agricultural Field
HR Hedgerow
TC Tree Cluster

Unit ELC Community

- 1A Cattail Mineral Shallow Marsh (MAS2-1)
- 1B Duckweed Floating-leaved Shallow Aquatic (SAF1-3)
- 1C Open Aquatic (OAO)
- 1D Pondweed Submerged Aquatic (SAS1-1)
- 2A Dry-Moist Old Field Meadow (CUM1-1)
- 2B Reed-canary Grass Mineral Meadow Marsh (MAM2-2)
- 2C Willow Mineral Thicket Swamp (SWT2-2)
- 2D Cattail Mineral Shallow Marsh (MAS2-1)
- 2E Red-top Mineral Meadow Marsh (MAM2-3)
- 2F Broad-leaved Sedge Mineral Meadow Marsh (MAM2-6)
- 2G Forb Mineral Meadow Marsh (MAM2-10)
- 3A Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3)
- 3B Mosaic of Mineral Cultural Meadow (CUM1) and Forb Mineral Meadow Marsh (MAM2-10)
- 4 Dry-Fresh Sugar Maple-Oak Deciduous Forest (FOD5-3)
- 4I Mineral Thicket Swamp (SWT2) inclusion
- 5A Dry-Fresh Oak-Hickory Deciduous Forest (FOD2-2)
- 5B Jewelweed Mineral Meadow Marsh (MAM2-9)

Scale

0 50 100 200 300 400 m

Client

Prepared by

Date

November 2021

Project No.

1409222001

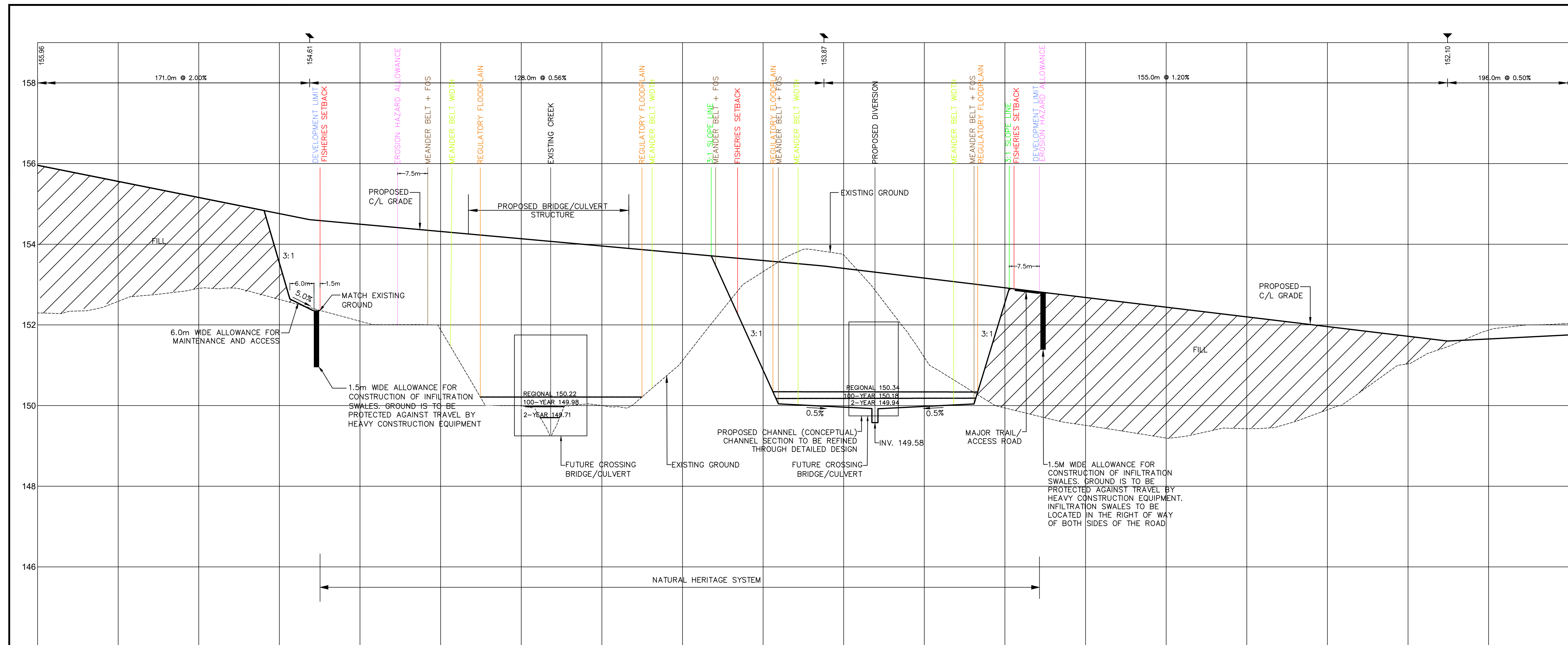
Aerial Photo

© DigitalGlobe, 2010, Google, 2009

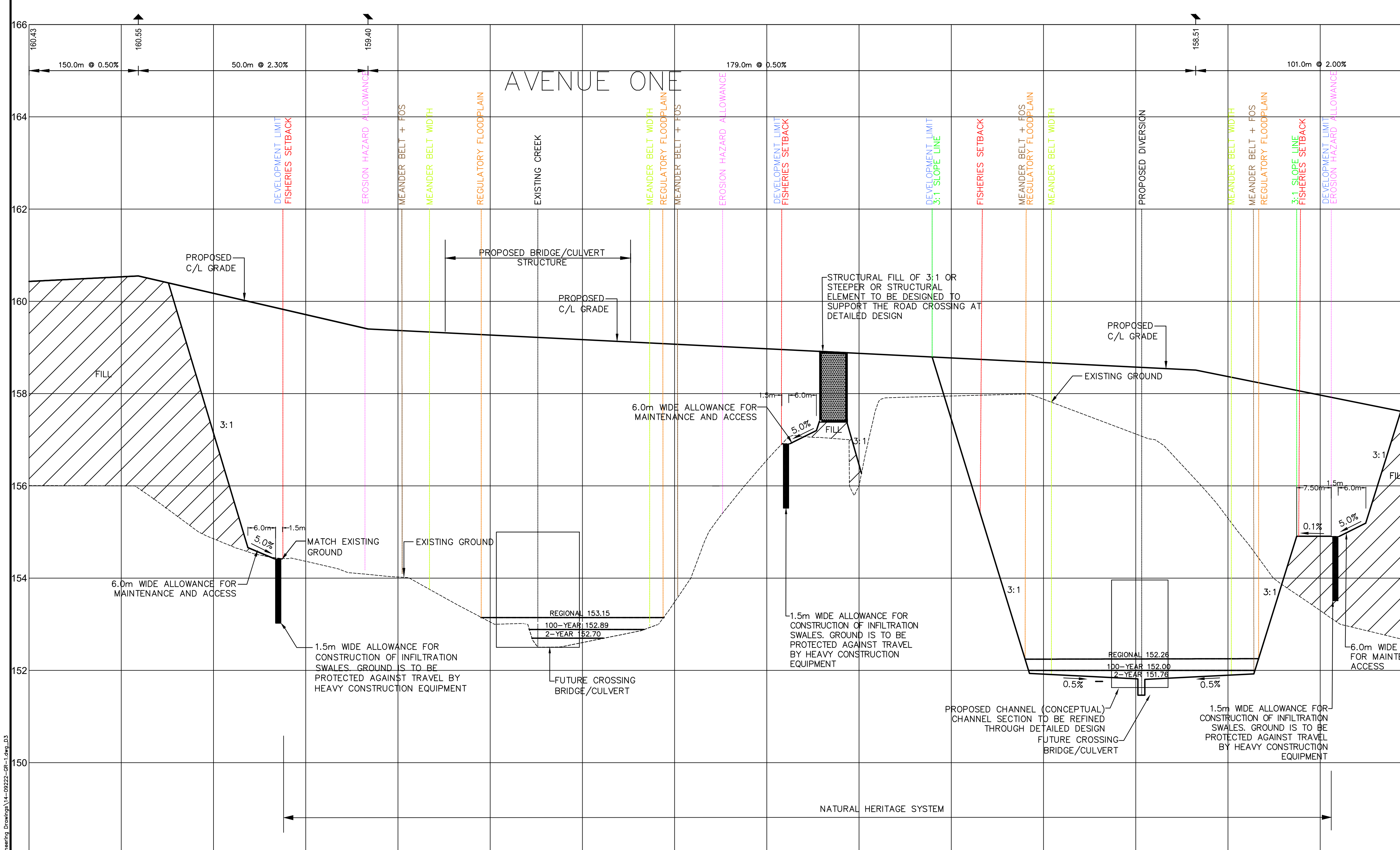
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WSP

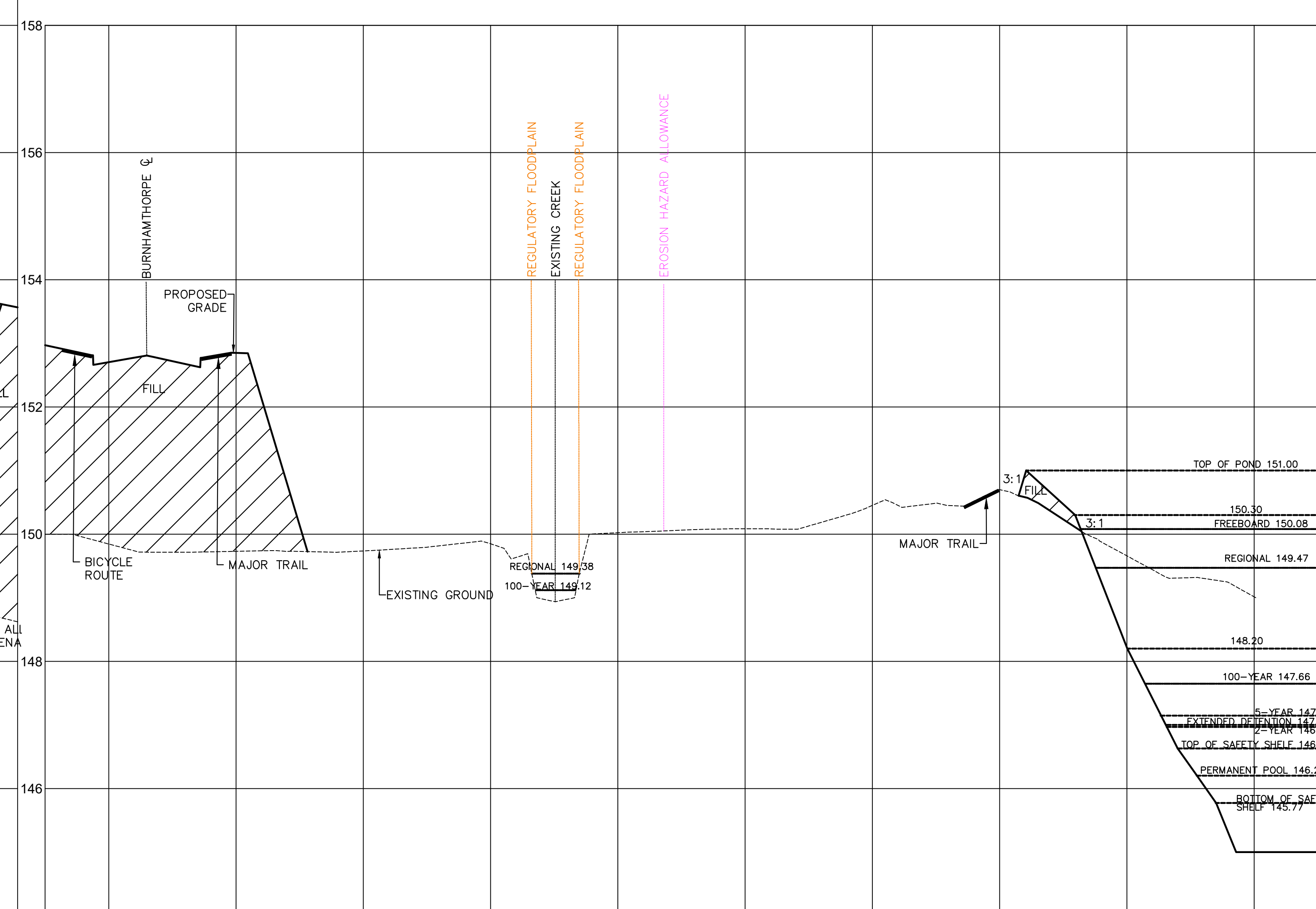
Figure: 5.2



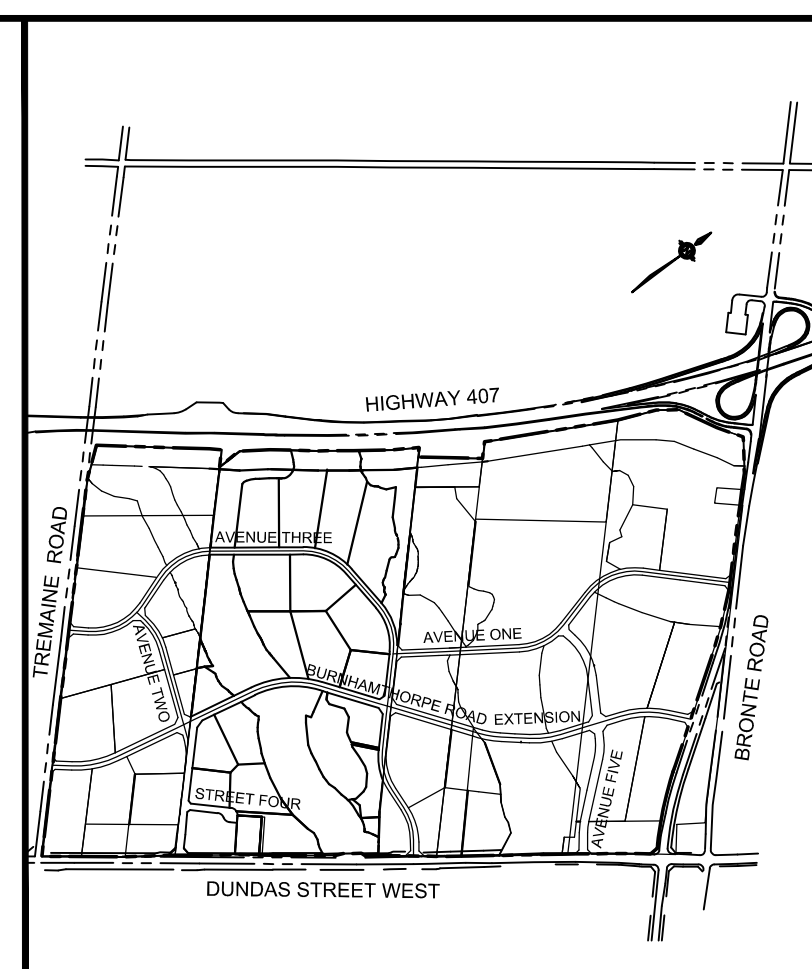
BURNHAMTHORPE ROAD



SECTION R-R
H: 1:500 V: 1:50



SECTION S-S
H: 1:500 V: 1:50



DETAIL FOR INFILTRATION SHAPE SHOWN ON DWG No. 14--09222--GR1			
ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED. DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.			
BENCHMARKS MTO BENCHMARK BM 81 8108, ELEVATION 167.059 TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1976 DATUM).			
9	JAN 2022	CONCEPTUAL ONLY- SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
8	MAY 2020	CONCEPTUAL ONLY- SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
7	DEC 2019	CONCEPTUAL ONLY- SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
6	APR 2019	CONCEPTUAL ONLY- SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
5	AUG 2018	CONCEPTUAL ONLY- SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
4	JUN 2017	CONCEPTUAL ONLY- SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
No	Date	By	
Drawn	S.W.	CAD 1012	Date SEPTEMBER 2020
Scale		Chtkd	References AS NOTED
CONSULTANT			
MUNICIPALITY 		Regional Municipality of Halton	
 TOWN OF OAKVILLE			
TITLE 407 WEST EMPLOYMENT AREA CROSS-SECTION DETAILS			
Municipal Drawing No		Regional Drawing No	
WSP File No		Drawing No	
14-09222		D3	