Whitevale TFPM Development Functional Servicing and Stormwater Management Report

Seaton TFPM Inc.
6696 Financial Drive
Mississauga ON L5N 7J6

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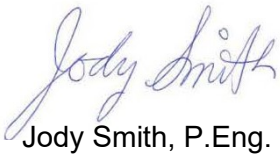

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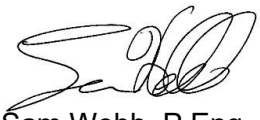

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Commonly-Used Acronym Glossary

MESP	Master Environmental Servicing Plan
MESPA	Master Environmental Servicing Plan Amendment
NHS	Natural Heritage System
NFSSR	Neighbourhood Functional Servicing and Stormwater Report
SAR	Species at Risk
ESA	*Endangered Species Act*
TRCA	Toronto Region Conservation Authority
MNRF	Ministry of Natural Resources and Forestry
MECP	Ministry of the Environment, Conservation and Parks
CAF	Comprehensive Aquatic Framework
SWMF	Stormwater Management Facility

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by Seaton TFPM Inc. to complete this Functional Servicing and Stormwater Management Report for the Whitevale TFPM Development located north of Whitevale Road in Neighbourhood 19, west of Brock Road in the Community of Seaton, City of Pickering. The boundaries of the subject Whitevale TFPM Development Lands are indicated on Figure 1-1.

A comprehensive design framework for the entire proposed Seaton Community has been completed and documented in the Phase 1 and Phase 2 Master Environmental Servicing Plans (MESPs), prepared by Sernas Associates (now GHD) et al, September 2008 and July 2010, respectively. Further, an amendment to the Phase 2 MESP was completed to address Agency comments and provide additional data and modelling for the Seaton area (Master Environmental Servicing Plan Amendment [MESPA], July 2013).

In addition to the MESP and MESPA documents, many other component studies have been completed as a framework for development of the subject Whitevale TFPM Lands, including the Staged Servicing and Implementation Strategy (GHD 2013), and the Class Environmental Assessment for Water, Wastewater, and Transportation for Seaton, completed by the Region of Durham. These two documents confirm preliminary alignments and locations for key infrastructure necessary to serve the Seaton Community.

1.1 Purpose and Scope

As part of the Neighbourhood planning process, the Seaton study area was broken down into six neighbourhoods, denoted as Neighbourhoods 16, 17, 18, 19, 20, and 21. As outlined in the MESPA for the Seaton study area, a Neighbourhood Functional Servicing and Stormwater Report (NFSSR) was required for each of the six neighbourhoods in support of Draft Plan of Subdivision and / or Site Plan Applications, as stated in the City of Pickering Official Plan Amendment No. 22 (OPA No. 22, Policy 11.73). During Ontario Municipal Board (OMB) negotiations in October 2013, the requirement for a neighbourhood-scale Functional Servicing Report (FSR) was removed and subsequently, the requirement to complete an FSR on a subdivision basis is required in support of the proposed draft plan for the subject Whitevale TFPM Lands. Figure 1-2 indicates the land ownership of Neighbourhood 19.

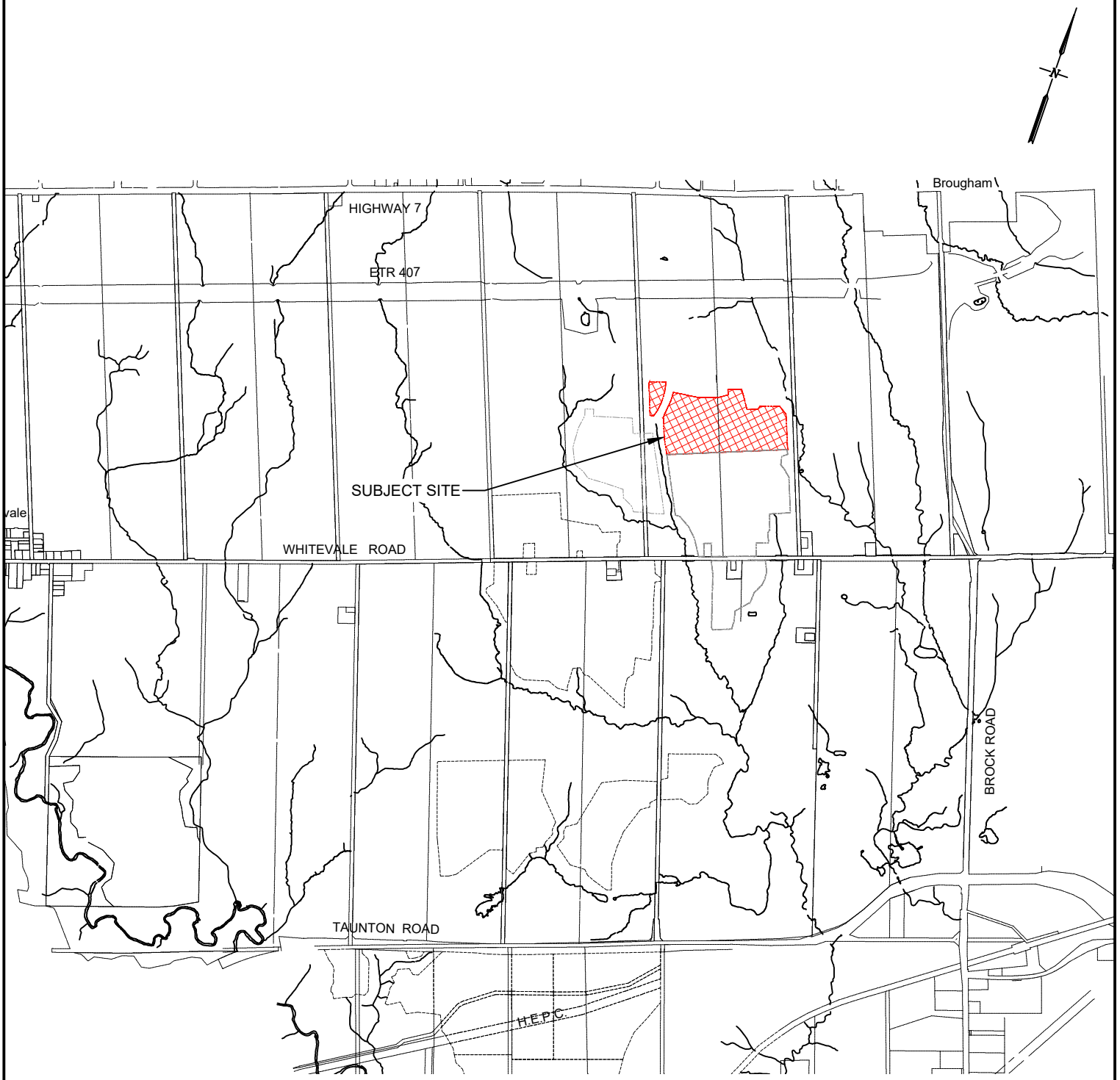

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Figure Title

WHITEVALE TFPM DEVELOPMENT

KEY PLAN

Client

SEATON TFPM INC.

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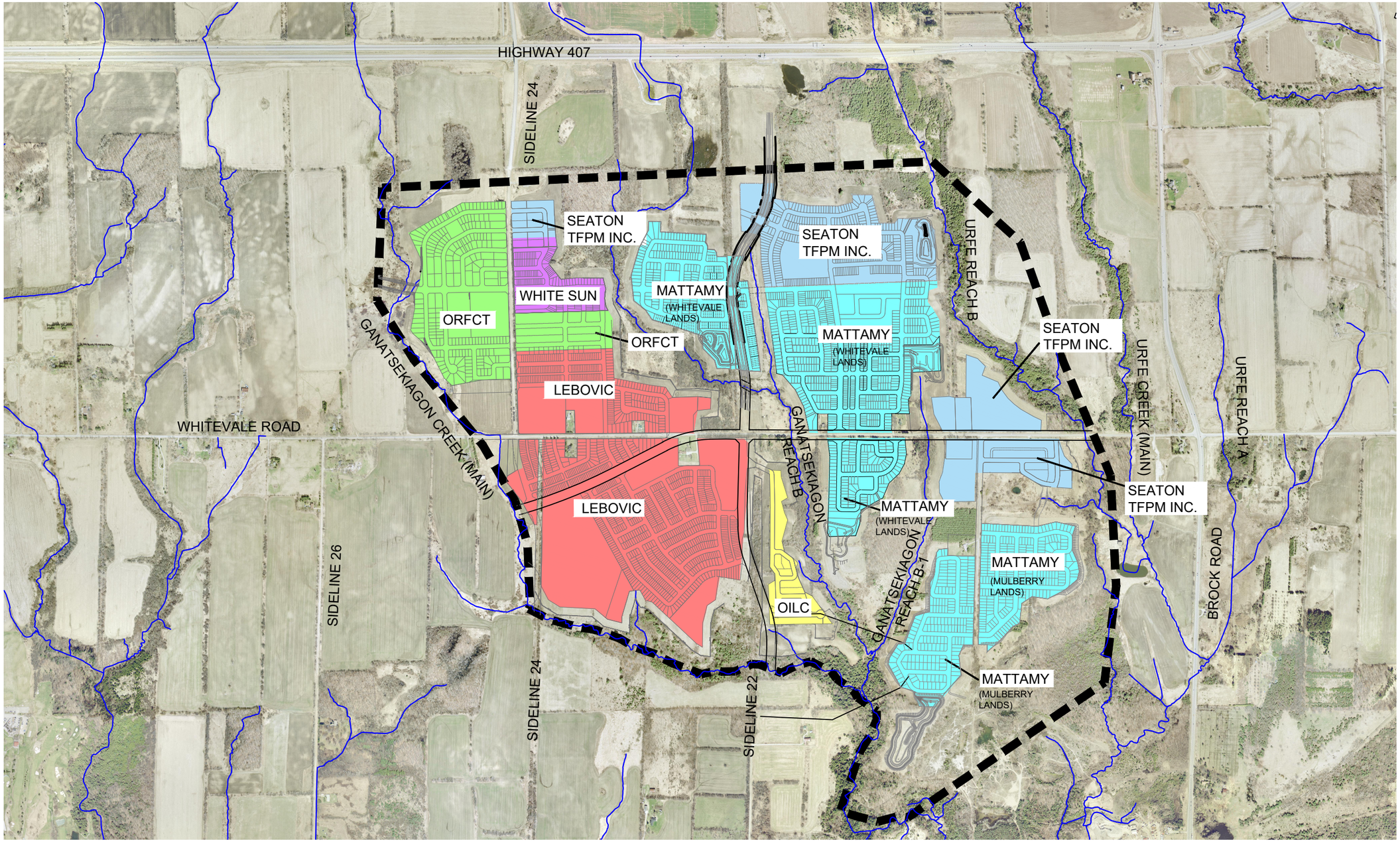

LEGEND

NEIGHBOURHOOD BOUNDARY

N

0 300 600 900 1,200

Meters

BURNSIDE

Figure Title

SEATON NEIGHBOURHOOD 19

LAND OWNERSHIP

Client

SEATON TFPM INC.

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The purpose of this FSR is to provide more functional design of the Whitevale Land Holdings of Seaton TFPM Inc. and further refine the servicing routing, environmental constraints, and Stormwater Management Facility (SWMF) location, size, and outfall locations presented in the MESPA. The MESPA is an overarching guidance document only, and refinement to servicing routes and infrastructure locations based on additional field information and conditions, are specified in the FSR.

Through consultation with both Toronto and Region Conservation Authority (TRCA) and the City of Pickering (the City), an annotated Table of Contents was developed to establish the scope of work required for the preparation of the NFSSRs. This FSR generally follows the format of the established NFSSR Table of Contents. In addition, this FSR has been completed in accordance with Pickering OPA No. 22 and relevant guidelines, including the City of Pickering's Stormwater Management Guidelines (July 2019), Toronto and Region Conservation Authority's Stormwater Management (SWM) Criteria (August 2012), Region of Durham Design Criteria, and the Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (2003). More recently (2017), revisions to SWMFs were made to address design guidelines from the MNRF with respect to best management practices for Redside dace (*Clinostomus elongatus*) habitat.

There are a number of policies within Pickering's OPA No. 22 that provide guidance and direction as follows, which have been reviewed and followed in the preparation of this FSR:

- City policy on Seaton Natural Heritage System (NHS) – Table 3:
  - Provides direction on grading and infrastructure within the NHS.
- City policy regarding development – Sections 11.37 (g) through (k):
  - Provides direction regarding water management (both ground and surface water and both quantity and quality control requirements).
- City policy on Sustainable Water Management – Sections 11.44 (a) and (b):
  - Requires the implementation of Low Impact Development (LID) measures and the incorporation of a treatment train approach to stormwater management.
- City policy on Stormwater Management Facility (SWMF) Considerations – Sections 11.45 (a) through (j):
  - Provides guidance for the location and design of SWMFs and LID measures.
- City policy on NFSSR – Sections 11.73 (a) through (r):
  - Requires the preparation of NFSSRs in support of development applications and outlines the NFSSRs requirements.

The MESPA provides conclusions and recommendations on the following topics, which have all been considered in preparation for this FSR:

- Water resources issues, including the hydrogeological assessment, groundwater modelling, water balance modelling, surface water hydrology for erosion, quantity control target release rates and volumes, natural feature-based water balance assessments, and recommended stormwater management strategies including LID measures (Chapter B).
- Existing and planned transportation infrastructure, traffic data, proposed road and transit networks, and road crossing design of the NHS (Chapter C).
- Municipal servicing needs, including service areas, trunk water and wastewater services, non-Municipal utilities, and preliminary servicing cost estimates (Chapter D).
- Endangered species (Chapter E).
- Potential impacts to aquatic systems and a fish habitat compensation framework (Chapter F).
- Major community facilities and trail connections, including the identification of needs, criteria, and location recommendations for high schools, emergency and operational support facilities, parks, indoor recreational facilities, libraries, trail connections, police, fire, and other uses (Chapter G).
- Public consultation, including agency consultation, public information centres, meetings with review agencies, and Aboriginal consultation (Chapter H).
- Development phasing, including early development of employment lands, cost sharing, and implementation agreements (Chapter I).
- Future study requirements (Chapter J).
- Future monitoring requirements (Chapter K).

This FSR addresses the Municipal Servicing, Grading, and Stormwater Management requirements, in general accordance with the intent of the NFSSR Table of Contents. It includes a summary of the MESPA findings and direction pertaining specifically to the subject Plan of Subdivision; a summary of existing conditions, as per the MESPA and further field work completed for the FSR including:

- Assessment of Species at Risk (SAR) protected under the *Endangered Species Act, 2007* (ESA).
- Conceptual Servicing and Grading.
- Conceptual Grading of Stormwater Management Facilities.
- Locations and sizing of required LID Measures.

1.2 Study Area

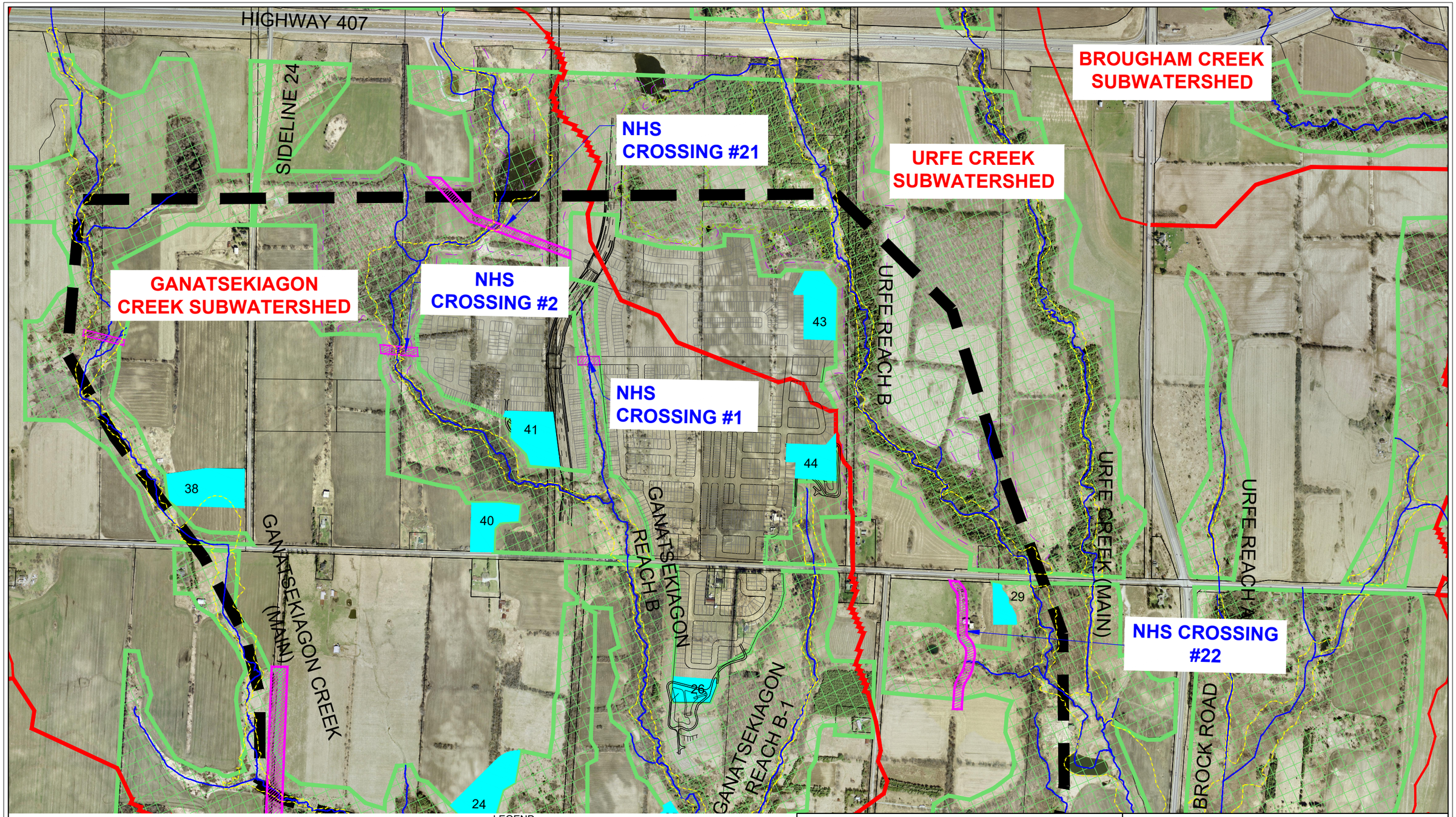
The subject lands are located within Neighbourhood 19 of the Seaton Community in the City of Pickering, Regional Municipality of Durham. The Whitevale TFPM Development is located approximately 900 m west of Brock Road, 500 m south of Highway 407 ETR.

The Development Lands are tributary to and in proximity to both the Ganatsekiagon Creek and Urfe Creek (refer to Figure 1-3).

The study area is located directly north of Phase 2 of the Mattamy Whitevale Development. Detailed Design of Whitevale Phase 2 will commence in 2023. Infrastructure within the Whitevale development is required to support the development of the subject lands.

The study area is comprised of mainly active agricultural tablelands with natural heritage features around the periphery. The Site currently has undulating topography, with slopes throughout the Site ranging from less than 1.0% to as much as 12% in some areas.

The proposed land use breakdown for the Whitevale TFPM Development lands is included in the concept plan provided by Korsiak.



LEGEND

- NEIGHBOURHOOD BOUNDARY
- EXISTING WATERCOURSE
- SUBWATERSHED BOUNDARY
- NHS CROSSING
- SWM FACILITY LOCATION
- NATURAL HERITAGE SYSTEM

N

0 200 400 600 800

Metres

BURNSIDE

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SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

SUBWATERSHED AREAS

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2.0 Summary of MESPA Recommendations and Design Criteria

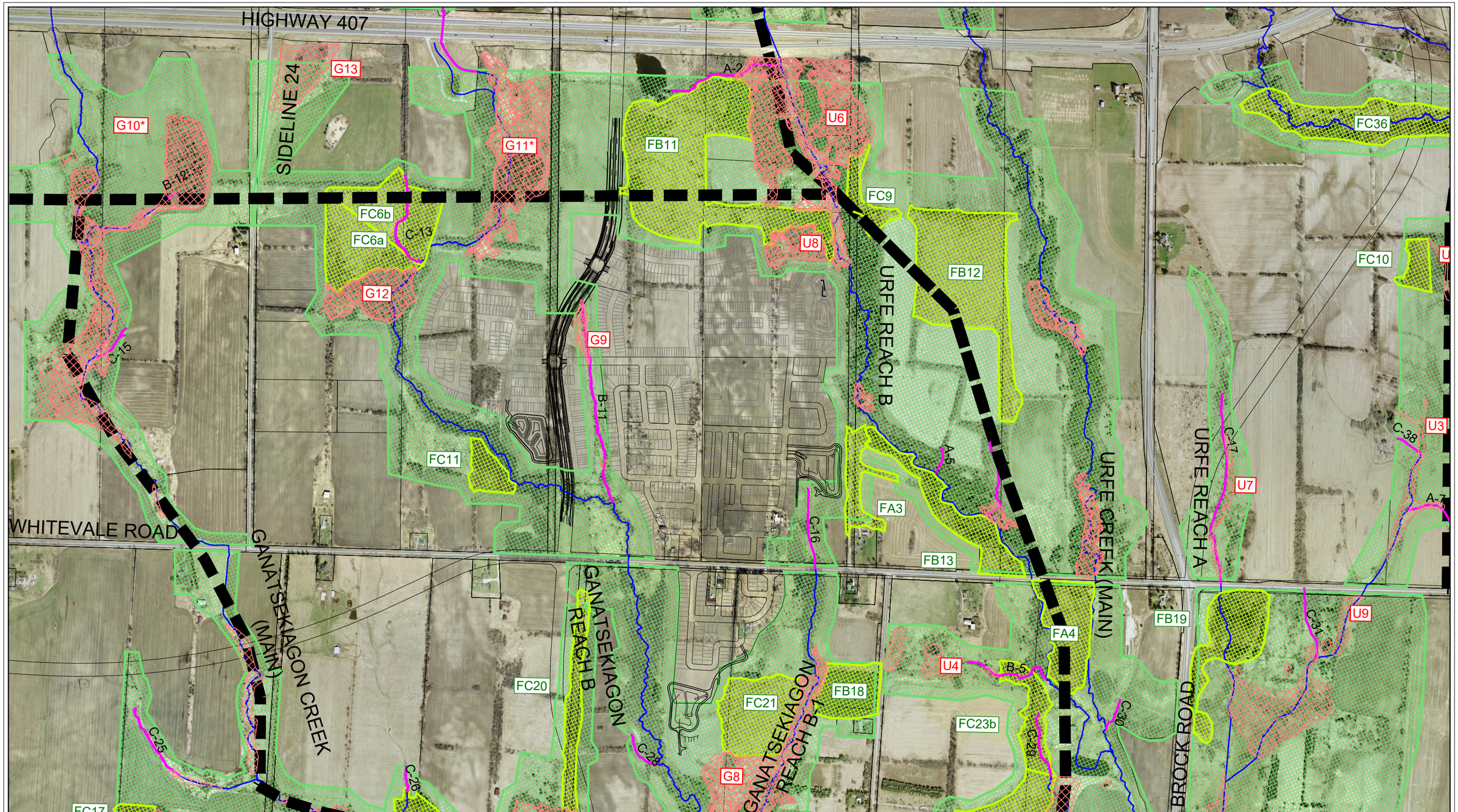
The MESPA provided conclusions and recommendations on a range of items relevant to the subject lands and surrounding developments in Neighbourhood 19. The MESPA provided a summary table of the components and their implications specific to Neighbourhood 19 (MESPA Table B11.10). This has been reproduced in Table 2.1, specific to the Whitevale TFPM Development. Refer to Figure 2-1 for further details.

Table 2.1: Summary of MESPA Recommendations Relevant to Whitevale TFPM Development

Study / Design Component	Neighbourhood 19 Requirements (Whitevale TFPM Development)		
	Ganatsekiagon Creek	**Urfe Creek**	**MESPA Reference**
Stormwater Management Facilities (SWMFs)	N/A	SWMF No. 43	Drawing B11.1 for SWMF locations
On-Site Control Areas (OSCAs)	N/A	N/A	Drawing B11.1 for OSCA locations
Feature-Based Water Balance			
Roof and / or Rear Yard Runoff to Wetlands	G9 East	U8	Drawing B11.1b for wetland locations
SWMF Discharge to Wetlands	N/A	N/A	Drawing B11.1b for wetland locations
Roof and / or Rear Yard Runoff to Woodlands	N/A	N/A	Drawing B11.1 for woodland locations
Roof and / or Rear Yard Runoff to Headwater Drainage Feature (HDF)	N/A	N/A	Drawing B11.1 for HDF locations
LID Measures	5 mm recharge requirement	5 mm recharge requirement	As outlined in Section B11.3
Watercourses for Further Study	N/A	N/A	Drawing B11.1 for locations
Areas of Interest	N/A	N/A	N/A
Reduced Buffer Areas	N/A	N/A	N/A
Crossings of the NHS	N/A	N/A	N/A

2.1 Natural Heritage System (NHS)

The development limit for the subject lands was established as part of the historical land exchange with the province. The west limit of the subject lands is bounded by the Ganatsekiagon Creek NHS, which includes woodlands, wetlands, hedgerows, and watercourse features. The east limit of the development is bound by the Urfe Creek NHS, which includes wetlands, woodlands, and watercourse features. The Natural Heritage Features are delineated on Figure 2-1. The recommendations of the MESPA related to the NHS adjacent to the subject lands are described below.



LEGEND

- HEADWATER DRAINAGE FEATURE
- NEIGHBOURHOOD BOUNDARY
- EXISTING WATERCOURSE
- WETLANDS
- NATURAL HERITAGE SYSTEM
- WOODLANDS

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SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

NATURAL HERITAGE FEATURES

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2.1.1 Water Augmentation

The MESPA identified a number of features within the NHS that may potentially be impacted by the proposed Whitevale TFPM Development. This includes Wetland Feature G9, and Wetland Feature U8. Due to the general nature of development, the post-development drainage areas may not mimic pre-development conditions because of grading alterations and an increase in impervious surfaces. Consequently, the MESPA determined that clean water augmentation is necessary to compensate for changes in drainage area and increased imperviousness. The following augmentation measures are outlined in the MESPA document, specific to the Whitevale TFPM Development:

- Wetland Feature G9 East to be augmented with 0.2 ha of roof and / or equivalent rear yard drainage directed to the wetland via the implementation of LIDs (MESPA Table B11.2).
- Wetland Feature U8 to be augmented with 0.2 ha of roof and / or equivalent rear yard drainage directed to the feature via the implementation of LIDs (MESPA Table B11.2).

2.1.2 Fencing Requirements Adjacent to the NHS

The MESPA recommends a 1.2 m high, black vinyl-coated chain link fence where lots abut a Stormwater Management Block or where lots are within 40 m (30 m buffer + 10 m) of a significant wetland feature within the NHS.

Based on the previously approved landscaping plans, 1.5 m high, black vinyl-coated fence was installed between all residential lots and NHS lands. Further fencing requirements (such as surrounding Pond Blocks and outfall access roads) in accordance with the City's Standards and TRCA preferences will be determined during Detailed Design.

2.1.3 Archaeological Site

In conjunction with the MESPA, an archaeological assessment was carried out for the Wonowin Site (AIGs-329), an approximate 1.8 ha area representing a Middle Iroquoian (Ancestral Wendat) village, dating ca. AD 1300-1350. The Wonowin Site is located on the southwest corner of the planned intersection of Peter Matthews Drive and Street C. A 20 m protective buffer was established around the archaeological site as part of the Stage 3 Archaeological Assessment, with lands internal to the buffer to be preserved through incorporation within the NHS. Refer to Appendix A for details of the Stage 3 Archaeological Assessment. The development limits of the subject Whitevale TFPM Site do not encroach within the 20 m protective buffer.

2.2 MESPA *Endangered Species Act* Considerations

At the time of the MESPA, five SAR, listed as Endangered or Threatened under the ESA, were identified on the Seaton lands:

- Least bittern (*Ixobrychus exilis*).
- Redside dace (*Clinostomus elongatus*).
- Bobolink (*Dolichonyx oryzivorus*).
- Eastern meadowlark (*Sturna magna*).
- Butternut (*Juglans cinerea*).

The Least bittern record, provided by the MNRF, was located within the NHS. However, the location of this occurrence did not contain suitable habitat conditions for Least bittern when investigated by the MESPA team. Suitable habitat was noted elsewhere in the NHS and the MESPA concluded that there would be no negative impact on this species within the approved development limit; therefore, no further work or protection measures are required in Seaton with regards to Least bittern. Additionally, the subject lands do not contain suitable habitat (wetlands, with a preference for Cattail (*Typha*) marshes with a mix of open pools and channels) for this species.

A summary of information pertaining to SAR in Neighbourhood 19, based on the MESPA, is provided in the following subsections. Due to the passage of time since detailed field investigations were undertaken, SAR that have been uplisted provincially and / or federally, and site-specific considerations, additional ecological work will be required. Additional SAR investigations are required as part of individual Environmental Site Assessments that were not studied as part of the MESPA, including Barn swallow (*Hirundo rustica*), Chimney swift (*Chaetura pelagica*) and SAR bats that may be present on or adjacent to the approved development limit. These additional studies are discussed in more detail in Section 3.6.

Overall Benefit Plans are outlined in detail in the MESPA for Redside dace, Bobolink, Eastern meadowlark, and Butternut. The following provides an outline of the MESPA findings and recommendations relevant to Whitevale TFPM Development, within the draft plan approved development limit (i.e., the tablelands).

2.2.1 Redside Dace

Numerous occupied and recovery reaches for Redside dace were identified by MNRF in portions of three subwatersheds in the eastern half of the Seaton lands, consisting of Ganatsekiagon Creek, Urfe Creek, and Brougham Creek. Given the scale of development within the Seaton lands, the MESPA advocated a subwatershed scale approach, consistent with the Redside Dace Recovery Strategy (Redside Dace Recovery Team, 2010) and MNRF guidance available at that time. A suite of overall benefit opportunities was identified in the MESPA, through field investigations and consultation with the MNRF and TRCA. Restoration opportunities included the removal

of barriers to fish passage, online pond removals, localized channel rehabilitation works where channels had been impacted by recreational vehicle access, and riparian enhancement plantings.

The extent of regulated Redside dace habitat and the Overall Benefit Plan have been refined since completion of the MESPA, through the development of the Comprehensive Aquatic Framework (CAF) (Beacon et al., 2013).

The Whitevale TFPM Development Site is bordered by Ganatsekiagon Creek to the west and Urfe Creek to the east, both of which contain regulated Redside dace habitat as identified in the MESPA, CAF, and Aquatics Species at Risk Mapping (DFO, 2018). The adjacent Ganatsekiagon Creek (Reach GB6-1) and associated wetland (G9) are both considered contributing Redside dace habitat. Urfe Creek (Reach UB7) has been identified as recovery habitat in the vicinity of the project site. As such, the proposed development area will be obligated to provide appropriate mitigation to avoid impacts (direct and indirect) to the adjacent aquatic environments. When impacts to regulated habitat are anticipated, Overall Benefit Permit(s) from the MNRF in support of the proposed development may be required. The CAF document was prepared subsequent to the MESPA in this regard and provides additional details on reach delineation (contributing, recovery, and occupied habitat), Overall Benefit opportunities and ESA permitting requirements.

Further assessment of Redside dace, within the approved development limit, is discussed in Section 3.6.

2.2.2 Bobolink and Eastern Meadowlark

Targeted breeding bird surveys for Bobolink and Eastern meadowlark were not undertaken in support of the MESPA. Based on data provided by MNRF, there were 18 records of probable breeding pairs of Bobolink recorded within the Seaton Lands, split evenly between the NHS and the developable area. At the time of the MESPA, there were no permit exemptions for development within Bobolink habitat under the ESA. As such, the MESPA proposed a Development Plan for Bobolink and Eastern meadowlark for land parcels that were draft approved on December 17, 2013. This Plan identified four locations in the NHS that would provide suitable habitat for Bobolink, that were of suitable size and vegetation type (i.e., 0.49 to 2.5 ha minimum territory size and did not contain woodland or wetland habitats). The total area for those four locations was approximately 54 ha. This proposed Development Plan was anticipated to support more than 22 breeding pairs and would provide habitat for the nine records of breeding pairs that would be displaced by the development. The Development Plan does not apply to the subject lands as they were not draft plan approved at the time the plan was developed. Additional details related to the current ESA approvals process are provided in Section 3.6.

2.2.3 Butternut

As outlined in the MESPA, the FSR is required to investigate the presence of Butternut trees within the approved development limit and does not include infrastructure (e.g., grading, access roads, LIDs, and SWMF areas) located outside of the approved development limit, where there may be intrusions into the NHS. As Butternut has a general habitat of 50 m from the stem (pers. corr. MNRF, 2018), if Butternut trees are identified in these areas or in the 50 m vicinity, then the ESA applies.

Further assessment of Butternut trees within the approved development limit is discussed in Section 3.6.

2.3 Stormwater Management

The MESPA frames the Stormwater Management Plan for the Seaton Community. The following stormwater management measures and / or considerations are outlined:

- End-of-pipe SWMFs (wet ponds) are specified to provide quantity control (where applicable), an enhanced level of water quality control, and erosion control.
- Water augmentation requirements as identified in Section 2.1.1 above.
- Roof drainage to be directed to LID measures, where feasible.
- 5 mm rainfall volume retention via LIDs.

2.3.1 Stormwater Management Facilities

Detailed Stormwater Management Modelling was completed, through the MESPA and the Duffins Creek Hydrology Update, 2012 (DCHU), to identify the best approach to minimize erosion and negative impacts to the receiving watercourses. As a result, the following was recommended for the Whitevale TFPM Development Lands in Neighbourhood 19:

End-of-pipe SWMF 43 is to provide the following:

- **Water Quality** – Enhanced protection (minimum 80% total suspended solids removal), based on the MECP SWM Manual (2003).
- **Erosion Control** – Provide extended detention of the 25 mm Rainfall Event for a minimum of 120 hours. This is achieved through the criteria established in Table B11.1 of the MESPA:
  - Unitary Storage Volume: 250 m^3/imp. Ha (based on post-development area).
  - Unitary Discharge: 0.6 L/s/ha (based on pre-development area).
- **Water Quantity** – Control of peak flows to target rates established in the DCHU for the 2- through 100-year, 12-hour Atmospheric Environmental Service (AES) Storms.

Stormwater Management controls are discussed in greater detail in Section 9.0.

2.3.2 Low Impact Development (LID) Measures

The MESPA recommended Low Impact Development (LID) Measures to address water balance conditions for natural features, as well as for maintaining overall groundwater recharge and providing surface water runoff volume reductions in the developed areas. LID measures will provide retention of 5 mm of rainfall over certain impervious areas as follows (applicable to Whitevale TFPM and residential land use):

- All residential roof areas must be managed on the basis that 5 mm of runoff from each rooftop will be treated through LID measures that can be provided communally and / or on individual lots (at source).
- The 5 mm requirement does not apply to driveways.
- LID measures are not required for local roads, except for local roads that extend through the NHS or where they abut (i.e., physically touch) the NHS.

2.3.3 Areas of Special Interest

In Chapter J, Section 2.1 of the MESPA, 11 areas of special interest have been identified within the Seaton Community that require additional consideration at the FSR Stage. There are no Areas of Special Interest within the subject Whitevale TFPM Development (refer to Figure B5.6 of the MESPA).

2.3.4 Features with Reduced Buffers

The MESPA identified features with reduced buffers on MESPA Figures B5.6 and J2.2. There are no reduced buffer features within the vicinity of the subject lands.

3.0 Existing Conditions

3.1 Hydrology / Hydraulics

Based on the existing site topography, the pre-development storm drainage is directed towards the two watercourses bounding the Whitevale TFPM Lands; those two watercourses being Urfe Creek and Ganatsekiagon Creek. Within the Whitevale TFPM subdivision limits, approximately 3.99 ha drains to Ganatsekiagon Creek and 17.49 ha draining to Urfe Creek under existing conditions (refer to Figure 3-1). It should be noted that under proposed conditions, a portion of the 3.99 ha tributary to Ganatsekiagon Creek drains to SWMF 44, located in the Mattamy Whitevale Lands, which discharges to Urfe Creek.

The 2012 Duffins Creek Hydrology Update – Final February 2013 (DCHU) provides existing and future conditions peak flow rates for the 2- through 100-year AES Storm Events. The study provides unitary release rates and quantity control storage volumes. The study also concludes that quantity controls are not required for the Regional Storm Event.

An update to the hydraulic model and regulatory floodlines for Seaton has been undertaken and documented in a Report entitled Seaton Floodline Mapping Study Update, Seaton Lands, City of Pickering (GHD 2013). The updated mapping was based on the flows presented in the 2012 DCHU. The hydraulic model and floodlines presented in the Seaton Floodplain Mapping Study Update (2013) have been utilized in this FSR for the purposes of providing conceptual design of SWMF and NHS crossings.

3.2 Channel Morphology and Streambank Erosion

Channel Morphology and Streambank Erosion was studied in depth for existing conditions in the Seaton MESP Phase 1 Existing Conditions Report (Sernas et al. 2008) and the MESPA. Meander belt widths for existing conditions were presented in the individual SWM Matrices available in Chapter B, Appendix B6-B of the MESPA (2013). A summary of the field work and characterization of the findings and constraints is provided in Section 4.0 of the Phase 1 MESP and Chapter B, Section 5.9.1 of the MESPA.

Erosion-sensitive sites were analyzed in the MESPA and the reaches under study in this report were not identified as sensitive erosion sites. Refer to Drawing B5.5 in the MESPA which identifies the Sensitive Erosion Sites.

URFE CREEK SUBWATERSHED
(CATCHMENT 38)

URFE
16.51 ha

SWMF43
17.49ha
16.51ha

GANA
3.99 ha

REACH UB7
URFE CREEK

REACH GB6-1
GANATSEKIAGON
CREEK

REACH UB6
URFE CREEK

LEGEND

SUBWATERSHED BOUNDARY
SUBDIVISION BOUNDARY

URFE
0.46 ha
EXISTING SUBWATERSHED ID
DRAINAGE AREA IN HECTARES

SWMF43
DRAINAGE ID
24.29ha
DEVELOPABLE DRAINAGE AREA TRIBUTARY TO URFE CREEK
23.92ha
DEVELOPABLE DRAINAGE AREA TRIBUTARY TO URFE CREEK (EXCLUDING REAR LOT DRAINAGE TO NHS)

EXISTING DRAINAGE AREA TRIBUTARY TO URFE CREEK

EXISTING DRAINAGE AREA TRIBUTARY TO GANATSEKIAGON CREEK

UNCONTROLLED REAR YARD DRAINAGE AREAS TO NHS

N

0 50 100 200 300 400
Metres

BURNSIDE

Figure Title
WHITEVALE TFPM DEVELOPMENT
PRE-DEVELOPMENT DRAINAGE AREA

Client
SEATON TFPM INC.

Drawn	Checked	Date	Figure No.
MH	HS	22/11/17	**3.1**
Scale		Project No.	
1:5,000		300043770	

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3.3 Geotechnical Conditions

Three geotechnical investigations have been completed on the subject Development Lands:

- Technical Memorandum, Golder Associates, August 2012.
- Technical Memorandum, Golder Associates, August 2015.
- Geotechnical Investigation, AME, April 2006.

As well as a draft geotechnical investigation that includes more specifics on the stormwater management infrastructure:

- Report on Geotechnical Investigation, Whitevale TFPM Subdivision, DS Consultants, September 2024.

Two of these Geotechnical Investigations were completed for subject Development Lands prior to the NFSSR 19 being completed in 2013. Additional Geotechnical Analysis will be completed prior to Detailed Design. However, for the purposes of this FSR, the geotechnical content in the GHD FSSR for the Ontario Infrastructure and Lands Corporation (OILC) in 2015, and the Neighbourhood 19 NFSSR in 2013, contains sufficient geotechnical information for this preliminary design and in support of the proposed draft plan. Copies of the relevant Reports have been included in Appendix B.

The Geotechnical Investigations confirm that the surficial overburden materials on the subject lands are predominantly sandy-silt till to silty sand to sand deposits. The thickness of the till in most of the boreholes was at least 4.0 m deep. The native soil encountered in the borehole studies was noted as suitable for use in on-site earthworks.

The draft geotechnical report provided updated high groundwater elevations within the future pond and infiltration gallery locations. These have been incorporated into the FSSR Figures and the draft report has been included in Appendix B.

3.4 Hydrogeological Conditions

Groundwater levels were observed through inspection of multiple monitoring throughout the subject area, with follow-up readings for settled groundwater levels. Throughout the property, the groundwater depths varied spatially and seasonally. The shallowest depth observed was 0.42 m, and the depth was shallower near the south edges of the Site (AME MW-2-92-2 and MW2-92-15). The groundwater depth was deeper in the higher upland areas near the centre of the Site (AME MW-2-92-4) with several observations below 6.4 m deep.

On a broader scale, groundwater levels have been measured in monitoring wells, stream piezometers, and wetland piezometers across the Neighbourhood 19 area to characterize the depth to water table, shallow groundwater flow directions, and recharge and discharge conditions. Field tests have also been completed to assess the soil

hydraulic conductivity and the potential for use of LID measures for stormwater infiltration. Details of the Hydrogeological Investigations and findings are provided in the Seaton Neighbourhood 19 Hydrogeological Assessment Report (Burnside, 2013), in Appendix C.

Generally, the groundwater flow patterns are interpreted to essentially follow the surface water drainage patterns, with flow generally moving from higher areas to lower areas, (i.e., southwards across the Neighbourhood with convergence towards the watercourse valleys). The depth to the water table varies across the study area and is generally found at depths approximately 2 m below-grade or shallower in the sandier upland areas (recharge areas) and seasonally at grade along the lower valley elevations and incised watercourse valleys (discharge areas).

The results of the Hydrogeological Study show that the till overburden deposits found over most of the Neighbourhood area have relatively low hydraulic conductivity. This limits groundwater movement through the thick, surficial till sediments such that overall groundwater recharge and discharge volumes in the Neighbourhood tend to be quite low. Much of the interaction between groundwater and surface water in the till areas is interpreted to occur very locally and at shallow depths. In the south and southeastern portions of the Neighbourhood, there are sandier sediments mapped at surface along the Iroquois shoreline and alluvial deposits along the watercourse valleys that have higher hydraulic conductivity than the surrounding till. There may also be local areas where small shallow sand layers and lenses within the till (interstadial deposits) have higher hydraulic conductivity and effect local lateral movement of groundwater; however, the more substantial lateral flows occur regionally in the higher hydraulic conductivity sand sediments of the underlying Thorncliffe Aquifer Complex. The Thorncliffe sands are interpreted to intersect the Urfe Creek tributaries in the eastern portion of the study area, and Ganatsekiagon Creek in the southern portion of the study area.

Regional groundwater discharge from the Thorncliffe Aquifer is interpreted to contribute to the watercourses and wetlands along the lower reaches of these creeks, and particularly to the wetlands below and along the Iroquois shoreline at the southern boundary of the study area. Based on modelling of the groundwater flow conditions, the MESPA (Final, 2013) reported that groundwater contributions to the wetlands accounted for less than 5% of the net wetland water budget and concluded that the wetlands in the study area generally rely on surface water contributions (precipitation and surface water runoff). The MESPA also presented detailed surface water balance assessments and modelling for the natural features (wetlands, woodlands, and headwater drainage features) in the Neighbourhood and provided feature-based target water volumes to maintain the natural features. The MESPA findings and water volume targets for the features for Neighbourhood 19 have been summarized in the Hydrogeological Assessment Report in Appendix C.

It was envisioned in the MESPA that clean roof drainage from the Development Lands could be conveyed to the natural heritage features to maintain the water balance

conditions. Distribution of surface water inputs to the natural features through the use of swales, shallow infiltration trenches, or other spreading techniques located in the feature buffers is generally recommended. The proposed feature augmentation system is described in Section 10.0 of this FSR.

The use of LID measures across all areas of the Neighbourhood was also recommended in the MESPA, to maintain overall recharge to the groundwater regime, and minimize (where possible) the volumes of runoff in the developed areas. Techniques considered are outlined in Section 10.0. Based on the soil characterization and infiltration testing completed during the NFSSR studies, it has been concluded that much of the Neighbourhood 19 area is not considered suitable for the use of large-scale subsurface infiltration techniques due to the low soil hydraulic conductivity and relatively highwater table conditions that present constraints for such techniques.

It is noted; however, that smaller-scale and shallow subsurface infiltration measures, such as galleries, trenches, and soak-away pits may still be feasible in till areas where there is sufficient depth to water table. All areas of Neighbourhood 19 are considered suitable for surface measures, such as directing roof leaders to grass swales, bioswales, etc. This is because the surficial till sediments tend to be weathered and fractured, and this improves the effective shallow hydraulic conductivity. Such measures can be located in the NHS buffers.

Lastly, given the nature of the subsurface stratigraphy, specifically the Halton Till Cap, and nature of the interaction with groundwater, there is no requirement to recharge the Thorncliffe Aquifer with an additional 5 mm volume, as was the case in Neighbourhood 16 (Mattamy Taunton Development).

3.5 Feature Based Water Balance

As discussed in Section 2.1.1, the MESPA defined areas of required water augmentation for wetlands, woodlots, and headwaters. Within or adjacent to the subject lands, there are two features requiring augmentation; Wetland U8 and Wetland G9 (see **Error! Reference source not found.**). The drainage areas to each feature were reviewed based on updated topographical information. Refer to Table 3.1 for a comparison of the MESPA and updated drainage areas to each feature within the subject lands.

Table 3.1: Comparison of MESPA and Updated Feature Drainage Areas

Feature	Existing Condition Drainage Area (ha)		Proposed Conditions Drainage Area (ha, excluding augmentation)	
Wetlands	**MESPA**	**FSR**	**MESPA**	**FSR**
U-8	5.4	9.14	3.6	6.16
G-9	4.6	4.83	2.3	2.37

UNDEVELOPED AREA = 6.16 ha

U8

DEVELOPED AREA = 2.98 ha

DEVELOPED AREA = 2.46 ha

G9

UNDEVELOPED AREA = 2.37 ha

LEGEND

- HEADWATER DRAINAGE FEATURE
- SUBJECT PROPERTY BOUNDARY
- EXISTING WATERCOURSE
- WETLANDS
- DEVELOPED AREA TRIBUTARY TO WETLAND
- EXISTING DRAINAGE AREA TO WETLAND G9
- EXISTING DRAINAGE AREA TO WETLAND U8

N

0 200 400 600 800

Metres

BURNSIDE

Client

SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

NHS FEATURE WATER AUGMENTATION DRAINAGE AREAS

Drawn	Checked	Date	Figure No.
AS	HS/SW	22/11/17	**3.2**
Scale		Project No.	
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Refer to **Error! Reference source not found.** for delineation of the feature drainage areas.

Based on the updated drainage areas, a PCSWMM was prepared for each feature since they were not specifically modelled in the MESPA. A continuous simulation model was run for the six years of continuous rainfall data (1998 to 2003) in accordance with the MESPA. The average months and annual runoff volumes were then extracted from the model and tabulated for comparison to existing conditions. In accordance with the MESPA, the months of March through to October have been highlighted as per TRCA request. The resulting Tables are presented in Appendix D, and the PCSWMM files are included with the digital submission (see Section 10.1 for details).

3.6 Species at Risk Considerations

Additional species have been added to the ESA since the completion of the MESPA. As stated in the MESPA, it is the responsibility of all proponents to ensure that the ESA and its regulations are met as development proceeds. The following SAR may be present on or adjacent to the development limits, based on a review of background sources, known records for the area, and previous field surveys that have been conducted for neighbouring sites. Additional ecological field work was conducted by Burnside in 2019, largely due to the passage of time and the uplisting of SAR.

3.6.1 Redside Dace

The MESPA, CAF, and Process for ESA Authorizations (v.4) (Seaton Environmental Consulting Team, 2018; Appendix E) outline works that would require Overall Benefit Permits, with respect to Redside dace. It is anticipated that pursuance of Overall Benefit Permits, or Letter of Advice (LOA) through consultation with MNRF, will be required during Detailed Design when impacts to regulated Redside dace habitat are anticipated. However, as noted above, details provided in this report discuss activities pertaining to the approved development limit and do not address any temporary or permanent alteration to fish and fish habitat, including regulated Redside dace habitat features.

Though direct impacts to Redside dace habitat will not be addressed until Detailed Design, indirect impacts (i.e., water quality) may occur as a result of the proposed activities within the development limit. As such, appropriate mitigation strategies, including a detailed Erosion and Sediment Control (ESC) and Water Quality Monitoring Plan, will be required in support of the Works. An LOA will be pursued through the MECP following the development of a Construction Monitoring Plan (CMP), in support of the grading and earth works component of the project.

3.6.2 Bobolink and Eastern Meadowlark

As discussed in Section 2.2, all of the land parcels within the Seaton area that were draft approved on December 17, 2013, have been addressed comprehensively by one

Development Plan (MNRF File Number AU-DP-001-15, accepted on February 6, 2015). As reported in the Process for ESA Authorizations (v.4), lands shown to be owned by Infrastructure Ontario (IO) did not receive draft approval which includes the subject lands (Seaton Environmental Consulting Team, 2018). Following the MESPA, the IO lands in Neighbourhood 19 were assessed for Bobolink and Eastern meadowlark habitat and inventoried in 2013 and 2014 (GHD, 2015; Seaton Environmental Consulting Team, 2018). The subject lands were found to not have appropriate habitat for Bobolink or Eastern meadowlark. Refer to Appendix E for a copy of these reports. Due to the passage of time, site-specific investigations were undertaken to confirm the absence of these species on the subject lands. Breeding bird surveys, including a specific search for grassland birds, were conducted on May 27, June 12, and June 24, 2019, by a Burnside avian specialist. No Bobolink or Eastern meadowlark were recorded during any survey within the development limit.

3.6.3 Barn Swallow

At the time of breeding bird surveys in 2019, Barn swallow was listed as Threatened under the ESA. As of January 25, 2023, Barn swallow has been reclassified to Special Concern under the ESA and no longer received general habitat protection. Regardless, the 2019 data provides confirmation that nesting and foraging habitat for Barn swallow is absent from the subject lands.

3.6.4 Chimney Swift

Chimney swift is listed as Threatened under the ESA. They have historically nested / roosted in large, hollow trees, other tree cavities, and cracks in cliffs. Currently, the majority are found in anthropogenic structures, most commonly in uncapped chimneys (Cadman et al., 2007). Based on a review of aerial imagery, Chimney swift habitat (chimneys on anthropogenic structures) is not present on the subject lands.

3.6.5 Butternut

As outlined in the MESPA, the FSR is required to investigate the presence of Butternut trees in the approved development limit, and in NHS areas where any development-related activities may intrude.

This Section only describes the requirements under the ESA for those Butternut trees found within and immediately adjacent to the development limit and disturbance limits, as documented by the Seaton Environmental Consulting Team in December 2014, and reported in the Process for ESA Authorizations (v.4) (Seaton Environmental Consulting Team, 2018; Appendix E) and the Neighbourhoods 18, 19, and 21 Butternut Health Assessment (Niblett, 2013; Appendix E) in the Seaton Neighbourhood 19 Functional Servicing and Stormwater Report (NFSSR) – SWMF No. 43 (GHD, 2015). An updated Butternut Health Assessment (BHA) was conducted in August 2019 for the area within the development limit and 50 m adjacent habitat area as the previous data is considered

outdated. Any required authorizations under the ESA for clearing within the development limit will be undertaken prior to the submission of this FSR and any required authorizations under the ESA for infrastructure intrusions into the NHS will be undertaken during Detailed Design.

A BHA is required to assess the health of the tree(s) in question, as it relates to infection with Butternut canker (*Ophiognomonia clavigignenti-juglandacearum*), a fungal disease that often results in tree mortality. The Endangered status of Butternut is based on declines in the species due to Butternut canker. The BHA determines to which Category (1-'non-retainable', 2-'retainable', 3-'achievable') the tree belongs, and if the tree is a hybrid. Category 1 (non-retainable) and hybrid trees are not protected under the ESA. Categories 2 (retainable) and 3 (achievable) trees are protected under the ESA. General habitat for Butternut trees includes suitable areas within a 50 m radius, centered on the trunk or stem of each Butternut tree in Ontario (regardless of its size). Category 1 habitat is 25 m from the trunk or stem and includes the immediate habitat conditions surrounding the tree that support the growth and persistence of the tree over its lifetime. Category 2 habitat is 25-50 m from the trunk or stem and includes the surrounding habitat conditions, supporting the core's nut dispersal and seedling establishment areas up to 50 m from a parent tree. In discussion with MNRF (now MECP), it has been established that for the area up to 50 m from a stem should be considered for potential impact to the individual Butternut and for reproductive habitat in order to avoid the requirement for authorizations under the ESA. While any activity in the 0-25 m zone is typically considered an impact, activity in the 25-50 m zone may not be considered an impact and is typically discussed with MECP Biologists prior to proceeding with authorizations. Under the ESA, a maximum of 15 Category 2 trees and 5 Category 3 trees may be registered as being affected (i.e., killed, harmed, or taken) by any one development application. Beyond this threshold, remaining trees must be retained, or an Overall Benefit Permit is required.

Niblett Environmental Associates Inc. (2013) identified 10 'non-retainable' (now called Category 1) and 5 'retainable' (now called Category 2) Butternut trees on and within 50 m of the subject property. The Seaton Community Process for ESA Authorizations (v.4) (Seaton Environmental Consulting Team, 2018) identified 11 Category 1 and 5 Category 2 Butternut trees on and within 50 m of the subject property. Given the date of these observations (prior to December 2014), the MNRF (now MECP) requires that these BHAs are updated to review for Category 3 (archivable) Butternut, a new Category added to O. Reg. 242/08 in 2014. Additionally, it is possible that the health of these Butternut trees has changed, and / or that there are additional Butternut in the area. A Burnside ecologist conducted the updated BHA on August 30, 2019. A total of 13 Butternut trees were recorded, with two resulting as Category 2 Butternut and the remaining 11 resulting as Category 1 Butternut. All samples tested for Butternut hybridity had no hybridity detected; therefore, they were all deemed to be pure species. As stated above, Category 1 Butternut are not protected under the ESA. The two Category 2 Butternut trees, one located within the development limit, and one located

immediately adjacent to the development limit, have been registered under Section 23.7 of O. Reg. 242/08 on October 1, 2021 (M-103-4435454016). No other Butternut will require registration unless additional encroachment into the NHS is determined through Detailed Design. At which time, an additional Butternut search and applicable BHAs should be completed. If Butternut are found and need to be registered, the registration will occur under the updated Butternut exemptions, set out in O. Reg. 830/21.

3.6.6 Bats

There are four species of bats that are listed as Endangered under the ESA:

- Little brown myotis (*Myotis lucifugus*) – listed in 2013.
- Northern myotis (*Myotis septentrionalis*) – listed in 2013.
- Eastern small-footed myotis (*Myotis leibii*) – listed in 2014.
- Tri-coloured bat (*Perimyotis subflavus*) – listed in 2016.

Significant population declines are attributed to a rapidly spreading fungus, *Pseudogymnoascus destructans*, which causes white-nose syndrome, and thrives in caves and mines where bats hibernate. While potential hibernacula habitat for these species is not present in the subject lands or adjacent areas (i.e., no caves or mines), there is growing concern over protecting bat maternity colonies and roosting habitat for these species.

Leaf-off surveys look for trees with habitat features suitable for Little brown myotis and Northern myotis maternity roosts. These surveys were conducted for the north parcel on March 5, 2021, and for the west parcel on May 9, 2022. Leaf-off surveys were conducted for the hedgerows, woodlands, and NHS intrusions. Leaf-on surveys look for Oak (*Quercus sp.*) and Maple (*Acer sp.*) trees, with dead and dying leaf clusters, where Tri-colored bats may roost. These surveys were conducted as acoustic monitoring stations were being installed, to help influence station location.

The subject lands were surveyed using acoustic stations and exit surveys. Four acoustic stations were deployed on June 14, 2021, and retrieved on June 28, 2021. The recorders were deployed for a total of 14 nights (i.e., sunset to sunrise), to ensure the required ten days of suitable weather conditions (i.e., ambient temperatures above 10°C and no rain), per MNRF protocols. Exit surveys were conducted at three stations on the dates of June 10 and June 24.

No SAR bats were detected on-site. However, one Little brown myotis call was identified by Kaleidoscope software within the NHS in 2021, north of the subject lands. No intrusions are currently expected in this area. However, future SWM pond outfalls will be investigated to determine if bat habitat will be impacted. If it is found that candidate maternity bat habitat will be impacted by future intrusions, MECP will be notified, and habitat compensation requirements discussed.

An Information Gathering Form (IGF) will be submitted to MECP to detail the investigation and findings. This IGF will also include other lands included in the Whitevale area to provide a holistic view of the area and its impact on SAR. Discussion with MECP will determine the level of mitigation and compensation that may be required. Mitigation measures will require trees to be taken down in winter, outside the bat active period. Compensation in the form of a rocket-style bat box may be required.

4.0 Municipal Servicing, Grading, and Erosion and Sediment Control

4.1 Grading

The Site Grading Design will take into consideration the following requirements and constraints:

- Conform to the City's grading criteria.
- Match existing boundary grading conditions with some grading into the NHS buffers where setbacks allow.
- Minimize earth moving operations and work towards achieving a balanced site.
- Provide minimum cover on proposed servicing.
- Provide overland flow conveyance for major storm conditions.

Grading has been completed to match pre-development drainage patterns to the greatest extent possible. Conceptual Grading Plan has been provided in Figure 4-1.

Road grading has been designed such that the right-of-ways (ROWs) will be utilized as overland flow routes to direct the major storm system to the proposed SWMFs. Overland drainage will be conveyed to SWMF 43 via the subdivision ROWs as shown on Figure 4-7.

The design of Peter Matthews Drive (Rossland Road extension) along the western TFPM frontage is under a developer-led Regional Works Spine contract which has not yet been awarded. However, as this design advances, it will be coordinated closely with the Whitevale TFPM Subdivision design to ensure that the Regional Road profile, grading transitions, culvert crossings, and stormwater management capture are all considered, among other items. In order to ensure storm flows will not cross Peter Matthews Drive, a 100-year storm capture point will be required on the west side of the intersection as shown in Figure 4-2. It should also be noted that a portion of Peter Matthews Drive could not be graded to direct stormwater flow towards the TFPM subdivision; therefore, SWMF 43 will provide overcontrol of peak flows to accommodate this portion of road in order to maintain its target release rates. Please refer to Figure 9-3 for more information.

BURNSIDE	Figure Title: **WHITEVALE TFPM DEVELOPMENT**		
	GRADING		
Client: **SEATON TFPM INC.**	Drawn: AS/MH	Checked: SW/HS	Date: 22/12/08
	Scale: 1:1,000	Project No.: 300043770	Figure No.: **4.1**

BURNSIDE

Figure Title
WHITEVALE TFPM DEVELOPMENT
100 YR CAPTURE

Client
SEATON TFPM INC.

Drawn	Checked	Date	Figure No.
AS	SW/HS	22/12/19	4.2
Scale		Project No.	
1:1,250		300043770	

4.2 Grading Outside Site Limits

In some locations adjacent to the Whitevale TFPM Development lands, grading within the NHS tablelands is required to meet the City's grading standards for lots and SWMFs. Where grade transitioning is required within the NHS, a slope of 3:1 is proposed to allow for stability and minimize intrusion. Utilizing erosion control methods (as presented in Section 7.2) and restoring cut or fill slopes with appropriate vegetative cover will ensure impacts to the NHS buffers will be both temporary and minimal.

Figure 4-3 shows that, in general, this grading encroachment to the NHS does not extend into the limits of vegetation but, in most cases, remains within tableland buffers that are currently (or were recently) disturbed by agricultural practices. The notion of providing a more subtle grading transition, further into the agricultural buffer around the NHS, is supported and promoted by TFPM. This would provide opportunities for planting and more natural integration with the existing vegetation edge within the NHS. Further discussion with all stakeholders is encouraged to advance this opportunity for Whitevale TFPM.

In the areas around SWMF 43 where there is more significant grading proposed within the NHS, enhancement plans will be developed to maintain the functionality and connectivity of the NHS. Areas which will be enhanced are shown on Figure 4-4. Detailed enhancement plans will be developed at the Detailed Design stage, in consultation with TRCA.

Within the NHS, a diversion swale will be required to convey drainage around the boundary of the proposed lots. In the existing condition, drainage would sheet drain across the Site towards the U8 Feature. In order to avoid ponding water at the development limit and to ensure that this external drainage continues to feed the U8 Feature, a diversion swale is required to convey the flow. The drainage area contributing to this swale is delineated on Figure 4-8 and the associated 100-year peak flow utilizing the rational method was determined to be 1.62 m^3/s (see Appendix F). With this peak flow, the diversion swale was found to have a flow depth of 0.65 m which can be contained within the swale and will not spill into proposed lots. During Detailed Design, the option to enhance this swale will be explored to further provide quality control for runoff entering the U8 Feature.

LEGEND

TEMPORARY DISTURBANCE FOR GRADING WITHIN PROVINCIAL NHS

POTENTIAL PERMANENT EASEMENTS ON PROVINCIAL NHS LANDS

N

0 40 80 120 160

Metres

BURNSIDE

Client

SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

INFRASTRUCTURE AND GRADING WITHIN PROVINCIAL NHS TABLE LANDS

Drawn	Checked	Date	Figure No.
AS	HS/SW	23/02/13	**4.3**
Scale		Project No.	
1:2,000		300043770	

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LEGEND

- BUFFER ENHANCEMENT PLANTING ZONE
- BUFFER NATIVE SEEDING ZONE
- 10m TREE LINE SETBACK
- STAKED DRIPLINE
- WATERCOURSE
- 30m FISHERIES SETBACK
- BUFFER ENHANCEMENT LIMIT
- MEANDER BELT WIDTH
- APPROXIMATE DRIPLINE

N

0 40 80 120 160

Metres

BURNSIDE

Figure Title

WHITEVALE TFPM DEVELOPMENT

NHS BUFFER ENHANCEMENT

Client

SEATON TFPM INC.

Drawn	Checked	Date	Figure No.
AS	HS	22/11/17	**4.4**
Scale		Project No.	
1:2,000		300043770	

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4.3 Proposed Storm Drainage

4.3.1 Minor Storm Drainage

The Minor Storm System will consist of a series of storm sewers sized to convey the 5-year Return Period Storm to the end-of-pipe SWMF. The storm sewer network will be designed to the City's Design Standards. A Preliminary Storm Sewer Design is depicted on Figure 4-5.

4.3.2 Major Storm Drainage

The Major Storm System design requirements for capture and conveyance have been established in detail in previous sub-sections. The major system will be designed to convey the 100-year storm event minus the 5-year event overland via proposed roadways to the SWMF. Overland flow routes have been identified on the Preliminary Grading Plans, which are illustrated on Figure 4-1.

A preliminary analysis of the major system conveyance has been completed in support of the FSR. One critical node within the overland flow route was identified based on drainage area and slope of the road, as shown on Figure 4-7, this location has the largest major system contributing drainage area within the entire subject site. Calculation of the 100-year major system flow rates are shown in Appendix G. The analysis concluded that the roads can safely convey the major system runoff to a safe outlet at velocities and flow depths permissible according to the City's SWM Guidelines Table 5. Further analysis of the major system conveyance (including a detailed inlet capacity) will be carried out during Detailed Design according to the criteria in Section 4.2.3.

4.3.3 Roof Drain Collector System

As per Section 3.6, the MESPA outlined the requirement to maintain flow to features within the TFPM Lands. These features are known as U8 and G9. The general recommendation involved the redirection of clean roof or rear yard stormwater runoff be utilized for this feature augmentation. To help achieve the required augmentation, a roof drain collector system (RDC) is proposed on Street 8 and Street 9. The RDC on Street 8 outlets to Feature U8 and the RDC on Street 9 outlets to Feature G9. It should be noted that Feature G9 is a part of Catchment 35, more specifically, the GB6-1 Reach of the Ganatsekiagon Creek. Please refer to Section 10.0 for more details.

LEGEND

PROPOSED STORM SEWER AND MANHOLE (WITH FLOW DIRECTION)	EXISTING TRUNK SANITARY SEWER AND MANHOLE (WITH FLOW DIRECTION)
PROPOSED SANITARY SEWER AND MANHOLE (WITH FLOW DIRECTION)	FUTURE TRUNK SANITARY SEWER AND MANHOLE BY OTHERS (WITH FLOW DIRECTION)
PROPOSED ROOFTOP DRAINAGE COLLECTOR SEWER AND MANHOLE (WITH FLOW DIRECTION)	EXISTING SANITARY SEWER AND MANHOLE (WITH FLOW DIRECTION)
PROPOSED ZONE 4 WATERMAIN	EXISTING STORM SEWER AND MANHOLE (WITH FLOW DIRECTION)
PROPOSED ZONE 5 WATERMAIN	

0 20 40 60 80
Metres

BURNSIDE

Figure Title
WHITEVALE TFPM DEVELOPMENT
PRELIMINARY SERVICING

Client
SEATON TFPM INC.

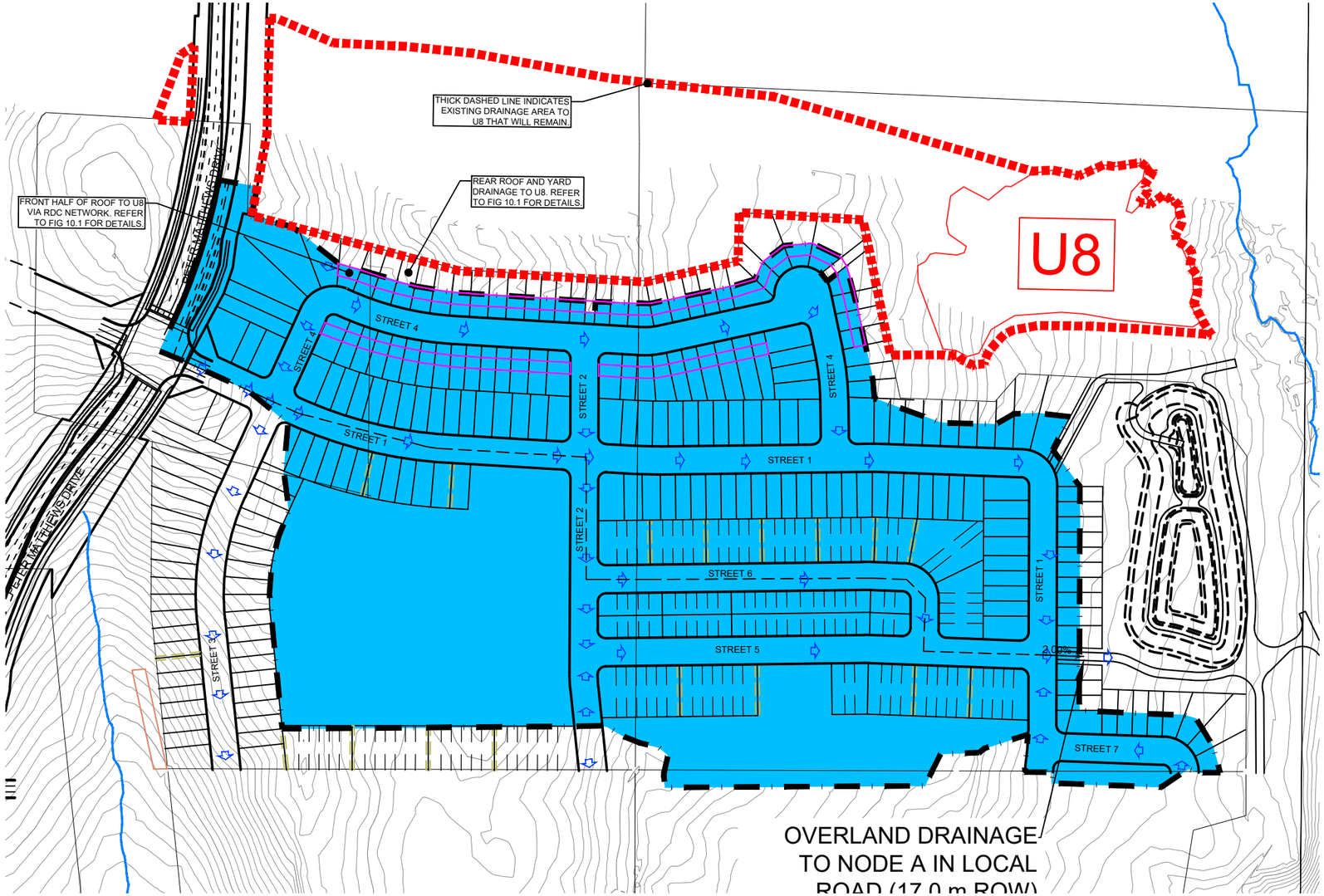
Drawn	Checked	Date	Figure No.
AS	SW	23/02/13	4.5
Scale		Project No.	
1:1,000		300043770	

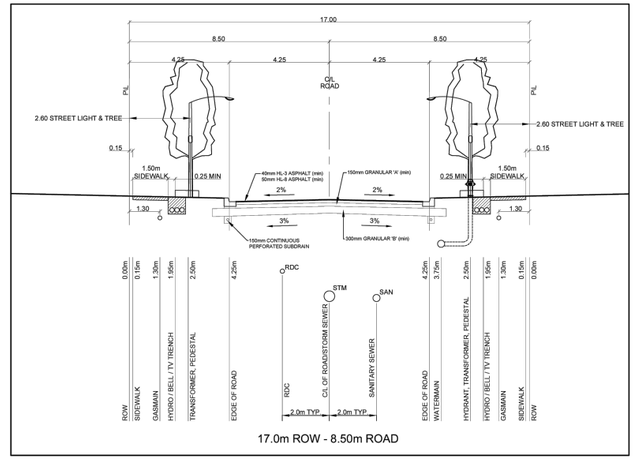
BURNSIDE

Figure Title: **WHITEVALE TFPM DEVELOPMENT**

EXTERNAL SERVICING

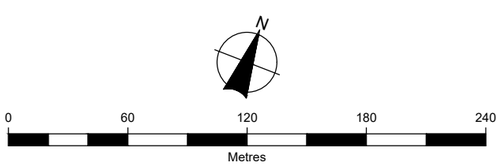
Client	Drawn	Checked	Date	Figure No.
SEATON TFPM INC.	AS	SW	24/03/26	4.6
	Scale: 1:1500		Project No.: 300043770	





17.0m ROW - 8.50m ROAD

Overland Flow Conveyance						
Node	Drainage Area (ha)	Slope (%)	100-yr Major Runoff (cms)	Flow Depth (m)	ROW Flow Velocity (m/s)	Open Lane Width (m)
Street 1&5/6	13.55	2.0%	2.97	0.217	1.74	0.00



LEGEND:

- OVERLAND FLOW DIRECTION
- FLOW PATH TO CRITICAL SECTION IN ROAD
- DRAINAGE BOUNDARY

BURNSIDE

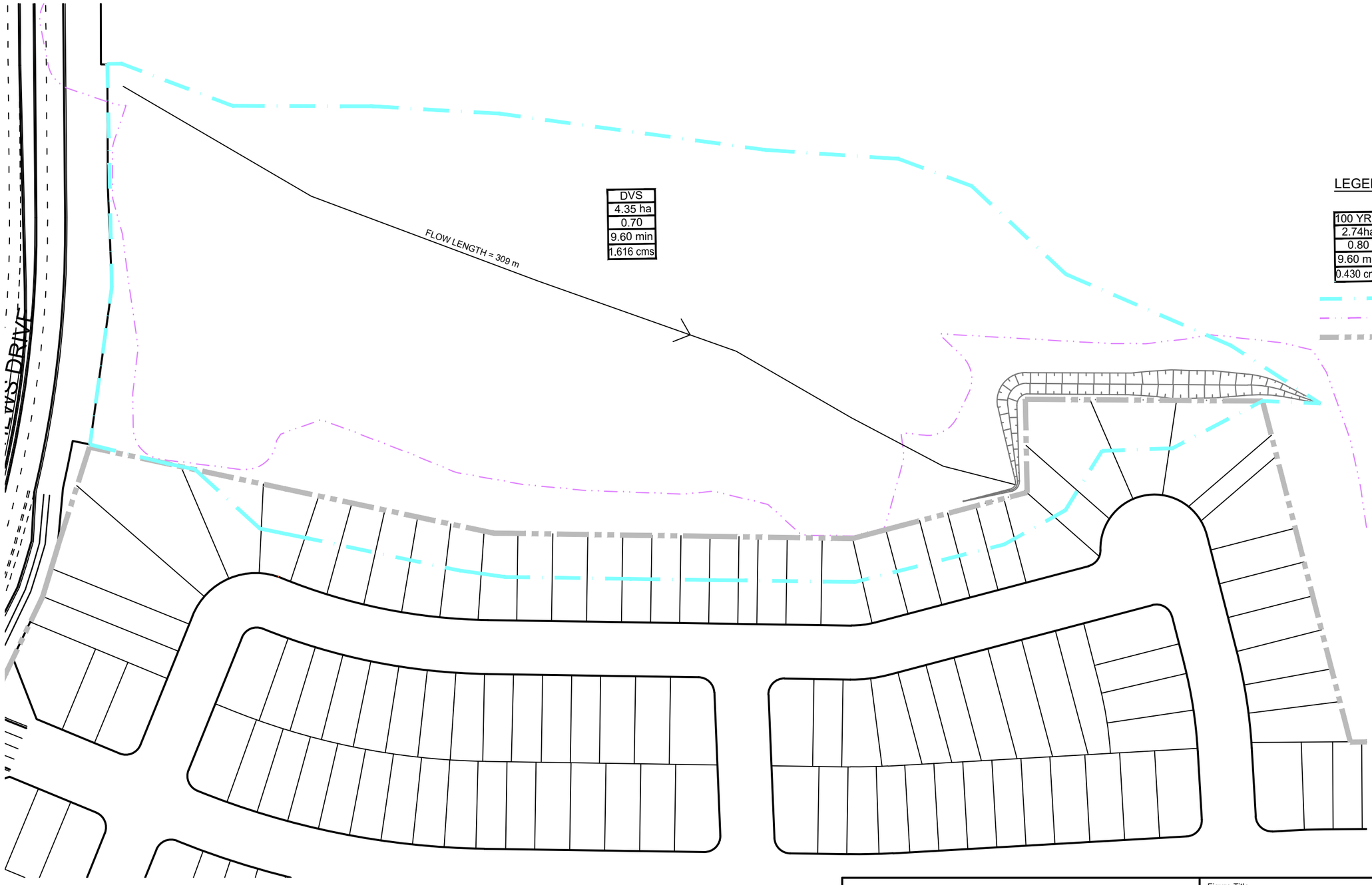
Client: **SEATON TFPM INC.**

Figure Title: **WHITEVALE TFPM DEVELOPMENT**

OVERLAND DRAINAGE CONVEYANCE

Drawn	Checked	Date	Figure No.
MH/AS	HS/SW	22/12/06	**4.7**
Scale: 1:3,000		Project No.: 300043770	

File: \\BARKLEY\Shared Work Areas\043770 - TFPM Whitevale North FSR\02_Production\Dwg\043770_FSR_OVERLAND CONVEYANCE.dwg Date Plotted: September 18, 2024 - 11:56 AM



BURNSIDE

Figure Title

WHITEVALE TFPM DEVELOPMENT

DIVERSION SWALE DRAINAGE AREA

Client

SEATON TFPM INC.

Drawn	Checked	Date	Figure No.
AS	HS/SW	22/11/29	**4.8**
Scale		Project No.	
1:1,250		300043770	

File: \\BARKLEY\Shared Work Areas\043770 - TFPM Whitevale North FSR\02_Production\Dwg\043770_DIVERSION SWALE-DRAP.dwg Date Plotted: September 18, 2024 - 11:57 AM

5.0 Wastewater Servicing

5.1 Wastewater Design Criteria

The sanitary sewer network for the Whitevale TFPM Development will be designed to follow Region of Durham Development Standards, and MECP Design Guidelines. It will be of sufficient depth to provide adequate gravity servicing connections to all individual lots within the developments.

5.2 External Wastewater Servicing

The proposed trunk sanitary sewer network is presented in Figure D3.1 of Chapter D in the MESPA. The section of trunk sewer that goes through the Whitevale TFPM Site is noted as 1LS-1 on this Figure. Subsequent to the MESPA, an investigation of the trunk sanitary sewers within the Seaton development was completed by GHD. The subject sewer is noted as “Sub-Trunk 3” in this investigation. Further to these investigations, Burnside has prepared the Detailed Design of the Whitevale Phase 1 Development and Assignment 7C for the Region of Durham. The existing trunk sewer on Street 1 ,found on Figure 4-5, is coordinated with the constructed downstream infrastructure.

5.3 Internal Wastewater Sewer Design

The internal subdivision will be serviced by a standard gravity sewer network with a minimum size of 200 mm diameter of sufficient depth to provide adequate gravity servicing connections to all individual lots.

The sewer network generally follows the proposed road grading from the high side of the Site in the northwest towards the low side of the Site near the south end of the pond, and outlets into the previously discussed trunk sewer at the southeast end of the Site.

Figure 4-5 shows a proposed internal sanitary sewer design concept for the Development.

6.0 Water Distribution

6.1 Water Distribution Design Criteria

Water distribution within the Whitevale TFPM subdivision will be used for potable domestic consumption and fire suppression and will be designed in conformance with the City, Region of Durham, and MECP Design Standards / Guidelines. Hydrants will be spaced on local watermains to provide adequate fire protection. The Region will ensure, through analysis of its water skeleton model, that the system is capable of supplying sufficient pressure and fire flows under various demand scenarios to all areas of the Whitevale TFPM Development.

6.2 External Water Servicing and Pressure Zones

A number of feedermains, pumping stations, and reservoirs to service the entire Seaton Community are currently being designed in accordance with Durham Region's Environmental Assessment.

The Whitevale TFPM Development is located within two separate pressure zones; Zone 4 and Zone 5 pressure districts, and is, at a minimum, dependent on the following external Regional Works to be completed, that are part of the overall Seaton build-out per the MESP and CPDP EA (refer to MESPA Figure D1.1 and CPDP Figure 3.3-24):

1. Construction of Zone 1 Feedermain from Tillings Road and the Canadian Pacific Railway to Zone 1 Reservoir.

2. Construction of Zone 1 Reservoir and Zone 3 Pumping Station.

3. Construction of Zone 3 Feedermain and Reservoir.

4. Construction of Zone 4 Pumping Station.

5. Construction of Zone 4 Distribution mains from Zone 4 Pumping Station along Whitevale Road to the Mattamy Whitevale development (600 mm diameter).

6. Construction of Zone 4 Feedermain.

7. Construction of Zone 5 Pumping Station and Zone 5 Elevated Tank.

8. Construction of Zone 5 Distribution Mains from Zone 5 Elevated Tank, along City east / west collector (Nathaniel Hastings Drive).

As the design of the Spine Infrastructure Projects are advanced, more specific connection details will be developed in coordination with the Detailed Design of the Whitevale TFPM Subdivision.

In the event that Zone 5 water distribution infrastructure has not been fully constructed, the development may be phased along the limit of the pressure zone which will be confirmed by the Region of Durham during Detailed Design. In this case, only Items 1. to 5. in the list above would be required for lots within the Zone 4 pressure district.

6.3 Internal Water Servicing

Conceptual Watermain Layout and sizing has been prepared as part of this report. Refer to Figure 4-5 for the proposed internal water distribution design. Provisions have been made for looping through the subdivisions to provide security of supply and circulation within the Whitevale TFPM Lands. Strategic valve configurations at Detailed Design will ensure that isolation of small segments of the system can be achieved in the

event of required maintenance, additional connections, or other shutdown requirements. All local watermains will be designed at 1.8 m depth below final grade.

6.4 External Zone 5 Water Servicing

Conceptual External Watermain Layout and sizing has been prepared as part of this report to provide the necessary connections to the Zone 5 pressure district. Refer to Figure 4-5 for the proposed external water distribution design. Provisions have been made for connections to existing Zone 5 watermain north of Highway 407 ETR to provide security of supply and circulation within the Whitevale TFPM Lands. Strategic valve configurations at Detailed Design will ensure that isolation of small segments of the system can be achieved in the event of required maintenance, additional connections, or other shutdown requirements. All external watermains will be designed at 1.8 m depth below final grade.

7.0 Construction Considerations

Based on previous geotechnical recommendations and experience working in the Seaton Whitevale area, the following provisions are generally recommended for servicing installation:

- Temporary shallow excavations for sewers, trenches, basements, and utilities are not expected to pose any difficulty.
- Undisturbed natural soil is suitable for supporting watermain, sewers, manholes, etc.
- Bedding to meet the City's and Region of Durham Standards.
- Excavation in the native material below the groundwater level will require a positive system of dewatering.

There are a number of factors and conditions that should be taken into consideration when installing buried services throughout the Seaton Community. Each is discussed below.

7.1 Construction Below the Groundwater Table

The construction of buried services below the groundwater table has the potential to capture and redirect groundwater flow through more permeable fill materials typically placed in the base of excavated trenches. Over the long-term, these impacts can lower the local groundwater table. Particularly in the vicinity of local wetlands and woodlots, it is important to maintain the groundwater table levels within their natural elevation ranges in order to continue to support these natural features. Permeable trenches also have the potential to provide conduits for migration of contaminants through the subsurface.

To mitigate these effects, it is important that any services constructed below the groundwater table be constructed using best management practices to reduce or prevent redirection of groundwater flow and overall lowering of the water table adjacent

to features. This may involve the use of anti-seepage collars or clay plugs surrounding the pipes to provide barriers to prevent groundwater flow along granular bedding material and erosion of the backfill materials.

7.1.1 Dewatering Requirements

Temporary dewatering for construction may be required where sewer excavations must extend below the local groundwater table. In areas of surficial till overburden, the hydraulic conductivity of the soils is relatively low, and as such, significant dewatering is not anticipated for residential construction excavations. In these cases, groundwater and drainage can often be managed by occasional pumping of accumulated water from sumps. There are however, areas of surficial sands and gravels that have higher hydraulic conductivity and could require more significant dewatering. Construction of deeper infrastructure could also encounter local water bearing zones that may require dewatering and / or depressurization for construction.

Should the contractor need to pump water at rates exceeding 50,000 L/d, a Permit to Take Water (PTTW) from the MECP will be required for construction dewatering. The PTTW must be obtained in accordance with the Provincial Regulations prior to dewatering activities.

7.1.2 Environmentally Sensitive Areas

For environmentally sensitive areas, ESC practices during construction will be in accordance with the Greater Golden Horseshoe Conservation Authorities Erosion and Sediment Control Guideline for Urban Construction. The following provides a general outline of the standard mitigation measures to be implemented for construction:

- **In-Water Works** – Only, if necessary, will occur during the applicable fisheries window, or as otherwise directed by the MNRF.
- **Fish Rescue and Relocation** – Fish rescue will be completed by a qualified biologist, utilizing a combination of seine nets, dip nets, and an electrofisher. All methodologies related to electrofishing will be completed following the MNRF (2004) Guidelines. Electrofishing will only be used when less invasive methods cannot be effectively applied.
- **Construction Supervision** – A team comprised of engineers, ecologists, and fluvial geomorphologists will be present, as necessary, during construction to ensure proper function of the ponds, outlets, and instream works. This will enable quick and appropriate response to construction issues and ensure implementation of important design details and construction techniques. As per a signed agreement per Draft Conditions from the TRCA, Burnside will have a CISEC Certified Professional complete periodic inspections of ESC installations on-site to ensure they are functioning as designed.
- **Erosion Control** – A multiple barrier approach to ESC will be used, where feasible. Detailed Erosion and Sediment Control Plans and Reports will be prepared during

Detailed Design, outlining detailed construction management strategies, phasing, and staging of works.

- **Unwatering** – Sediment-laden unwatering discharge will be pumped to a stilling basin or filtering system well away from the watercourse and allowed to settle and / or filter through the riparian vegetation before re-entering the watercourse downstream of the construction area.
- **Newly Constructed Vegetation** – Rapid establishment of vegetation on any channel banks and adjacent floodplains will minimize potential erosion, where applicable. Vegetation also provides cover, which improves aquatic habitat and water quality. An aggressive planting plan is therefore warranted.
- **Site Stabilization** – Immediately following construction, all disturbed areas will be graded to finished design elevation and organic soil will be added with the appropriate seed mix. Disturbed areas within 2 m of the work area, and along valley walls, will be covered with coir cloth, jute mat, or crimped straw. The Site will be re-vegetated as soon as conditions allow. As it is likely that the build-out of the development will be phased to some extent, exposed areas will be stabilized as soon as possible if they will be sitting dormant for an extended period of time, until future development takes place on the lands.
- **Materials and Equipment** – Any stockpiled materials should be stored and stabilized away from watercourses and temporary and ultimate SWMFs. Vehicle and equipment re-fueling and / or maintenance should be conducted away from the watercourse. Any part of a vehicle and / or equipment entering the water should be free of fluid leaks and externally cleaned / degreased to prevent deleterious substances from entering the water.

7.2 Erosion, Sediment, and Topsoil Control Strategy

ESC will be implemented for all construction activities, including tree removal, topsoil stripping, earth moving operations, foundation excavation, and stockpiling of materials. Detailed Erosion and Sediment Control / Construction Management Plans and a Report will be prepared under separate cover in support of necessary permit applications for site alteration.

ESC Plans will be designed in conformance with the City's, TRCA, and Ministry of the Environment, Conservation and Parks and Climate Change (MECP) Guidelines and the Greater Golden Horseshoe Conservation Authorities Erosion and Sediment Control Guideline for Urban Construction. TFPM will have a CISEC accredited Professional undertake periodic inspections and file reports to ensure conformity with the approved Construction Management / ESC Plans and best practices.

ESC strategies will include the following:

- Perimeter Heavy Duty Silt Fence and Double Silt Fence / Straw Bale Barriers along sensitive outfall areas and along the entire NHS boundary.
- Immediately following construction, all disturbed areas are to be graded to design pre-grades and organic soil added with the appropriate seed mix. Site to be re-vegetated as soon as conditions allow.
- Rapid establishment of vegetation on any channel banks and adjacent floodplains to minimize potential erosion, where applicable.
- Temporary sediment control fence at construction limits, and / or downstream of any disturbed areas prior to grading.
- Gravel mud mats and vehicle wash-down stations at construction vehicle access points to minimize off-site tracking of sediments.
- Material stockpiles located a reasonable distance from watercourses, stabilized and bordered by temporary sediment control fence.
- Vehicle and equipment re-fueling and / or maintenance conducted a reasonable distance from watercourses.
- Temporary sediment ponds as required, utilizing the permanent stormwater management facilities, where possible.
- Sediment laden unwatering discharge pumped to a stilling basin or filtering system well away from the watercourse and allowed to settle and / or filter through the riparian vegetation before re-entering the watercourse, downstream of the construction area.
- Rock Check dams for erosion / velocity control.
- Sediment traps to be placed in catchbasins (once underground servicing is installed).
- Routine inspection, monitoring, and repair as necessary of all temporary ESC measures during construction.
- Removal of temporary controls once the areas they serve are restored and stable.
- In-water works, if necessary, will occur during the allowable fisheries window, or as otherwise directed by the MNRF.
- Turbidity monitoring may be required periodically to ensure that the quality of water being released from unwatering, dewatering, or any other construction operation is compliant.

7.3 Utility Requirements

The Seaton Community will require electrical servicing, telephone and television telecommunications, and natural gas supply. Within the city of Pickering, the service utility companies are Elexicon Energy, Bell Canada, Rogers Communications, and Enbridge Gas Distribution, respectively. These utility companies have been advised of the scope and timing of the proposed developments within the Seaton Community. The MESPA states that the Seaton Community, including the study area, can be serviced with either the extension of existing services or the implementation of new infrastructure as required as the development advances.

Street illumination for local, collector, and arterial roadways will also be required. Streetlights internal to the Whitevale TFPM Subdivision will ultimately be municipally owned and maintained. It will be a requirement for each developer to retain an electrical consultant for the design of streetlights and to coordinate the electrical supply to the streetlights. The City has released the Seaton Community Street Lighting Guidelines, dated December 2016. This version supersedes the Guidelines dated March 2016. These Guidelines incorporate the requirements for streetlights to have a colour temperature of 3,000 k on local roads, and revised Region of Durham Specifications for Roadway Lighting. These will be used to inform the detailed lighting designs. Another Consultant will be completing a composite utility coordination plan.

8.0 Transportation

The transportation system for the subject lands, including all roads, the transit system (where applicable), trails, sidewalks, and bike lanes, will be developed during Detailed Design and will generally follow the recommendations of the MESPA, Regional Roads EA and City Roads EA, and City of Pickering Placemaking Guidelines.

8.1 Right-of-Way (ROW) Cross-Sections

The subject development includes 17 m local road ROWs and a 10 m laneway. The City‘s approved cross-sections are proposed for the development of the Site. Peter Matthews Drive is a 36 m ROW section. The road and intersection design will be coordinated as part of the Detailed Design process.

8.2 Noise Attenuation

A Noise Assessment Report has not yet been prepared for the subject site and will be completed in support of Detailed Design. It is not expected to have any excess noise areas that would affect the layout of the proposed draft plan. Measures such as noise fence and a/c units may be utilized to mitigate noise in areas noted as required by the noise consultant during Detailed Design.

9.0 Stormwater Management Strategy

The stormwater management strategy has been presented in the following sections.

9.1 Design Parameters / Terms of Reference

An extensive analysis of the watersheds within the Seaton Community was completed through the MESP and the MESPA in addition to the 2012 DCHU. The following criteria for Urfe Creek within the subject Whitevale TFPM Lands have been developed based on the modelling completed to date.

Quality Control

Enhanced (Level 1) protection (minimum 80% total suspended solids removal), is required based on MECP SWM Manual (2003).

Erosion Control

Extended detention from the first 25 mm rainfall event is required for a minimum of 120 hours. This is achieved with an extended detention unit storage of 250 m³/imp. ha (based on post-development area) and an outflow of 0.0006 $m^3/s/ha$ (based on pre-development area) as per the MESPA.

Quantity Control

Control of post-development 2-year to 100-year peak flows is required. Release rate requirements were established in the 2012 DCHU for Catchment 38, which encompasses the Whitevale North TFPM Lands under post-development drainage conditions.

SWM Pond Grading

The stormwater facilities are required to be designed in accordance with MECP, TRCA, MNRF, and the City's design criteria, as summarized below:

- Minimum length to width ratio of 4:1.
- Side slopes:
  - 3:1 from the bottom of the permanent pool to 500 mm below the normal water level (NWL).
  - 6:1 within 3.0 m on either side of NWL.
  - 4:1 where the slope backs onto the rear yard lot line or an adjacent valley system.
  - 4:1 where the pond is adjacent to a municipal boundary.
  - 5:1 where the slope backs onto an adjacent road system.
- Water levels:
  - Permanent pool: 3.0 m deep.
  - Extended detention storage: 1.5 m max depth.
  - Quantity control storage: 2.0 m max depth.
- Berming:
  - Max berm height: 3 m.
  - Where berm is >2 m, it must be assessed and possibly designed by a geotechnical engineer with experience in the design of dams.
- Maintenance access road / walking trail.
- Emergency spillway.

- Recommendations regarding pond liner requirements shall be in accordance with geotechnical recommendations or as prescribed by the City of Pickering (i.e., up to the 100-year high water level).

9.1.1 Storm Sewer Design and Future HGL Analysis

The Minor Storm System will consist of a series of storm sewers sized to convey the 5-year Return Period Storm to the end-of-pipe SWMF. The storm sewer network will be designed to the City's Design Standards and will generally be of sufficient depth to allow gravity service connections to individual lots.

In addition to the storm sewer network, in order to achieve water augmentation to existing features and achieve the 5 mm recharge requirement, a local RDC may be situated within ROWs to various discharge locations. All lots with a frontage greater than 12 m within the proposed development will be provided with roof downspout connections to the storm network, per City Standards. A Preliminary Storm Sewer Design is depicted on Figure 4-5 and Figure 4-7.

The storm sewer design for the Whitevale TFPM Development will be based on the City of Pickering Stormwater Management Design Guidelines. An HGL Analysis based on the following criteria is required:

1. For watersheds greater than 40 ha in size, the 100-year, 1-hour AES Storm will determine the Design HGL for the storm sewer (minor system).

2. For watersheds less than 40 ha in size, a Rational Method spreadsheet will be used for HGL analysis.

3. The starting elevation for the HGL modelling shall be the height of the 100-year water surface elevation within the receiving system (i.e., SWMF).

4. The modelling shall be completed assuming the full 100-year peak flow is conveyed by the pipes.

5. Hydraulic losses must be accounted for in the minor system.

6. For detailed criteria, refer to Section 6.3.1 in the City of Pickering Stormwater Management Design Guidelines.

A full HGL analysis will be performed at the Detailed Design stage.

9.2 Impervious Ground Cover

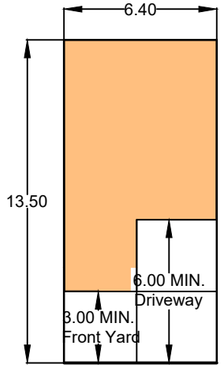
To determine the quality and erosion control storage requirements, a weighted percent impervious value was calculated based on the land use presented in the Draft Plan. The percent impervious for various land use types was calculated based on draft City of

Pickering by-laws for Seaton regarding lot setback requirements for residential land uses and the City's SWM Guidelines (2019) for all other land use types. For residential lands, details of the impervious area coverage assumed for the various typical lot sizes and unit types are presented on Figure 9-1 and Figure 9-2. The imperviousness of each type of land use is summarized below in Table 9.1.

Table 9.1: Percent Impervious Cover Based on Land Use

Land Use	Percentage
Low Density (Single Detached)	68%
Medium Density (Townhouses)	73%
Medium Density (Back-to-Back Towns)	90%
Site Plan Block	75%
Open Space (Including Park Blocks)	21%
Trailhead Block	59%
SWMF Block	90%
Roads Only (Combination of ROWs)	85%
School Block	80%

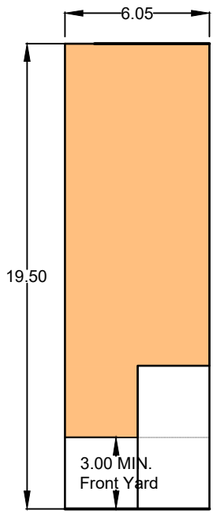
TYPICAL
6.4m B2B



LOT AREA = 86.4

ROOF AREA =57
PERCENTAGE ROOF =66%

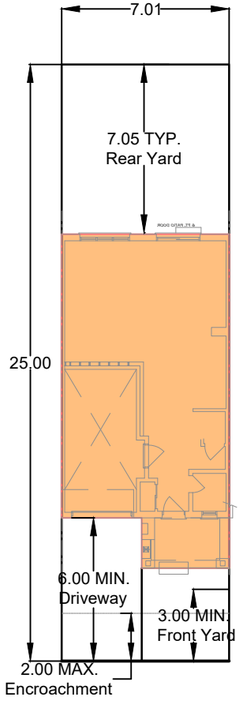
TYPICAL
6.05m REAR
LANE TOWN



LOT AREA = 118.0

ROOF AREA =90
PERCENTAGE ROOF =76%

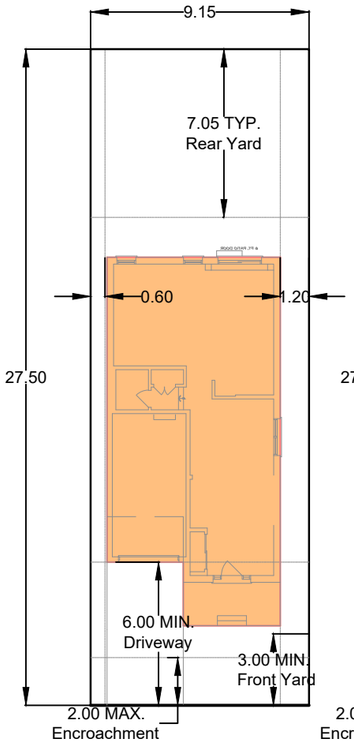
TYPICAL
23' TH



LOT AREA = 175

ROOF AREA = 91
PERCENTAGE ROOF = 52%

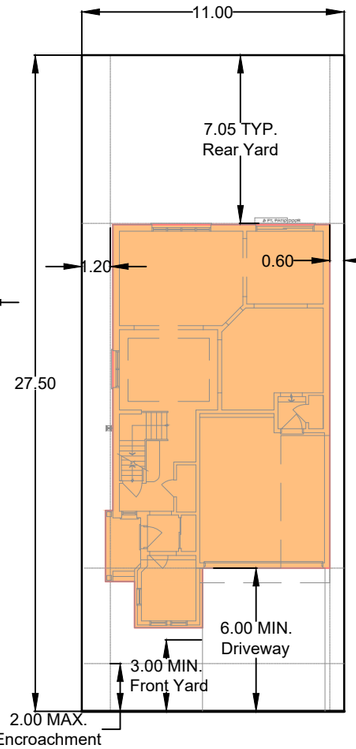
TYPICAL
30'



LOT AREA = 252

ROOF AREA = 114
PERCENTAGE ROOF = 45%

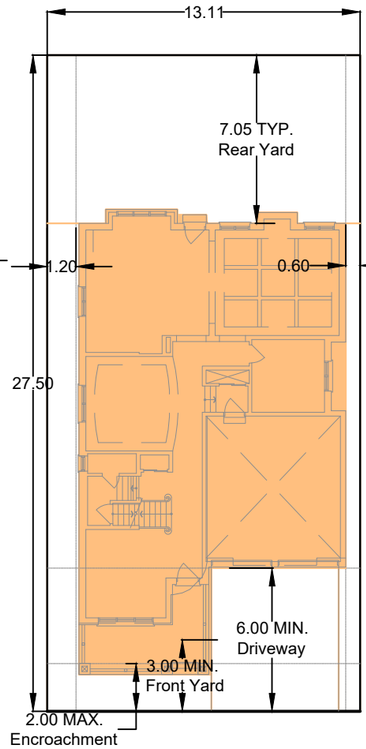
TYPICAL
36'



LOT AREA = 302

ROOF AREA = 153
PERCENTAGE ROOF = 51%

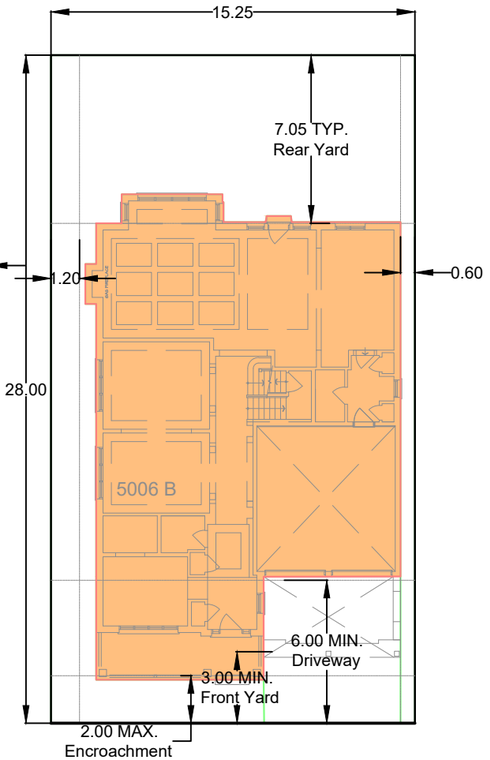
TYPICAL
43'



LOT AREA = 360

ROOF AREA = 207
PERCENTAGE ROOF = 58%

TYPICAL
50'



LOT AREA = 427

ROOF AREA = 248
PERCENTAGE ROOF = 58%

NOTE:
ROOF AREA BASED ON 110% OF ENVELOPE FOR SINGLES AND ALL ROOF AREA INCLUDED

BURNSIDE

Figure Title
WHITEVALE TFPM DEVELOPMENT

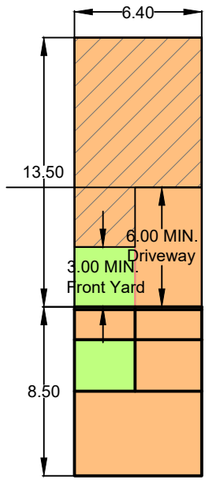
ROOF AREA CALCULATION

Client
SEATON TFPM INC.

Drawn	Checked	Date	Figure No.
MH	SW	18/12/13	**9.1**
Scale		Project No.	
NTS		300043770	

File Name: 043770_FSR_ROOF CALC.dwg Date Plotted: September 18, 2024 - 11:57 AM

TYPICAL 6.4m B2B



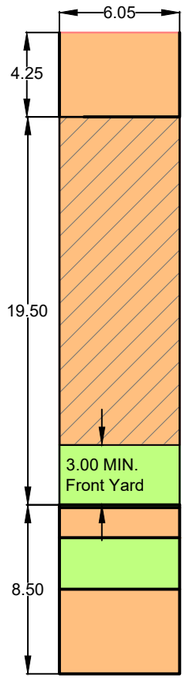
LOT AREA = 86.4m²
TOTAL AREA (INCL. ROW) = 140.9**m²**

IMPERVIOUS AREA @ 100% = 123.4m²
PERVIOUS AREA @ 0% = 17.5m²

NET IMPERVIOUS = 88%

ROOF AREA =57m²
ROOF (% OF LOT ONLY) =66%

TYPICAL 6.05m REAR LANE TOWN



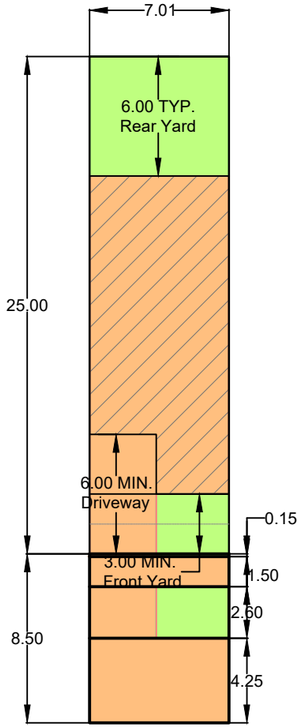
LOT AREA = 118.0m²
TOTAL AREA (INCL. ROW) = 195.1m²

IMPERVIOUS AREA @ 100% = 160.3m²
PERVIOUS AREA @ 0% = 34.8m²

NET IMPERVIOUS = 82%

ROOF AREA =100m²
ROOF (% OF LOT ONLY) =85%

23' TOWN



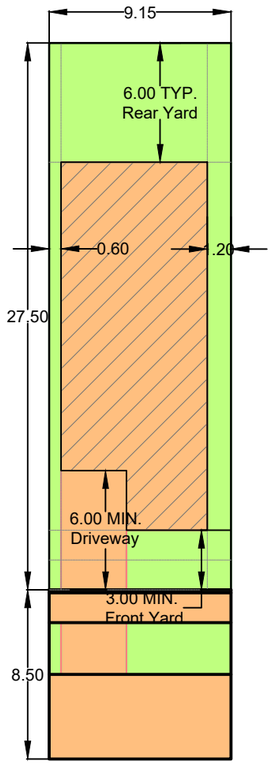
LOT AREA = 175m²
TOTAL AREA (INCL. ROW) = 234.9m²

IMPERVIOUS AREA @ 100% = 171.8m²
PERVIOUS AREA @ 0% = 63.1m²

NET IMPERVIOUS = 73%

ROOF AREA =102m²
ROOF (% OF LOT ONLY) =58%

30'



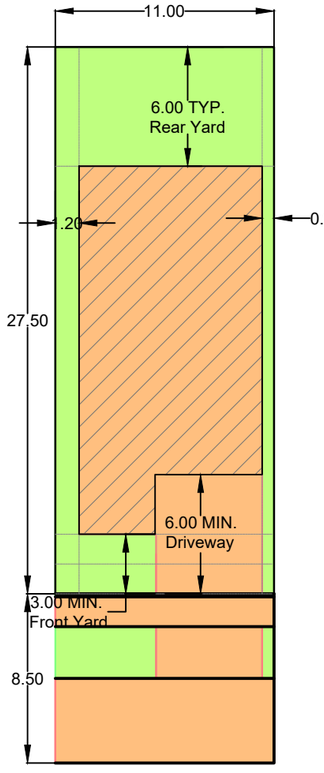
LOT AREA = 252m²
TOTAL AREA (INCL. ROW) = 329.4m²

IMPERVIOUS AREA @ 100% = 207.5m²
PERVIOUS AREA @ 0% = 121.9m²

NET IMPERVIOUS = 63%

ROOF AREA =126m²
ROOF (% OF LOT ONLY) =50%

36'



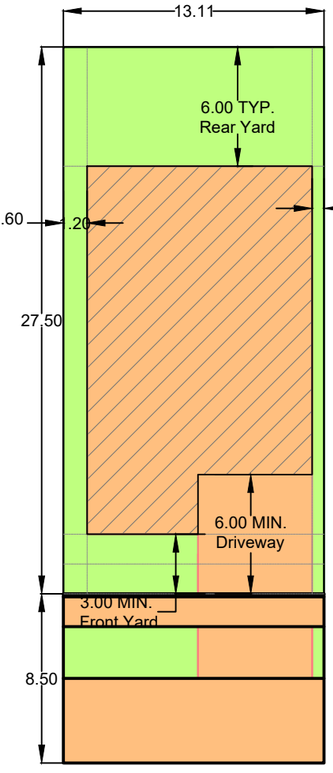
LOT AREA = 302m²
TOTAL AREA (INCL. ROW) = 396m²

IMPERVIOUS AREA @ 100% = 264.1m²
PERVIOUS AREA @ 0% = 131.9m²

NET IMPERVIOUS = 67%

ROOF AREA =154m²
ROOF (% OF LOT ONLY) =51%

43'



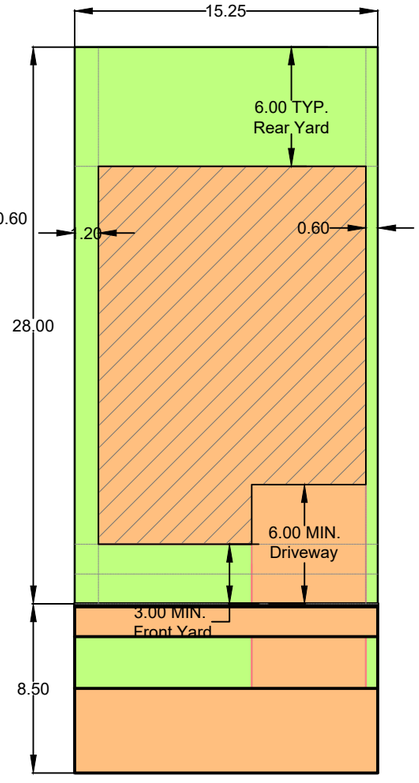
LOT AREA = 360m²
TOTAL AREA (INCL. ROW) = 471.9m²

IMPERVIOUS AREA @ 100% = 317.6m²
PERVIOUS AREA @ 0% = 154.3m²

NET IMPERVIOUS = 67%

ROOF AREA =192m²
ROOF (% OF LOT ONLY) =53%

50'



LOT AREA = 427m²
TOTAL AREA (INCL. ROW) = 556.6m²

IMPERVIOUS AREA @ 100% = 376.2m²
PERVIOUS AREA @ 0% = 180.4m²

NET IMPERVIOUS = 68%

ROOF AREA = 238m²
ROOF (% OF LOT ONLY) =56%

BURNSIDE

Client

SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

ROOF AND IMPERVIOUS AREA CALCULATON

Drawn	Checked	Date	Figure No.
MH	SW	23/02/13	**9.2**
Scale		Project No.	
NTS		300043770	

File Name: 043770_FSR_ROOF CALC.dwg Date Plotted: September 18, 2024 - 11:57 AM

9.3 Uncontrolled Rear Lots to NHS

The rear roof and rear yard areas from all lots abutting the NHS, as well as some of the trailhead block, will not be collected and conveyed to the SWMF. Some of these areas will sheet flow uncontrolled to the existing wetland features (0.65 ha to U8 and 0.15 ha to G9) while the remainder will sheet flow into the NHS lands (0.33 ha) bypassing the features. The total of these uncontrolled areas is approximately 1.13 ha and are depicted on Figure 9-3. A vegetated filter strip is proposed at the edge of the NHS to attenuate runoff prior to it reaching the NHS/associated wetland features; therefore, no overcontrol in the SWMF is required.

9.4 Overcontrol of Peter Matthews Drive

There is a portion of the Peter Matthews Drive ROW that could not be collected due to grading constraints. This uncontrolled area totals approximately 0.74 ha and is depicted on Figure 9-3. Overcontrol in the downstream SWMF is proposed to attempt to reduce the erosion hazard / peak flows within the associated watercourses.

9.5 Stormwater Management Facility Details (SWMF 43)

There is one SWMF proposed within the Whitevale TFPM Development Lands – SWMF 43. The Preliminary Design of the SWMF, including catchment area, pond footprint, grading, and cross-sections, are provided in Figure 9-3 through Figure 9-5.

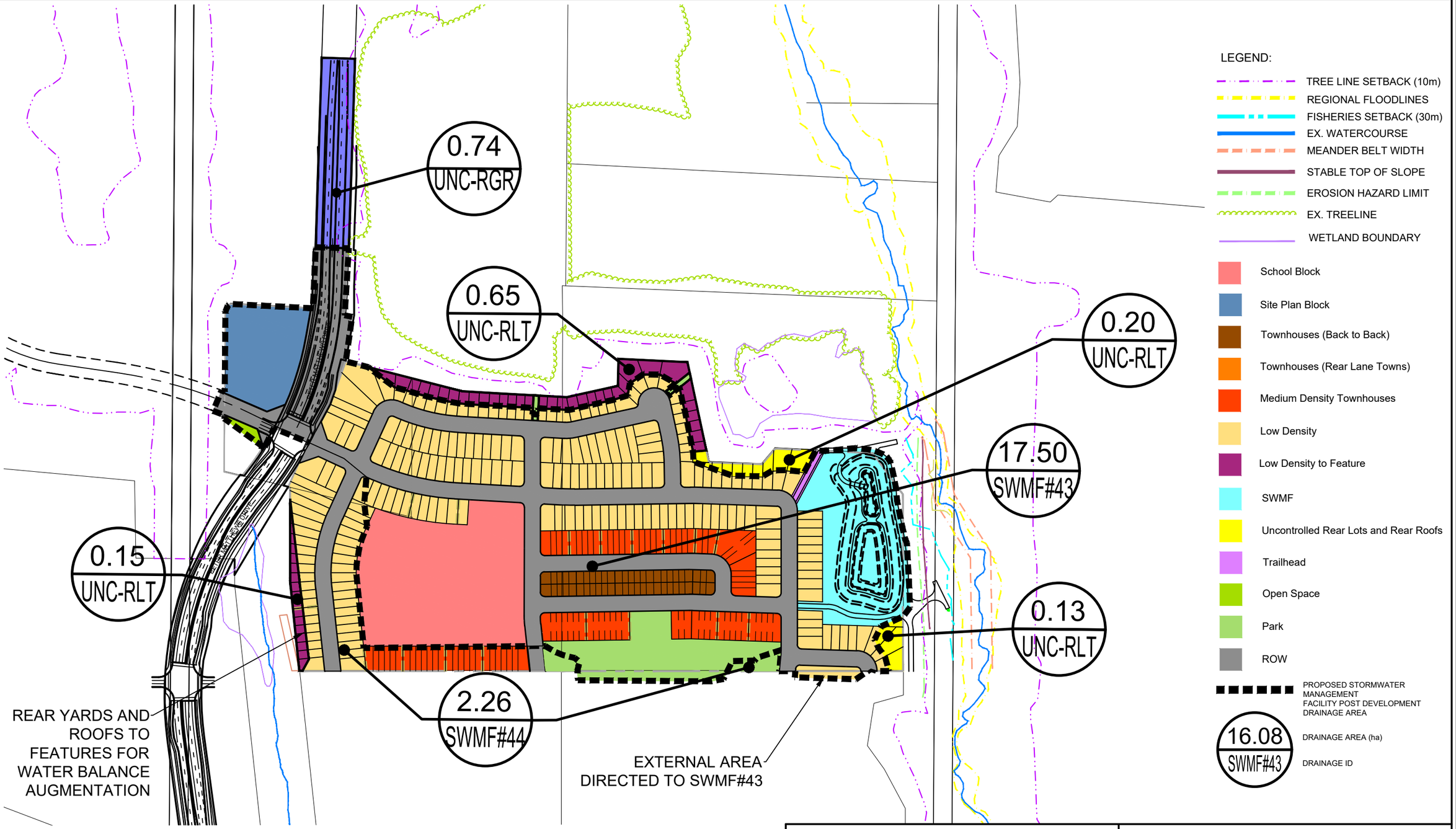
A Visual HYMO Model was prepared to establish the functional volumes required to meet the release rate targets established in the DCHU, as discussed in Section 9.1. SWMF 43 has been sized based on controlling the major and minor system flows to pre-development target rates, which have been calculated by multiplying the prescribed unitary discharge rates to the pre-development drainage to the facility. The total proposed drainage area to SWMF 43 is 17.50 ha with an overall percent impervious of 74.8% (refer to imperviousness calculations that can be found in Appendix H). The curve number of 75 used in the modelling of SWMF 43 is as per Table A.1 in the DCHU for Catchment 38.

Table 9.2: Summary of SWMF Target Release Rates

	SWMF 43 – 17.50 ha Drainage Area (Based on 16.51 ha Pre-Dev)	
Storm Event	**Unitary Discharge (L/s/ha)**	**Target Discharge (L/s)**
25 mm (Extended Detention)	0.6	9.9
2-year	2.36	39.0
5-year	3.79	62.6
10-year	4.80	79.2

25-year	6.22	102.7
50-year	7.33	121.0
100-year	8.50	140.3

A brief discussion of the pond is presented in the sections below.



BURNSIDE

Figure Title

WHITEVALE TFPM DEVELOPMENT

SWMF#43 DRAINAGE AREA

Client

SEATON TFPM INC.

Drawn	Checked	Date	Figure No.
AS	SW/HS	23/02/13	**9.3**
Scale		Project No.	
1:3,000		300043770	

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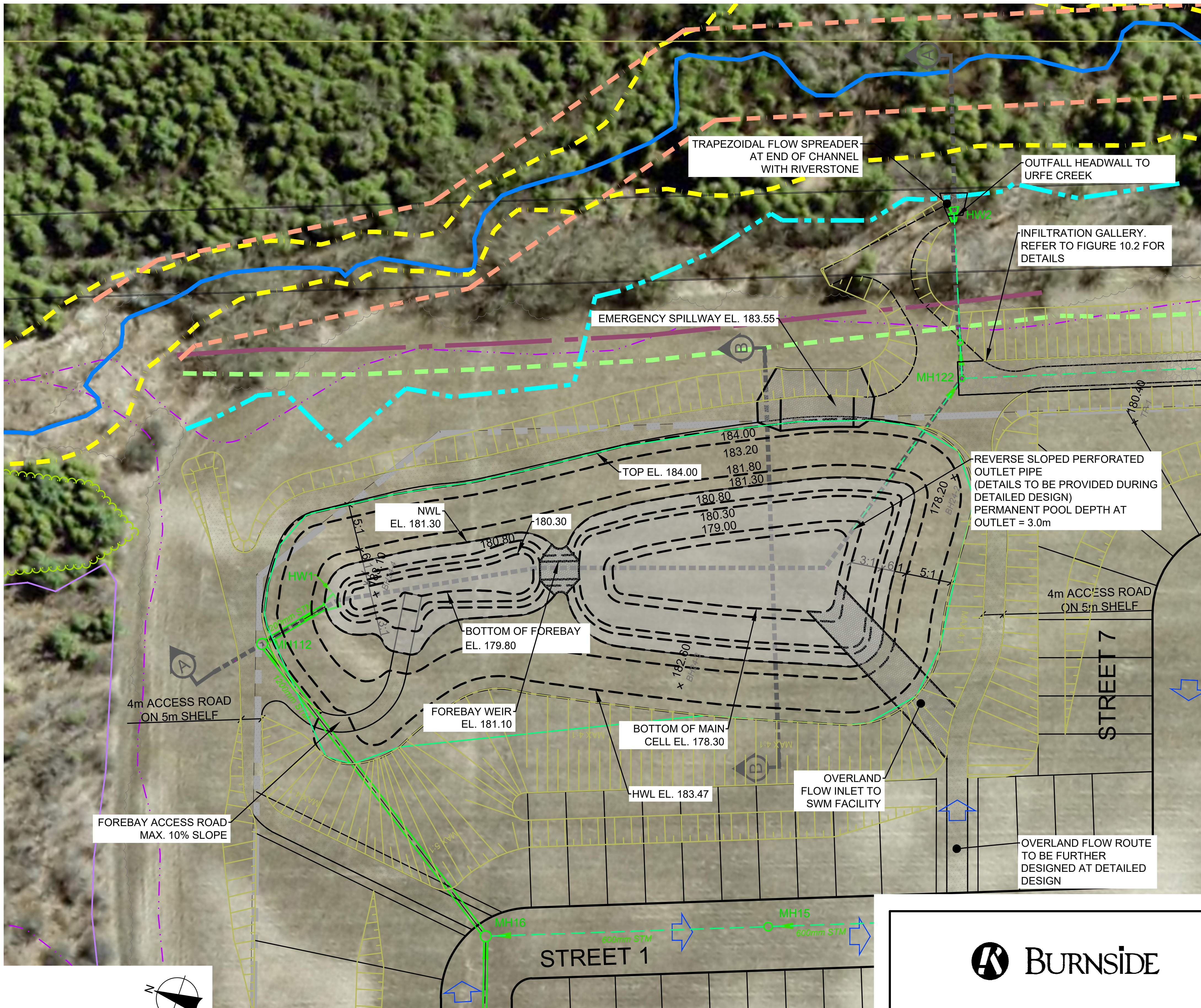
SWM FACILITY OPERATING CHARACTERISTICS				
	DISCHARGE (m^3/s)	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)	ELEVATION (m)
FOREBAY	-----	879	880	181.30
PERMANENT POOL	-----	3,378	6,148	181.30
EXTENDED DETENTION	0.0099*	3,273*	3,543	182.00
100 YEAR	0.1403**	10,710	10,710	183.47

*FROM 2013 MESPA
**FROM 2012 DCHU



0 20 40 60 80
Metres

LEGEND

- TREE LINE SETBACK (10m)
- REGIONAL FLOODLINES
- FISHERIES SETBACK (30m)
- EX. WATERCOURSE
- MEANDER BELT WIDTH
- STABLE TOP OF SLOPE
- EROSION HAZARD LIMIT
- EX. TREELINE
- WETLAND BOUNDARY
- 201.50 EXISTNG CONTOUR
- STORM SEWER AND MAINTENANCE HOLE
- OVERLAND FLOW DIRECTION

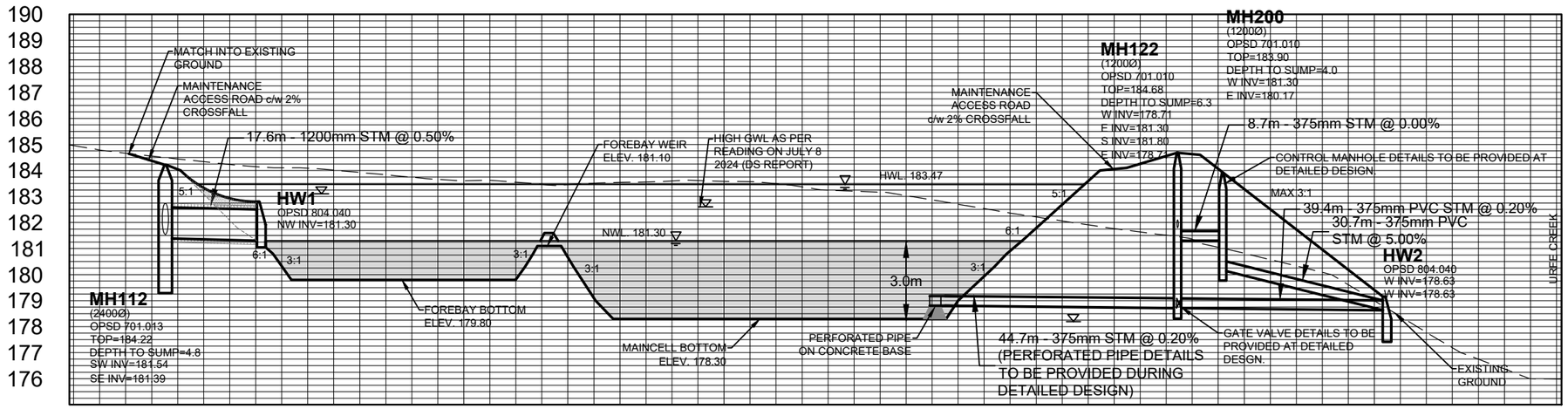
BURNSIDE

Figure Title
WHITEVALE TFPM DEVELOPMENT
SWMF#43 PLAN

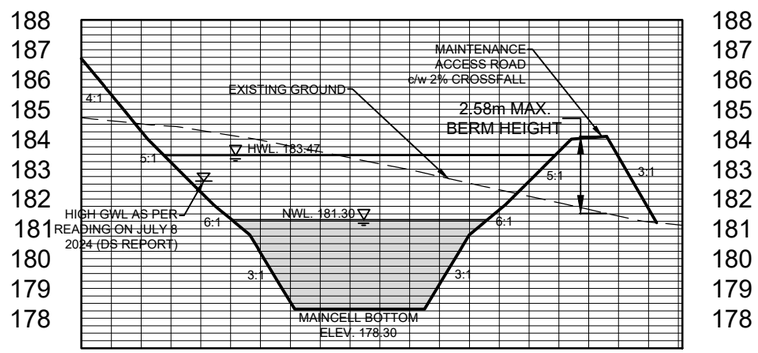
Client	Drawn	Checked	Date	Figure No.
SEATON TFPM INC.	MH/AS	HS/SW	23/02/13	9.4
	Scale: 1:1,000		Project No.: 300043770	

File: \\BARKLEY\Shared Work Areas\043770 - TFPM Whitevale North FSR\02_Production\Dwg\043770_FSR_SWMF43.dwg Date Plotted: September 18, 2024 - 11:58 AM

Section A-A



Section B-B



BURNSIDE	Figure Title: **WHITEVALE TFPM DEVELOPMENT** SWMF#43 SECTIONS		
Client: **SEATON TFPM INC.**	Drawn: PH/MH/SD Checked: HS/SW	Date: 23/02/13	Figure No.: **9.5**
	Scale: H 1:1000 V 1:200	Project No.: 300043770	

9.5.1 Stormwater Management Facility 43 (SWMF)

The following sections outline the specific criteria utilized and the resulting functional design requirements for SWMF 43.

9.5.1.1 Drainage Area

SWMF 43 is located at the east limit of the Whitevale TFPM Lands in Urfe Subcatchment 38 (refer to DCHU), and outlets to Urfe Creek Reach UB6. The total drainage to SWMF 43 is 17.50 ha, and consists of low, medium, and high-density residential, open space, roads, a park, a school, and a SWM block as previously indicated (see Figure 9-3). Appendix H includes detailed impervious calculations. The Preliminary Design of SWMF 43 is shown on Figure 9-4, cross-sections on Figure 9-5, and pond calculations are included in Appendix H.

A portion of the drainage area from the draft plan, proposed as part of the Whitevale TFPM Lands, was considered in the design of SWMF 44, which was completed as part of the Whitevale Central and South SWM report. Originally, 2.47 ha of drainage at 74% impervious was considered in the SWMF 44 design. Since the first submission of this FSR, the Whitevale Central and South SWM report (Burnside, 2023) has been updated to reflect the increased density in the Whitevale Phase 2 Lands. As part of this update, the portion of the draft plan that is tributary to SWMF 44 was also updated to ensure capacity in the downstream facility. In this updated analysis, 2.36 ha at 74% impervious was assumed in the calculations. Since the submission of the updated Whitevale Central and South SWM Report, the TFPM FSR grading has been further updated and the drainage area to SWMF 44 has been refined to be 2.26 ha at 69.5% impervious. No capacity concerns are therefore anticipated in the downstream facility (SWMF 44).

9.5.1.2 Water Quality

Enhanced (Level 1) protection (minimum 80% total suspended solids removal), based on MECP SWM Manual (2003) is required to meet water quality objectives.
SWMF 43 has been designed as a wet pond and provides a permanent pool volume of 6,148 m³ which is sufficient to meet the required 3,378 m³ permanent pool volumes to satisfy Enhanced Fisheries Protection as per MECP Guidelines. The main cell of the pond has been designed with a 3.0 m deep permanent pool (as it discharges to Redside dace habitat). Refer to Appendix H for the permanent pool sizing calculations.

9.5.1.3 Erosion Control / Extended Detention

Extended detention of the first 25 mm Rainfall Event for a minimum of 120 hours is required to meet erosion control objectives. This is accomplished using an extended detention unit storage of 250 m^3/imp. ha (based on post-development area of 17.50 ha and a percent impervious of 74.8%) and outflow rate of 0.0006 m^3/s/ha (based

on pre-development area of 16.51 ha). This corresponds to a volume requirement of 3,271 m³ and an extended detention release rate of 0.0099 m^3/s to Urfe Creek. This functional design provides an extended detention volume of 3,543 m³ with a release rate of 0.0098 m^3/s. The target release rate to the creek will be achieved using an outlet control structure, briefly described in Section 9.5.1.4, which is to be fully designed during Detailed Design, in accordance with the City's Guidelines.

9.5.1.4 Quantity Control

Control of post-development 2- to 100-year, 12-hour AES peak flows to targets established in the DCHU is required for SWMF 43. Table 9.3 below outlines the preliminary stage storage requirements for SWMF 43. The target release rate to the creek will be achieved using an outlet control structure, to be designed during Detailed Design in accordance with the City's Guidelines. Detailed calculations and actual stage-storage relationships have been provided in Appendix H.

Table 9.3: Summary of SWMF 43 Storage / Release Rates

	Peak Release Rate (L/s)	Peak Release Rate (L/s)	Active Storage (m3) Required	Pond Elevations (m)
Storm Event	**SWMF 43 Inflow (17.50 ha)**	**SWMF 43 Outflow (17.50 ha)**		
25 mm	N/A	9.8	3,543	182.00
2-year	754	17	5,330	182.81
5-year	1,019	47	6,800	183.00
10-year	1,186	62	7,750	183.12
25-year	1,400	96	8,910	183.26
50-year	1,561	112	9,790	183.37
100-year	1,722	129	10,710	183.47

Table 9.4: Summary of SWMF 43 and Uncontrolled Release Rates

Storm Event	Peak Release Rate (L/s)			
	Peter Matthews Drive Outflow (0.74 ha) (Uncontrolled)	**SWMF 43 Outflow (17.50 ha) (Controlled)**	**Total Outflow (18.24 ha)**	**Urfe Creek Target**
2-year	37	17	49	39.0
5-year	48	47	61	62.6
10-year	55	62	70	79.2
25-year	64	96	101	102.7
50-year	71	112	120	121.0
100-year	78	129	136	140.3

As noted in the table above, the target release rate is slightly exceeded during the 2-year event. The 2-year outflow is being controlled by the 75 mm dia. extended detention outlet orifice size, the minimum recommended size. In previous submissions, the 2-year outflow was controlled by a 50-mm dia. orifice; however, this only reduced the total peak outflow to 42 L/s still exceeding the 39 L/s target and greatly increased the extended detention volume required. It should be noted that with this 75 mm dia. orifice the pond outflow is closer to the expected volume requirement and peak outflow. The exceedance is being driven by the uncontrolled flows from Peter Matthews Drive. The exceedance; however, is not significant and occurs only during the 2-year storm event; therefore, no adverse effects are expected.

9.5.1.5 SWMF Grading

The Preliminary Grading Design of SWMF 43 has been completed with 3:1 slopes adjacent to the access road where tying into existing ground, 5:1 slopes have been provided where the SWMF is adjacent to the municipal roadway, and 4:1 slopes have been provided where the SWMF is adjacent to lots. Within the pond itself, the slopes have been graded in accordance with the criteria listed in Section 9.1.

9.5.1.6 SWMF 43 Outfall

The SWMF 43 outfall is proposed at the south end of the pond block, discharging to Reach UB6 which differs from the proposed location shown in the NFSSR. The outflow location was revised to allow overland flows (major system) entering the pond to discharge directly into the main cell, thereby reducing the resuspension of solids in the forebay during larger storm events. This new outfall location will require a field review and staking to assess existing physical constraints. Details related to the outfall will be provided at Detailed Design.

9.5.1.7 SWMF 43 Summary

Table 9.5 below outlines design details for SWMF 43, and further details including actual stage-storage can be found in Appendix H and on Figure 9-4.

Table 9.5: Summary Table for SWMF 43 Design

Features	Technical Data
Drainage Area	Drainage Area = 17.50 ha % IMP = 74.8%
Permanent Pool	Volume Required = 3,378 m³ Volume Provided = 6,148 m³ Max Depth = 3.0 m
Extended Detention	Volume Required: 3,273 m³ Volume Provided: 3,543 m³ Elevation: 182.00 m

Features	Technical Data
	Release Rate: 9.8 L/s
Active Storage	Volume Required: 10,710 m³ Elevation: 183.47 m Release Rate: 129.0 L/s
Top of Pond	Elevation: 184.00 m Max Berm Height = 3.0 m
Emergency Overflow Weir	17.50 m wide trapezoidal weir Max Depth of 0.15 m at Elevation 183.55 m Max. Outflow: 1.73 m^3/s

10.0 Low Impact Development (LID) Measures

As summarized in Section 2.0, the MESPA recommended LID measures to address:

1. Water balance augmentation to natural features.

2. Water quality control.

3. Maintaining overall groundwater recharge and providing surface water runoff volume reductions in the developed areas.

LID measures shall be designed to accept 5 mm of rainfall over specified impervious roof areas. Maintaining the water balance of Wetland U8 and Wetland G9 is the priority. The 5 mm volume from the remaining roof areas is to be made available for maintaining groundwater recharge and subsequently providing surface volume reductions in developed areas and at end-of-pipe facilities (despite no credit towards this). These three categories of LIDs are described in the following sections.

Determining the specific available volume of runoff from roofs is required to support several of the LID calculations in this report, and this requires an informed estimate of the roof area for various lot types. Figure 9-1 shows the roof area coverage for the various residential lot types. This analysis is based on zoning requirements established for the Seaton Community and assumes the full building envelope will be utilized. The roof areas estimated for each lot type have subsequently been used to size the LID facilities.

10.1 LID Measures for Feature-Based Water Balance

Section 3.5 outlined the natural features requiring water augmentation and summarized the existing conditions of the feature drainage. The MESPA provided direction on the augmentation requirements to maintain flow to the features, and generally recommended that LID measures involving the redirection of clean roof or rear yard

stormwater runoff be utilized. The MESPA recommended that this flow be directed into a dry swale or bioswales located in buffers prior to the release of flows into the features.

The MESPA identified preliminary roof areas needed for water augmentation for each feature. This has been further refined in accordance with the NFSSR Terms of Reference. The proposed water augmentation plan calls for a combination of roof and rear yard drainage to be directed towards Wetland U8 and Wetland G9. Rear yards and roofs abutting the NHS adjacent to the features will either sheet drain directly to the features or sheet drain to a bioswale which outlets the feature. Additional drainage from roofs internal to the Site will be piped via an RDC sewer to Features U8 and G9.

A PCSWMM Model was created to analyze the pre- and post-development runoff volumes and peak flows for each feature for the period of March to October as well as annually. This included a calculation of the percent change in runoff volume between the average existing and future conditions with augmentation for six years (1998 to 2003) of continuous rainfall data. The percent change was then compared to the natural variability of runoff to the feature under existing conditions. If the future change in runoff volume was not within the natural variability range of the feature, then the roof area was either increased or decreased and the model re-run. The models were iterated until the percent change in runoff volume between post- and pre-development conditions were predicted to be within the natural variability of the feature under existing conditions. Refer to Appendix D for a summary of the modeling procedure.

Table 10.1 and Table 10.3 show the existing natural variability in runoff volume for Wetland Feature U8 and Wetland G9, respectively, and Table 10.2 and Table 10.4 indicate the projected future percent change for the same features under continuous simulation modelling. See Appendix D for pre- and post-development results, and the model summary for each of the augmented features within the Whitevale TFPM Development.

Table 10.1: U8 – Existing Conditions Percent Variability from Average Runoff Volumes

1998 to 2003	Minimum	Maximum
% Variability March to October Average	-31%	34%
% Variability Yearly Average	-28%	13%

Table 10.2: U8 – Proposed Conditions Percent Change in Runoff Volume from Existing Average Runoff

Percent Change	1998	1999	2000	2001	2002	2003	Average
March to October	27%	29%	8%	-9%	-33%	-7%	2%
Yearly	21%	8%	6%	-10%	-21%	8%	2%

Table 10.3: G9 – Existing Conditions Percent Variability from Average Runoff Volumes

1998 to 2003	Minimum	Maximum
% Variability March to October Average	-41%	50%
% Variability Yearly Average	-38%	22%

Table 10.4: G9 – Proposed Conditions Percent Change in Runoff Volume from Existing Average Runoff

Percent Change	1998	1999	2000	2001	2002	2003	Average
March to October	23%	34%	11%	-15%	-34%	-12%	1%
Yearly	18%	11%	7%	-16%	-22%	4%	0%

As demonstrated, under proposed conditions, both features generally demonstrated variability within the natural range that was observed under existing conditions. The proposed augmentation plan for Wetland U8 resulted in an exceedance of 8% in 1998, and a deficit of 1% from March to October in 2002 when compared to the natural variability. The area proposed to augment the wetland was optimized to reduce the runoff volume outside the natural variability range as much as possible in these two cases. These results demonstrate satisfactory augmentation to maintain the pre-development water balance and functionality of Wetland U8 and Wetland G9.

Table 10.5 summarizes the updated recommended roof and rear yard areas for augmentation for each feature based on the analysis described above. The roof area as specified in the MESPA is also shown for comparison purposes.

Table 10.5: Drainage Area for Feature Augmentation

Feature	Roof Area to Feature (ha)	Yard Area to Feature (ha)
Wetland U8	0.74	0.47
Wetland G9	0.44	0.31

Time-varied runoff was also plotted as hydrographs and reviewed for the 6-year period for the proposed augmentation. Each year of data was broken into three hydrographs showing spring (March to May), summer (June to August), and fall (September to November). The hydrographs are presented in Appendix D.

It should be noted that the modelling presented does not include the proposed LID systems at the outfall to Wetland G9. The purpose of the modelling was to confirm that the appropriate roof and rear yard area was being utilized to augment the feature. The LID measures proposed at the outfall will dampen and disperse the peak flow in

addition to providing detention, evapotranspiration, and some infiltration. Therefore, these functions are not represented in the model or hydrographs. The hydrographs are generally representative of proposed conditions and show the general trends when looking at peak flows and duration; however, do not provide the exact peak flow or duration of flows to the feature under future conditions.

When establishing the appropriate area for augmentation, conclusions have been drawn from the analysis of runoff volumes. The conclusion is that the roof and rear yard areas, provided in the table above, will provide augmentation to the features such that any increases or decreases in runoff volume will be within the range of increases and decreases in runoff volume that the features experience under existing conditions. During some rainfall events, peak flows may be higher and the duration longer under proposed conditions; however, LID measures will work towards dampening and dispersing the flow to the feature. Further details for the LID measures are to be determined during Detailed Design.

Based on the prescribed requirements for feature-based water balance to Feature G9, LID measures to convey and distribute flows from the areas provided in Table 10.5 have been located within and adjacent to the subject lands. The locations of the LID measures are schematically shown on Figure 10-1.

At Detailed Design, each feature LID measure will be designed to convey the flows to the feature while providing detention, retention, infiltration, and evapotranspiration in accordance with the TRCA/CVC LID SWM Planning and Design Guide (2010, LID Guide). The key design criteria are as follows:

- Bottom width of 0.75 m to 3.0 m.
- Slope between 0.5% and 4%; check dams for slopes greater than 3%.
- Maximum flow depth of 100 mm and maximum flow velocity of 0.5 m/s during a 4-hour, 25 mm Chicago Storm Event.
- Sized to convey the 10-year Design Storm Event.
- Maximum side slopes of 2.5:1.

10.1.1 Outlet to Feature U8

The proposed LIDs for the area providing stormwater recharge to Wetland Feature U8 are located west of the wetland. The LID will receive RDC sewer discharge via a proposed headwall. While the intent of the proposed augmentation system is to match runoff volumes to Feature U8, directing rooftop runoff has the potential to increase peak flows and velocities compared to existing conditions.

To dampen peak flows and reduce velocities, discharge from the proposed RDC sewer will outlet to a sub-surface level spreader (stone core wetland) and then overland to the feature. A scoped Environmental Impact Study (EIS) will be prepared in support of the

Detailed Design of this outlet. Refer to Figure 10-1 for the preliminary layout of the outlet for augmentation of Feature U8.

U8

G9

SWALE AND HEADWALL OUTLETTING TO ENGINEERED STONE CORE WETLAND AT FEATURE U8. WETLAND DESIGN TO BE COMPLETED AT DETAILED DESIGN STAGE.

32.3m - 250mm RDC @ 4.50%

49.4m - 250mm RDC @ 4.14%

9.7m - 250mm RDC @ 0.50%

48.4m - 250mm RDC @ 0.50%

13.2m - 250mm RDC @ 0.50%

21.2m - 250mm RDC @ 1.48%

39.2m - 250mm RDC @ 3.15%

34.5m - 250mm RDC @ 3.85%

36.1m - 250mm RDC @ 3.88%

40.1m - 250mm RDC @ 4.50%

33.6m - 250mm RDC @ 4.28%

55.1m - 250mm RDC @ 3.14%

34.0m - 250mm RDC @ 3.87%

40.3m - 300mm RDC @ 4.43%

41.7m - 300mm RDC @ 4.27%

42.4m - 300mm RDC @ 2.50%

40.8m - 300mm RDC @ 0.50%

R4 31 0.25 0.00

RY1 34 0.25 0.47

R7 3 0.04 0.00

R3 15 0.14 0.00

R2 10 0.10 0.00

R5 12 0.15 0.00

R8 14 0.10 0.00

RY2 23 0.15 0.31

10% MAX

PETER MATTHEWS DRIVE

PETER MATTHEWS DRIVE

PETER MATTHEWS DRIVE

SWMF 43

MAX 4:1

HEADWALL OUTLETTING TO ENGINEERED STONE CORE WETLAND AT FEATURE G9. WETLAND DESIGN TO BE COMPLETED AT DETAILED DESIGN STAGE.

PROVIDE MAINTENANCE ACCESS FROM ROW GRADE PER MUNICIPAL STANDARDS

RDC HEADWALL 5 TO PROVIDE LINEAR SUB-SURFACE OUTLET TO ENCOURAGE SHEET FLOW AND MINIMIZE EROSION

RECEIVING FEATURE	CONTRIBUTING ROOF AREA	CONTRIBUTING YARD AREA
U-8	0.76 ha	0.47 ha
G-9	0.44 ha	0.31 ha

N

0 40 80 120 160

Metres

R1 11 0.15 0.20

CATCHMENT ID

TOTAL ROOF AREA (Ha)

TOTAL YARD AREA (Ha)

NUMBER OF UNITS WITHIN AREA

PROPOSED LOT AREA WITH ROOF DRAINAGE CONTRIBUTING TO FEATURE U8 VIA RDC SYSTEM

PROPOSED LOT AREA WITH ROOF AND REAR YARD SHEET DRAINING TO FEATURE U8

PROPOSED LOT AREA WITH ROOF AND REAR YARD SHEET DRAINING TO FEATURE G9

PROPOSED LOT AREA WITH ROOF DRAINAGE CONTRIBUTING TO FEATURE G9 VIA RDC SYSTEM

EXISTING LIMIT OF WETLAND FEATURE

ROOF DRAIN COLLECTION (RDC) SYSTEM

BURNSIDE

Client

SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

WATER AUGMENTATION TO FEATURES

Drawn	Checked	Date	Figure No.
AS	HS/SW	22/11/29	**10.1**
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10.1.2 Outlet to Feature G9

The proposed LIDs for the area providing stormwater recharge to Wetland Feature G9 are located east of the wetland. The LID will receive RDC sewer discharge via a proposed headwall. While the intent of the proposed augmentation system is to match runoff volumes to Feature G9, directing rooftop runoff has the potential to increase peak flows and velocities compared to existing conditions.

To dampen peak flows and reduce velocities, discharge from the proposed RDC sewer will outlet to a sub-surface level spreader (stone core wetland) and then overland to the feature. A scoped EIS will be prepared in support of the Detailed Design of this outlet. Refer to Figure 10-1 for the preliminary layout of the outlet for augmentation of Feature G9.

The MESPA describes that Feature G9 should be fed to match existing conditions by a combination of the TFPM Whitevale site as well as the Mattamy Whitevale West Site (on the west side of Peter Matthews Drive). During preliminary engineering of the Site and with correspondence with the City and TRCA, it was determined that the preference for Feature G9 was to eliminate the outlet on the west side from Whitevale West Development. As a result, the entire required augmentation (refer to Figure 10-1) balance will be satisfied by the TFPM Whitevale site.

10.2 LID Measures for Water Quality

There are no areas within the subject lands that require the use of LIDs for quality control as it is anticipated that all areas of the Site can adequately drain to a SWMF. The City has been clear in that LIDs, regardless of their intent for quality, or volume control, will not be credited toward quantity control volume requirements for the end-of-pipe SWMFs.

10.2.1 LID Measures for Recharge and Runoff Volume Reductions

The MESPA identified that LID measures are required to maintain overall groundwater recharge, provide surface water runoff volume reductions, and mitigate erosion in the developed areas. These LID measures are required to treat 5 mm of roof runoff for all roofs (or equivalent impervious area in the event some roof runoff cannot be captured) not needed for feature augmentation. Table 10.6 summarizes the volume control requirements.

Table 10.6: Volume Retention Requirements

Roof Drainage Ultimate Outlet	Number of Units	Total Roof Area (ha)	Infiltration volume Requirement (m^3)
SWMF 43	242.5	2.62	131.2

The following sections outline the strategy for the subject lands for both Municipal ROW and lot level drainage.

10.2.2 LID Measures for ROWs

The MESP stipulates that LID measures shall be considered for implementation on local roads that extend through, or directly abut the NHS. There is only one location on the Site where the road directly abuts the NHS, in the northwest corner. However, this location is not feasible to direct drainage to, as it is located at the highest point of the Site; therefore, a LID is not proposed at this location. The infiltration gallery proposed at the southeast corner of the Site (lowest area) has sufficient capacity to handle all infiltration requirements for the entire site.

10.2.3 Recharge / Runoff LID Strategies

For the Whitevale North TFPM residential lands, the following options and strategies have been considered for groundwater recharge and surface water volume reductions, and are presented in order of preference and suitability:

1. Centralized Infiltration Facilities.

2. Restoration of the Natural Heritage System Buffer (Enhancement / Planting).

3. Lot Level Infiltration Facilities / Rain Barrels for lots with frontages over 12 m.

Based on our preliminary discussions with the City and history working in the Seaton Community, we understand the acceptable practice for infiltration is to design LID facilities that provide the infiltration volume required, to meet the 5 mm target. Based on the Site topography and constrains, we propose that a centralized facility is the most suitable for this development.

10.2.3.1 Centralized LID Facility

A Centralized Infiltration Gallery (IG-43) located within the tableland NHS is proposed as the main recharge option. Generally, it is understood that the City prefers centralized facilities over lot-level controls. The preferred option for centralized IGs is that fed by SWMF discharge. Such facilities do not require an RDC third pipe system. The SWMF outlet will be designed to convey the equivalent 5 mm roof runoff volume for all TFPM Whitevale North. One facility is proposed, at the outfall of SWMF 43 to Urfe Creek, as shown on Figure 10-2.

The seasonally high groundwater in the location of the infiltration gallery has been approximated based on the high groundwater reading of BHTP-1 taken in July 2024 (180.40 m). The bottom of IGs should be a minimum of 1.0 m above the seasonally high groundwater level (MECP, 2003), the City requested that the bottom and sides be founded in native soil where possible. From correspondence with the TRCA this

1.0 m separation is a guideline and can be reduced depending on site conditions. A preliminary concept is shown on Figure 10-3. It should be noted that due to the City of Pickering requirement of the bottom and sides being founded in native soil the bottom of the proposed IG is located at approximately 181.10 m. Therefore, the separation to high groundwater level is 0.70 m. Detailed servicing specifications cleanout, and overflow pipe will be incorporated at Detailed Design stage. Additionally, infiltration testing will be required via test pits during the Detailed Design stage to refine percolation rates and drawdown calculations.

The infiltration calculations found in Appendix I demonstrated that the proposed location and sizing of IG-43 is adequate, the exact sizing will be completed at Detailed Design. Details of the proposed facility are provided in Table 10.7.

Table 10.7: Details of Proposed SWMF Effluent Fed-Centralized Infiltration Galleries

Infiltration Gallery	Location	Required Area (m^2)	Proposed Area (m^2)	Proposed Depth (m)	Proposed Volume (m^3)	Required volume (m^3)
IG-43	Southeast of SWMF 43	328	8 x 66.5	1.0	213	131.5

LEGEND

IG1
100 | 1.50

IG DRAINING ID

TOTAL ROOF AREA (Ha)

NUMBER OF UNITS WITHIN AREA

PROPOSED LID DRAINAGE AREA LIMIT

ROOF AREA TO HAVE 5mm STORM EVENT INFILTRATED IN PROVIDED CENTRALIZED LID FACILTY (IG 43)

ROOF AREA TO NHS FOR FEATURE WATER BALANCE AUGMENTATION (NO FILTRATION REQUIRED)

REAR ROOF AREA TO NHS (NO INFILTRATION REQUIREMENT)

PETER MATTHEWS DRIVE

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

IG43
242.5 | 2.62

IG44**
33.5 | 0.36

SWMF 43

A

B

8.0m BY 66.5m LONG INFILTRATION GALLERY (IG43) WITH PERFORATED PIPE
(REFER TO FIG 10.3 FOR DETAILS) WITH 4m ACCESS ROAD
IG TO BE FED FROM POND 43

** IG 43 HAS BEEN OVERSIZED TO INFILTRATE THE EQUAVILANT ROOFTOP AREA DRAINING TO POND 44 WITHIN THIS DEVELOPMENT

N

0 40 80 120 160
Metres

BURNSIDE

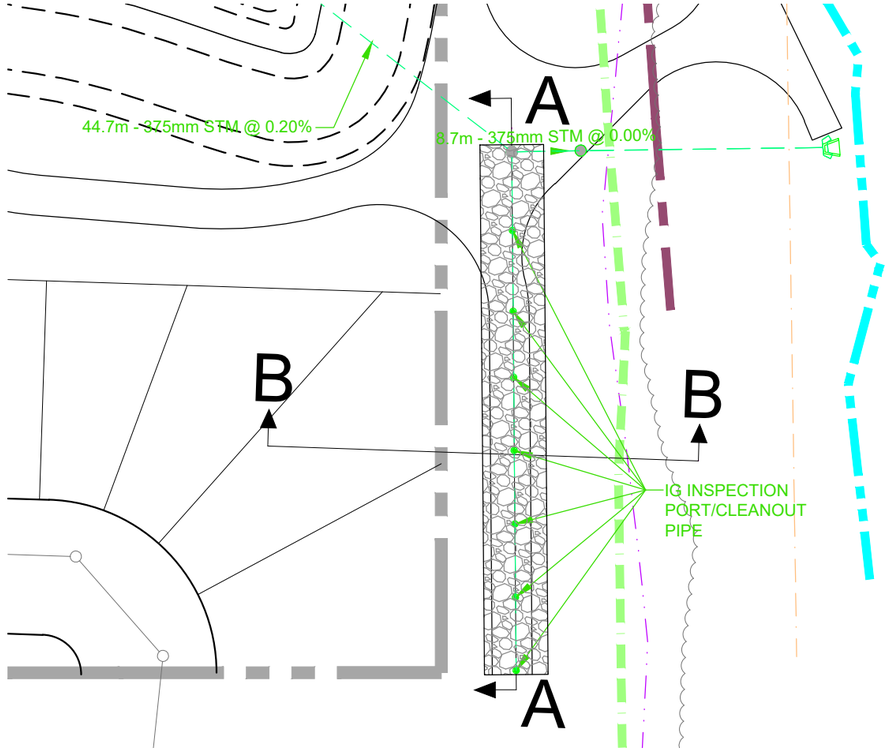
Figure Title
WHITEVALE TFPM DEVELOPMENT

CENTRALIZED LID FACILITY IG 43

Client
SEATON TFPM INC.

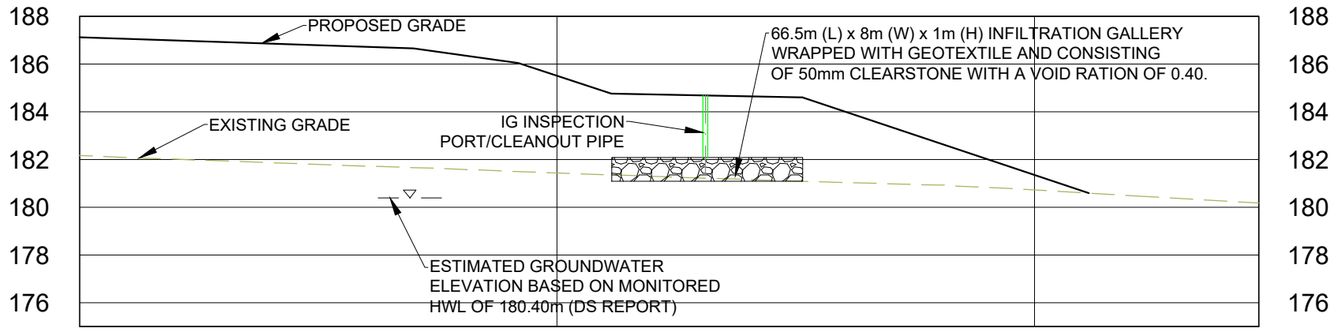
Drawn	Checked	Date	Figure No.
MH	SW	23/02/13	**10.2**
Scale		Project No.	
1:2,000		300043770	

File: \\BARKLEY\Shared Work Areas\043770 - TFPM Whitevale North FSR\02_ProductionDwg\043770_FSR_LID.dwg Date Plotted: September 18, 2024 - 11:58 AM



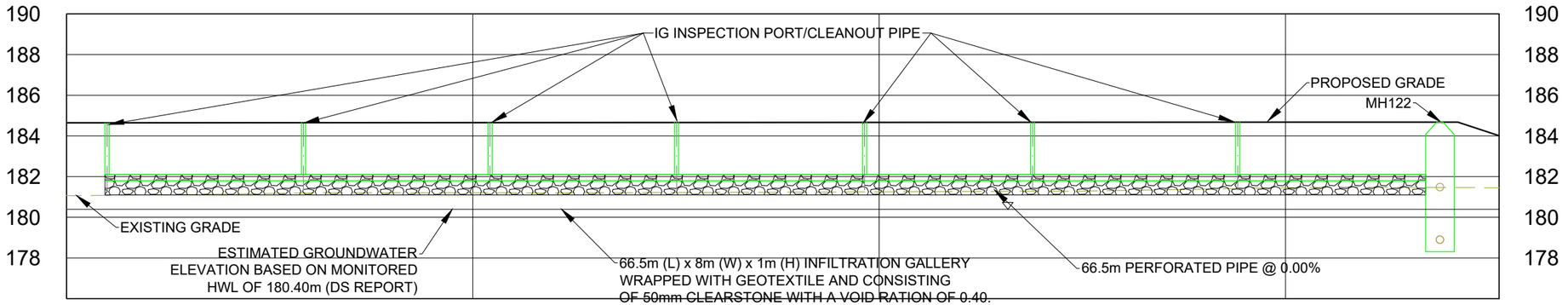
SECTION B-B

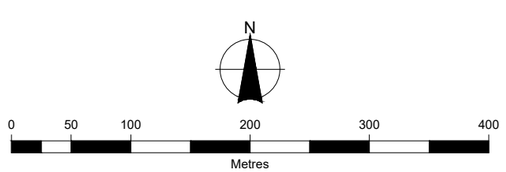
SCALE - 1:250



SECTION A-A

SCALE - 1:250





BURNSIDE

Client

SEATON TFPM INC.

Figure Title

WHITEVALE TFPM DEVELOPMENT

INFILTRATION GALLERY DETAILS

Drawn / Checked	Date	Figure No.
PH/MH/SD/AS HS/SW	18/12/12	**10.3**
Scale	Project No.	
AS NOTED	300043770	

11.0 Conclusions and Recommendations

As demonstrated herein, the Whitevale TFPM Subdivision lands can be developed in conformance with the agency standards and under the detailed framework established by the adopted Seaton MESPA.

A considerable amount of pre-consultation and analysis has already been completed to ensure that the Draft Plan of Subdivision adheres to all standards, and design preferences. We trust that this report is sufficient to support Draft Plan approval to allow the development to proceed with Detailed Design.

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Appendix A

Archaeological Study

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Appendix B

Geotechnical Reports

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Appendix C

Hydrogeological Assessment

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Appendix D

Feature Based Water Balance

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Appendix E

Environmental Input

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Appendix F

Diversion Swale

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Appendix G

Overland Conveyance

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Appendix H

Stormwater Management Calculations

Appendix I

Recharge Volume and LID Sizing Calculations

R.J. Burnside & Associates Limited