



Newcastle North Village Secondary Plan

Master Servicing Report

May 2023





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1. Introduction and Purpose

The purpose of the Master Servicing Report is to evaluate the impacts of the proposed development on Regional and Municipal servicing infrastructure and utilities.

The Phase 2 Master Servicing Report documents the servicing evaluation of the three (3) alternative Land Use Plans developed by the project team. The objective of the Master Servicing Report is to serve as a guide for establishing the servicing requirements for the Preferred Land Use Plan for the North Village Secondary Plan. The Master Servicing Report addresses the following infrastructure components of the planned development:

- Water supply for domestic and firefighting purposes;
- Sanitary servicing;
- Conceptual lot grading and storm drainage; and
- Stormwater management.

The following three (3) alternative land use plans were evaluated in the preparation of the Phase 2 Master Servicing Report:

- **Alternative 1 - Green Corridors + Community Courtyards:** Land Use Alternative 1 is defined by key green corridors through the neighbourhood, including Regional Road 17 and Street A, which create a welcoming and comfortable environment for all road users. These corridors link to destinations that integrate the neighbourhood with the approved area to the south. The plan is also defined by a distributed network of smaller open spaces that function as local gathering spaces, or courtyards, framed by surrounding development.
- **Alternative 2 - Four Corners + Green Corridors:** Land Use Alternative 2 uses a central hub and green corridors as its organizing elements and locations of greater activity and density. Importantly, Regional Road 17 is animated by creating a pedestrian-focused area around the four corners of the neighbourhood centre, which helps to enliven and urbanize the street.
- **Alternative 3 - Neighbourhood Centre + Promenade:** Land Use Alternative 3 provides a central hub of activity and density, organized around the neighbourhood centre and a linear promenade and park that are the focal point for community life. These are complemented by several distinct nodes for activity and interconnected linear parks, or “green fingers.”

Other background information reviewed and considered in the preparation of the Phase 2 report are as follows:

- Project File Report, Schedule B Municipal Class Environmental Assessment, Additional Zone 1 Water Storage and Zone 2 Water Pumping Station, Newcastle Urban Area by Stantec Consulting Limited dated Feb 25, 2021
- North Village Phase 1, Stormwater Management Report by GHD for Smooth Run Developments (Metrus) and Brookfield Homes (Ontario) Limited, dated Jan 2019



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- North Village Ph1 - Watermain Analysis Brief by GHD ref: 13271 200 (2821623) to the Region of Durham dated Nov 4, 2014
- Neighbourhood Plan – North Village Neighbourhood, Approved July 3, 2012;
- Functional Servicing Report, North Village Neighbourhood Plan, Village of Newcastle, prepared for Smooth Run Developments (Metrus) and Brookfield Homes (Ontario) Limited, prepared by Sernas Associates and dated September 2005, Revised April 2011;
- Functional Servicing and Stormwater Management Report, Proposed Subdivision Plan, Allin Property, North Village, Municipality of Clarington for Brookfield Homes (Ontario) Limited by GHD dated August 2017
- Available contour mapping of the study area;
- Region of Durham Sanitary Sewer Mapping;
- Region of Durham Water Distribution Mapping;
- Region of Durham, 2018 Development Charge Background Study, Appendix F – Regional Water Supply;
- Region of Durham, 2018 Development Charge Background Study, Appendix G – Regional Sanitary Sewage; and
- Recommended Water Servicing Solution as captured in the Municipal Class Environmental Assessment, hereafter referred to as MCEA, PIC Panels date April 9, 2019 for the Additional Water Storage and Pumping Capacity for Newcastle Urban Area prepared by Stantec.

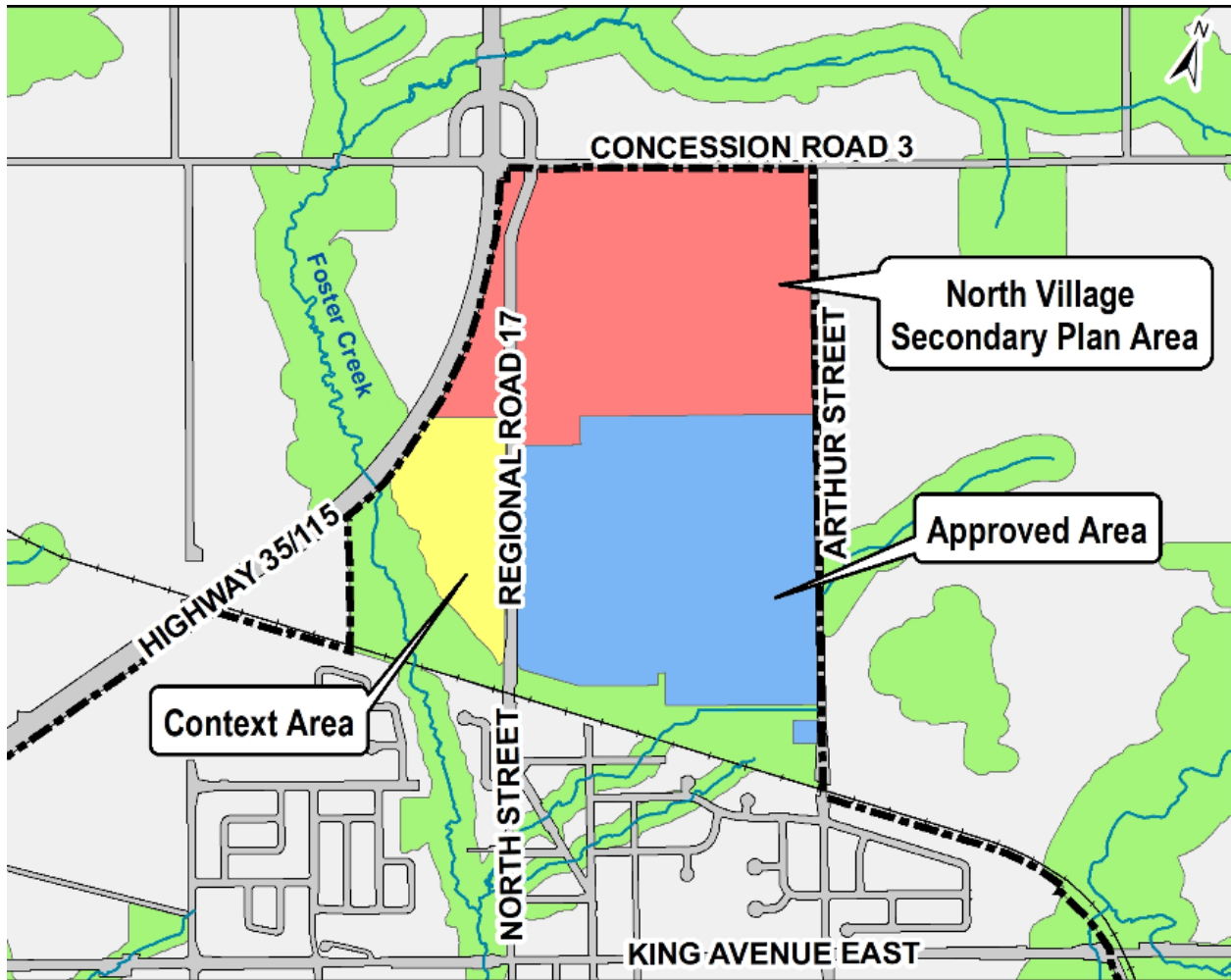
In addition to reviewing the above information, AECOM met with the Region of Durham Work's Department Staff on January 15th, 2020 to discuss the planned water / sanitary infrastructure improvements needed to facilitate the development of the Study Area's shown in **Figure 1** on the following page.

For the purpose of clarity, the Project Team will be using the following terms to describe the “study area”.

- North Village Secondary Plan Area = ‘Project Area’
- North Village Secondary Plan Area + Draft Approved Subdivision Area (Approved Area) + Context Area = ‘Study Area’



Figure 1: Study Area





2. Water Supply

The Region of Durham owns and operates the Newcastle Drinking Water Supply System. The following sections of the report describe the existing conditions and planned improvements to the water supply and distribution system.

2.1. Existing Conditions

The Newcastle Drinking Water Supply System provides municipal water service to the Newcastle Urban Area, as well as the Brownsville, Newtonville, and Wilmot Creek communities. The existing Newcastle Service Area is serviced by a large water pressure zone (PZ1), including 1 water storage reservoir located in the Study Area. Two existing booster pumping stations boost water pressure for localized servicing south and east of the study area.

The existing Newcastle Water Pressure Zone (PZ1) is controlled by means of floating storage at the Arthur Street Reservoir located in the Study Area. The existing reservoir is over 40 years old and in good to fair condition and provides enough water storage for the existing population (approx. 9,200 ppl).

Growth within Water Pressure Zone 1 is constrained by elevation contour 105 metres, based on minimum fire protection needs.

Establishment of a new Water pressure zone (PZ2) is needed to address the existing service deficiencies and facilitate future growth in areas of higher elevation in the Newcastle Urban Boundary.

The following table provides a summary of the Approximate Population Projections for the service area of the Newcastle Drinking Water system.

Table 1: Summary of Approximate Population Projections

Area	Existing Population	Newcastle Urban Area (2031)	Lands Beyond Urban Boundary (Long Range)
Newcastle	9,200	23,005	90,040
Newtonville	660	660	660
Wilmot Creek	1,645	1,645	1,645
Total	11,505	25,310	92,345

Source: PIC Panels, MECA for Additional Water Storage and Pumping Capacity for Newcastle Urban Area (April 9, 2019)

AECOM discussed the planned service population for the North Village Neighbourhood Plan lands and the Region advised that their expectation is that the Project Area will have a similar density as the Draft Plan Approved lands within the Study Area. Based on the Neighbourhood Plan – North Village Neighbourhood, Approved July 3, 2012, we estimated the unit count of the Project Area to be approximately 950 units.



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The range in the unit counts being considered by each of three Land Use Alternatives being evaluated in the Phase 2 report is as follows:

- Land Use Alternative 1 - lower end = 567 units / upper end = 1,432 units
- Land Use Alternative 2 - lower end = 625 units / upper end = 1,616 units
- Land Use Alternative 3 - lower end = 618 units / upper end = 1,666 units

Refer to **Figure 2** for the existing watermain conditions within and surrounding the Project Area.

2.2.Planned Improvements

Water Supply - Storage / Pumping

The Region completed a Schedule B Municipal Class Environmental Assessment (MCEA) for Additional Zone 1 Water Storage and Zone 2 Water Pumping Station Capacity for the Newcastle Urban Area. The notice of study completion was issued on February 25, 2021. A copy of the Project File Report is available on the Regions website and can be viewed and downloaded by accessing the following link:
<https://maps.durham.ca/PublicWorksMap/default.html>

The preferred water supply solution is located in the North Village Secondary Plan study area with frontage on Arthur Street and the preferred solution includes:

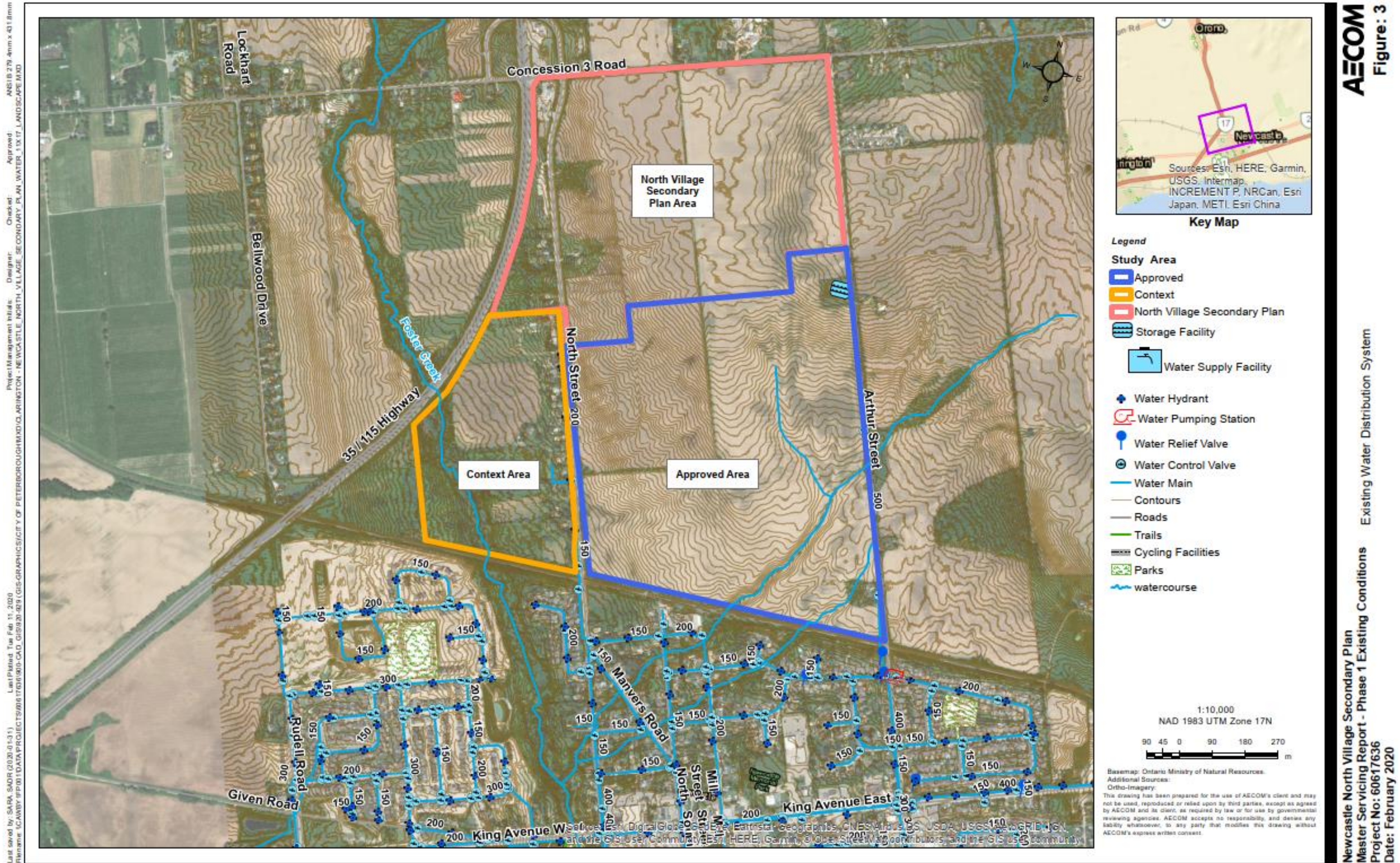
- One new pumping station and one new reservoir located on the North Village Secondary Plan lands;
- Ancillary features, including stormwater management, sanitary servicing and staff parking;
- Site grading which will accommodate a partially in-ground storage reservoir to mitigate aesthetic impacts where practical; and
- Adequate space to allow for expansion to the facility, if required in the future and subject to further review of estimated growth projections.

The Region selected the preferred solution on the basis that:

- The site is located within the Newcastle Urban Area and is close to existing servicing infrastructure
- It is a suitable size and configuration that is capable of accommodating existing and future population growth
- The site has the lowest potential impact to existing residents in the study area (social)
- The site has the highest potential to avoid impacts to the natural and cultural environments.

The Project File Report acknowledges that the property owner has not confirmed the final configuration and/or distribution of lands (e.g., residential lots, etc.) within the plan area and that the Region will continue to work with the property owner to confirm the precise location and limits of the preferred site.

Figure 2: Existing Water Distribution System



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Figure 3

Newcastle North Village Secondary Plan
Master Servicing Report - Phase 1 Existing Conditions
Project No: 60617636
Date: February 2020
Existing Water Distribution System

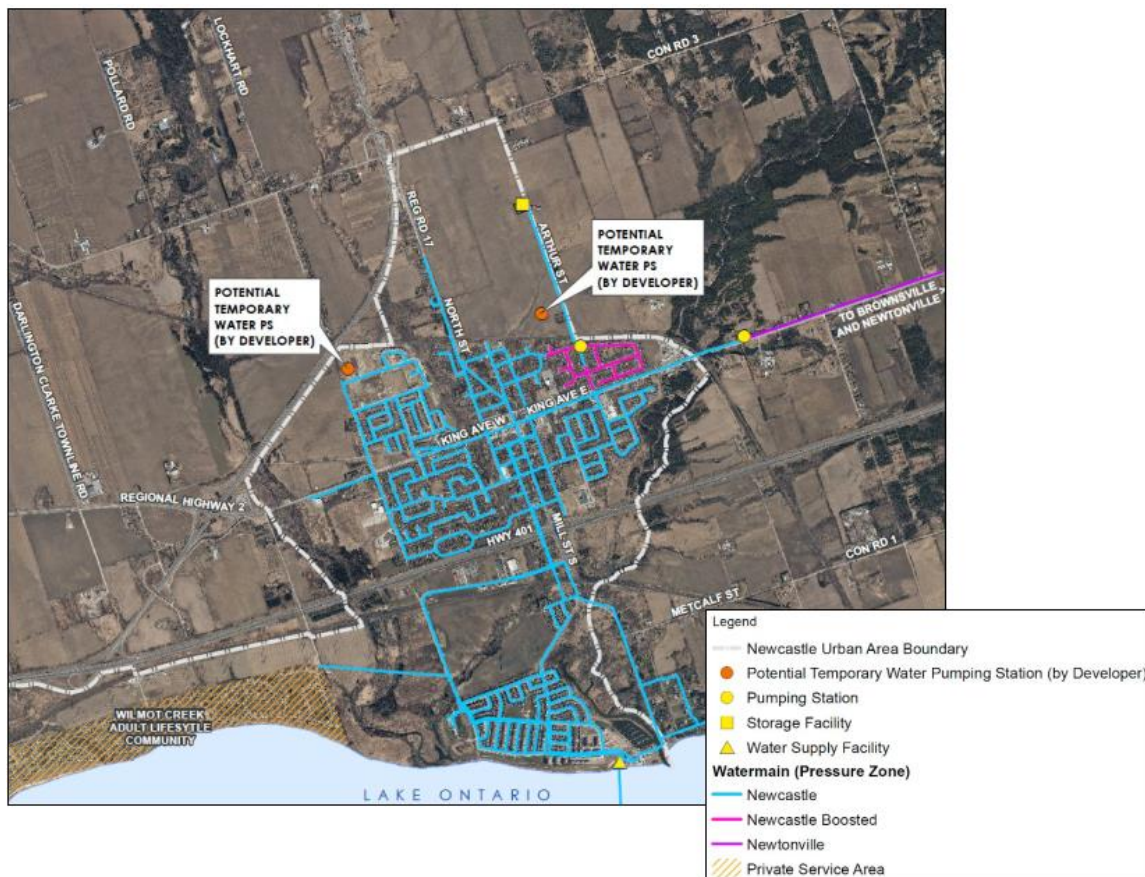


Section 6.3 of the Project File Report identifies additional servicing considerations that will need to be integrated into the planning and design of the storm and sanitary servicing infrastructure on the adjacent future development of the North Village Secondary Plan lands.

Section 6.4 of the Project File Report acknowledges the potential need for temporary pumping stations in the event the Zone 2 Water Pumping Station is not constructed early enough to service the development of the Approved Area, the North Village Secondary Plan Area or the Context Area as shown on **Figure 1**, Study Area. To address the potential timing issue the Region has agreed to allow the developers on their own lands and at their own costs to construct temporary water pumping stations as shown in **Figure 3**. The conditions for allowing such temporary facilities are as follows:

- Two small temporary pumping facilities may be constructed by the developers on their lands at their own cost, and will be removed once the Zone 2 Water Pumping Station is operational;
- The designs for these facilities will be subject to review and approval as part of the Plan of Subdivision process; and
- These temporary facilities will not have back up power. In the event of a power outage, water pressure and fire protection will be provided by a connection to Water Pressure Zone 1.

Figure 3: Potential Temporary Water Pumping Station





Water Supply - Treatment

The Newcastle Water Supply Plant (WSP) is a surface water treatment facility, having current treatment capacity of 8,200 cubic metres per day and it is currently being expanded to a capacity of 16,400 cubic metres per day. Construction of the expansion commenced in 2020 and it is expected to be completed by the fall of 2023.

The plant expansion is required to facilitate build out of the Newcastle Urban Area. Allocation of capacity to Development Applications is subject to the Region's servicing allocations policy whereby capacity is allocated at the time of signing the development agreement.

Water Supply – Conveyance

The water supply will be conveyed to the Study Area by means of new distribution watermains extending north from the existing water supply network along both North Street and Arthur Street.

There is an existing 150 millimetres watermain along North Street that will be replaced with new 400 millimetres / 300 millimetres watermains along North Street from Wilmot Street to Concession Road 3. These improvements will be implemented during the detailed design and construction of the planned development in the Study Area.



3. Sanitary Sewer

3.1. Existing Conditions

Sanitary Conveyance

There are no existing sanitary sewers servicing the study area. Refer to **Figure 4**.

Wastewater Treatment Plant Capacity

The expansion of the Newcastle Water Pollution Control Plant is required to facilitate the allocation of capacity to the planned development.

3.2. Planned Improvements

Sanitary Conveyance

Sanitary servicing of the Study Area will be provided by means of extending the existing 675 millimetres Trunk Sanitary Sewer (TSS) on North St from Wilmot Street northward to approximately the north limit of the Draft Plan Approved lands in the Study Area. A minimum 450 millimetres sanitary sewer will be required northward along the remainder of North Street to Concession Road 3. The sanitary sewer construction will be implemented with the detailed design and construction of the plans of subdivisions in the Study Area with the Region being responsible for oversizing needs. It is anticipated that the Trunk Sanitary Sewer along North St may be designed and constructed in 2023.

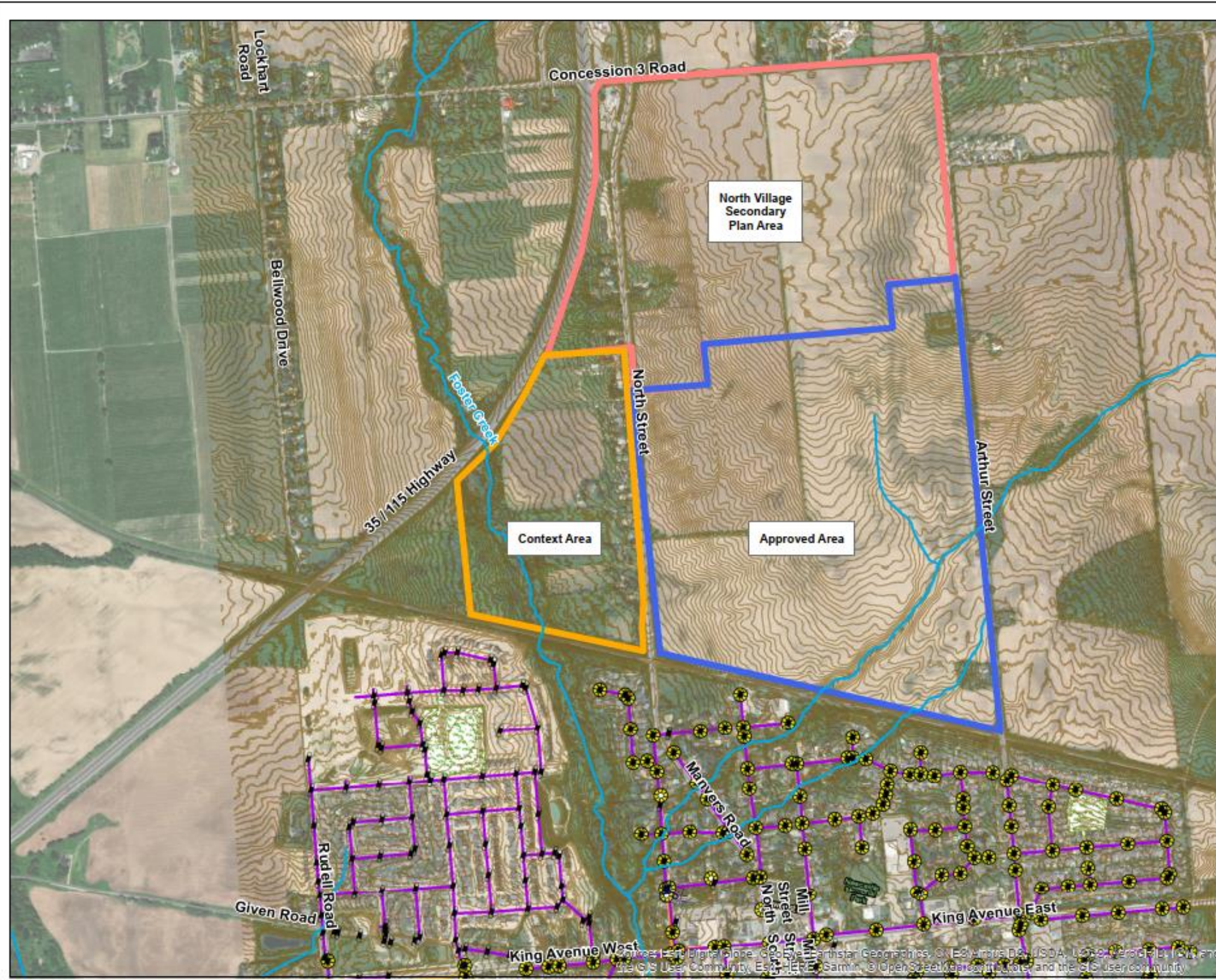
The design of the extension of the Trunk Sanitary Sewer northward will include a future connection at elevation 92.25 metres to service the “Context Area” lands on the west side of North Street.

The reviewed Functional Servicing Report for the North Neighbourhood Lands speaks to the need for a deep east – west sanitary sewer located within the southern end of the “Draft Plan Approved” Study Area for the purpose of servicing future development east of Arthur Street, north of the CPR and south the Concession Road 3. The detailed design of the deep sub-trunk and the means of connecting the local sewage loadings will be completed during the subdivision approval process for the Draft Plan Approved lands.

There is a future development area of 166 hectares, including a total population of 9,960 people, located east of Arthur Street that is to be captured and accommodated within the Brookfield/DG Group lands and outlet to the planned sanitary sewer on North Street (RR 17) as noted in the Region’s first submission comments provided to DG Group on Aug. 6/15. The sanitary sewer design to be completed in support of the DG Group development lands and the sanitary sewer will need to be lowered on future Street A to accommodate these external sanitary flows.

Figure 4: Existing Sanitary Sewer System

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 Project Management Initials: Designer: Checked: Approved: AUSA: B.279-dmm x 431.8mm
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Key Map

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China

Legend

Study Area

- Approved Area
- Context Area
- North Village Secondary Plan

San Chamber

- ◆ REGIONAL SAN WWT Facility
- PS REGIONAL SAN Pumping Station
- REGIONAL SAN Manhole
- San Manhole
- SAN Inlet/Outlet Structure
- REGIONAL SAN Chamber
- REGIONAL Gravity Sewer
- REGIONAL ForceMain

Other Features

- Parks
- Cycling Facilities
- Contours
- Roads
- ~ watercourse

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Basemap: Ontario Ministry of Natural Resources.
 Additional Sources:
 Ortho-imagery:
 This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM's express written consent.

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 Figure: 4
 Newcastle North Village Secondary Plan
 Master Servicing Report - Phase 1 Existing Conditions
 Project No: 60617636
 Date: February 2020
 Existing Sanitary Sewer System



Wastewater Treatment Plant Capacity

The Region is in the process of completing a Class EA addendum process for the Newcastle WPCP capacity re-rating and upgrades. The Region has identified the recommendations for a preferred solution and will confirm the preferred alternative solution based on feedback from the public and stakeholders and a Project File Report will be prepared to document the decision making process and it will be filed for a 30 day public review period. Once the Class EA Addendum process has been completed the Region will work on the detailed design of the various upgrades and modifications to support the re-rating of the WPCP. Construction of the upgrades will follow the completion of the design. The recommended re-rated capacity of the Newcastle WPCP for Stage 2 includes:

- An average day flow of 7,200 cubic metres per day
- A peak day flow of 21,600 cubic metres per day
- And a peak hourly flow of 33,800 cubic metres per day

The timing of the completion of the various upgrades will be implemented in stages with planned completion date of 2027. Allocation of capacity to Development Applications is subject to the Region's servicing allocations policy whereby capacity is allocated at the time of signing the development agreement.



4. Conceptual Lot Grading and Storm Drainage

4.1. Existing Conditions

The Study Area is generally undeveloped with the exception of the residential lots located on the west side of North Street and a residential lot on the west side of Arthur Street north of the CPR tracks. Refer to **Figure 5**.

The topographic relief within the Study Area generally varies from 3% to 7% and as noted in the Functional Servicing Report (FSR) it is anticipated that site grading operations will result in a surplus of material to be managed on site. There is an opportunity to utilize this surplus material to construct a berm along the north side of the CPR tracks as shown on the Functional Grading Plan of the FSR.

The Approved Area to the south of the North Village Secondary Plan area is currently being rough graded.

4.2. Planned Improvement

For the Approved Area, as shown in **Figure 1**, the Functional Servicing Report notes that normal lot grading types are expected with the majority of the lots being either rear-to-front or split drainage. The Functional Servicing Report also notes that there will be a large number of walk-out and back split lots in the middle and southern boundaries of the neighbourhood and the occasional front walkout in isolated areas.

The following considerations should be given to the detail design of the lot grading and drainage as means to mitigate the risk of water ponding for durations greater than 24 hours and enhance informal infiltration opportunities.

- On split drainage lots implement dry well (soakaway) features to enhance infiltration and mitigate risk of nuisance drainage condition.
- For split drainage lots backing onto rear to front drainage lots side yard lots should line up to mitigate risk of nuisance drainage complaints.
- On roads with grades approaching 4% and greater provide wider side yard building setbacks on the low side of rear to front drainage lots to facilitate construction of a swale.
- Provide informal dry well (soakaway) features at the outlet of all swales (on private property).
- Ensure Low Impact Development Measures and drainage swales will not have standing water for more than 24 hours by either designing with known geotechnical / groundwater conditions or providing subdrainage systems to achieve the objective.



5. Stormwater Management

5.1. Existing Conditions

The Study Area is serviced by four drainage areas as shown in **Figure 5**.

Drainage Areas 1 and 2 are being managed by planned Storm Water Management facilities located in the Draft Plan Approved lands of the Study Area. The planned Storm Water Management facilities will be sized to manage the runoff from both the Approved Lands and the North Village Secondary Plan Lands, as shown in **Figure 5**.

It is understood that there is an existing sedimentation deposition issue occurring at the existing culvert under North Street, north of the railway tracks, that services Drainage Area 1. Upon review of the contributing drainage to this existing culvert it is probable that the source of the sediment is the agricultural operations on the Secondary Plan lands. The planned development of the secondary plan lands will correct the erosion processes and the subsequent deposition of sediment at the existing culvert by means of providing a stable land use cover and the provision of Storm Water Management facilities with sediment retention capabilities. It is recommended that the Development Agreements include conditions requiring the Developers to remove existing sediment deposits to restore the capacity of the existing culvert and monitor / remove additional deposition at the existing culvert during construction of the development through to assumption of the various developments. It is acknowledged that that this condition, given multiple developers, may best be addressed by the Municipality retaining a Contractor to clean out the sediment and recover costs by means of a cost sharing agreement.

Drainage Area 3 is located in the Draft Plan Approved lands and it has a natural watercourse feature in it that services an external drainage area on the east side of Arthur Street. The Developer of the Draft Plan of Subdivision is responsible for providing a sufficient drainage conveyance system for this existing drainage condition.

Drainage Area 4 is located in the Project Area Lands and outlets across private property to the north of Concession Road 3. The capacity of the existing drainage swale located on private property and servicing the Project Area is unknown and field investigations should be completed to assess the sufficiency of this existing to receive and convey drainage from the Project Area. Key to decision-making in this regard is determining if this existing drainage swale is considered a “natural watercourse” and as such subject to Riparian Rights of Drainage that extend onto the Project Area.

The Context Area on the west side of North Street, as shown on **Figure 5**, consist of the following:

- Environmental Protection lands associated with Foster Creek and it’s floodplain forming the west boundary
- Agricultural lands located between Foster Creek and North Street; and
- Residential lots located along the west of North Street.

The Context Area topography slopes from east to west and conveys runoff to Foster Creek by means of sheet drainage. The residential lots fronting on the west of North Street drain to the existing ditch along North Street which collects and conveys this drainage south to the existing drainage channel located along the north side of the railway corridor. All of the Context Area outlets to the existing Foster Creek



culvert crossing the railway corridor. No change in land use is planned as part of this study and as such there is no need for further assessment of drainage impacts on the Context Area.

5.2.Planned Improvements

The Functional Servicing Report for the Approved Area land, shown on **Figure 5**, concluded that two Storm Water Management facilities will be designed by the Developer(s) to provide quantity control, quality control and erosion control measures for both the Approved Lands and the North Village Secondary Plan Area, as shown on **Figure 5**. One Storm Water Management facility will service Drainage Area 1 and the other Storm Water Management facility will service Drainage Area 2 as shown on **Figure 5**.

Water balance and Low Impact Development requirements will need to be incorporated in the design of both the Approved Lands as well as the North Village Secondary Plan lands, as shown in **Figure 1**, to industry standards to provide a best effort approach in regard to Low Impact Development measures approvable by the Municipality and the Ganaraska Region Conservation Authority.

The approach to managing the site drainage from Drainage Area 4 should be as follows:

- The developer shall obtain a legal opinion that Drainage Area 4 has Riparian Rights of Drainage onto the downstream lands. Upon confirmation of Riparian Rights of Drainage then maintain pre-development drainage conditions for both peak flow and volume of runoff;
- In the event that Riparian Rights of Drainage do not extend onto Drainage Area 4, then the developer shall either into an agreement for the conveyance across the downstream lands or find a new sufficient drainage out.
- Reference to Ganaraska Region Conservation Authority's Technical and Engineering Stormwater Management Submissions document shall be made during the design of the planned Storm Water Management / Low Impact Development measures.

Major Storm Overflow Condition:

The Municipality's drainage guidelines limit the depth of the major storm overland flow on their major storm overland flow routes to not encroach onto private property and that the depth of water at centreline of the Collector Roads to not exceed 0.15 metres.

Given the location of the Storm Water Management ponds at the south end of the Study Area the planned roads and major storm conveyance blocks may be receiving considerable major storm flows and detailed calculations will be required to ensure the Municipal Guidelines will be achieved by the Developers Design Consultant.



6. Alternative Land Use Plans

6.1. Concept Development Considerations

The following vision and guiding principles were developed by SvN Architects + Planners and form the core tenets for the land use development concepts for the North Village Secondary Plan area.

A Liveable Neighbourhood

- Provide a mix of housing options that are available to a wide range of ages, abilities, incomes, and household sizes.
- Provide an appropriate mix of uses, amenities, and services at the heart of the neighbourhood to encourage active, sociable lives and support a sense of well-being and connection.
- Provide a range of community facilities and co-locate these facilities where possible.

A Connected Neighbourhood

- Prioritize pedestrian mobility and comfort by designing a neighbourhood that is well connected internally and provides safe and walkable links to surrounding neighbourhoods.
- Design the movement network to safely and comfortably accommodate all modes of travel (pedestrians, cyclists, transit vehicles, loading and private vehicles).

A Beautiful and Inviting Neighbourhood

- Design a variety of open spaces linked by a beautiful and functional public realm.
- Encourage a high standard of design.
- Utilize the existing topography to optimize views of the surrounding areas.

A Resilient Neighbourhood

- Minimize contribution to climate change by incorporating green design principles related to energy, water, and waste at the building and neighbourhood scale.
- Where economically feasible, utilize materials from sustainable sources for construction and infrastructure projects, account for positive and negative life-cycle impacts of materials when assessing their contribution.
- Integrate indigenous and pollinator-friendly species into the development.
- Support resilience and future adaptability by designing homes and buildings to accommodate different uses and densities with diverse unit configurations.

A Unique Newcastle Neighbourhood

- Foster a unique identity by celebrating the rural heritage of the area.
- Engage the Newcastle community in planning the future of North Village

From a servicing perspective, the key guiding principal is to achieve a resilient neighbourhood by minimizing the contribution to climate change by incorporating green design principles related to energy, water, and waste at the building and neighbourhood scale.



The alternative land use plan that best achieves this guiding principal is the alternative that:

1. Provides the most opportunity to implement the use of green infrastructure comprised of Low Impact Development measures; and
2. Provides the most opportunity to mitigate impacts on downstream receiving drainage outlets.

A variety of alternative land use concepts based on the above land use planning tenets were developed by the project team and the following servicing needs and conditions were considered in the preparation of the three land use concepts.

- **Watermain Infrastructure**

- The constraints and opportunities for the implementation of watermain infrastructure will be similar for the potential concepts;
- The reservoir location and size is fixed for all potential concepts;
- The concept with highest unit count per kilometre of road would be the preferred alternative.

- **Sanitary Sewer Infrastructure**

- The constraints and opportunities for the implementation of watermain infrastructure will be similar for the potential concepts;
- The concept with highest unit count per kilometre of road would be the preferred alternative; and
- The “Approved Lands “ to the south provide the sanitary outlets for the North Village Secondary Plan . The Functional Servicing Report for the “Approved Lands” assumed the service population for the North Village Secondary Plan would be 2,100 persons. The sanitary conveyance capacity of the sanitary sewers planned for the “Approved Lands” and servicing the North Village Secondary Plan lands may be a constraint to achieving the upper range of the population estimates of the North Village Secondary Plan.

- **Storm Sewer Infrastructure**

- The Master Servicing Report – Existing Conditions dated May 6, 2020 identified a small drainage area (Drainage Area 4 on **Figure 5** of the Master Servicing Report) that currently provides an outlet for the northeast corner of the North Village Secondary Plan and Concession Road 3. The objective will be to minimize the size of this contributing drainage to the extent possible through the detailed design phase of the North Village Secondary Plan. The alternative that provides the largest area of open space / park directly connected to the culvert on the 3rd Concession, so as to provide opportunity to implement the Storm Water Management measures needed to mitigate the impacts in the change of land use would be the preferred alternative.
- The concept with highest unit count per kilometre of road would be the preferred alternative.
- The NSVP will be serviced by two planned Storm Water Management Facilities located on the “Approved Lands” to the south. The Functional Servicing Report for



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the “Approved Lands” specify that the east Storm Water Management Facility will receive 24.08 Hectares of the North Village Secondary Plan at a runoff coefficient of $C = 0.60$. The west SWM Facility will receive 22.63 Hectares of the North Village Secondary Plan at a runoff coefficient of $C = 0.60$. The alternative with the lowest runoff coefficient would be preferred alternative.

- The total area of the North Village Secondary Plan is approximately 52.8 Hectares. The Functional Servicing Report for the “Approved Lands” specify that 46.7 Hectares of the North Village Secondary Plan will be serviced by the storm sewers and major storm overland routes on the “Approved Lands”. The remaining 6.1 Hectares is related to the area in the northeast corner of the North Village Secondary Plan that drains to the existing outlet under Concession Road 3. Approximately 12.1 Hectares of the existing condition North Village Secondary Plan lands drain to the outlet on Concession Road 3. The alternative that provides the largest area of open space / park directly connected to the culvert on the 3rd Concession, so as to provide opportunity to implement the Storm Water Management measures needed to mitigate the impacts in the change of land use would be the preferred alternative.

- **Low Impact Development (LID) Measures**

- Opportunities to implement Low Impact Development measures are directly correlated to the following infrastructure / land use being implemented in the development of alternatives:
 - Length of roads
 - Length of Green Linkages
 - Length of Green Blvds / Enhanced Medians
 - Park Area
- The alternative with the longest length of each of the above infrastructure / land use features would be considered the preferred alternative.
- The opportunity to implement Low Impact Development measures is also conditional upon soil and groundwater conditions and if the Low Impact Development measure can operate with filtration benefits by means of a subdrain system connected to an existing storm or daylighted to existing open drainage feature (swale, ditch watercourse). This is generally not known until the planning and approval processes for land development are at the draft plan / detailed design phases of the approval process. The following table identifies the opportunities for the implementation of Low Impact Development measures.



Table 2: Opportunities for the Implementation of Low Impact Development (LID) Measures

LID Functions	Col 1	Col 2	Col 3	Col 4	Col 5	Col 5	Col 6	Col 7
	LID Subdrain Can Outlet to Storm Drainage System		Compliant Soil Conditions			Compliant Groundwater Conditions		
	Yes	No	Unkown	No	Yes	Unkown	No	Yes
Storage Above Grade								
Storage Below Grade								
Filtration to Storm Sewer		n/a						
Infiltration to Native Soils								
		Implementation of LID function is feasible						
		Implementation of LID function is subject to other conditions making the function feasible.						

6.2. Servicing Evaluation of Alternatives

The Project Team developed the following three alternative land use plans for evaluation.

Alternative 1 - Green Corridors + Community Courtyards: Alternative 1 is defined by key green corridors through the neighbourhood, including Regional Road 17 and Street A, which create a welcoming and comfortable environment for all road users. These corridors link to destinations that integrate the neighbourhood with the approved area to the south. The plan is also defined by a distributed network of smaller open spaces that function as local gathering spaces, or courtyards, framed by surrounding development.



Figure 6: Alternative 1 - Green Corridors + Community Courtyards

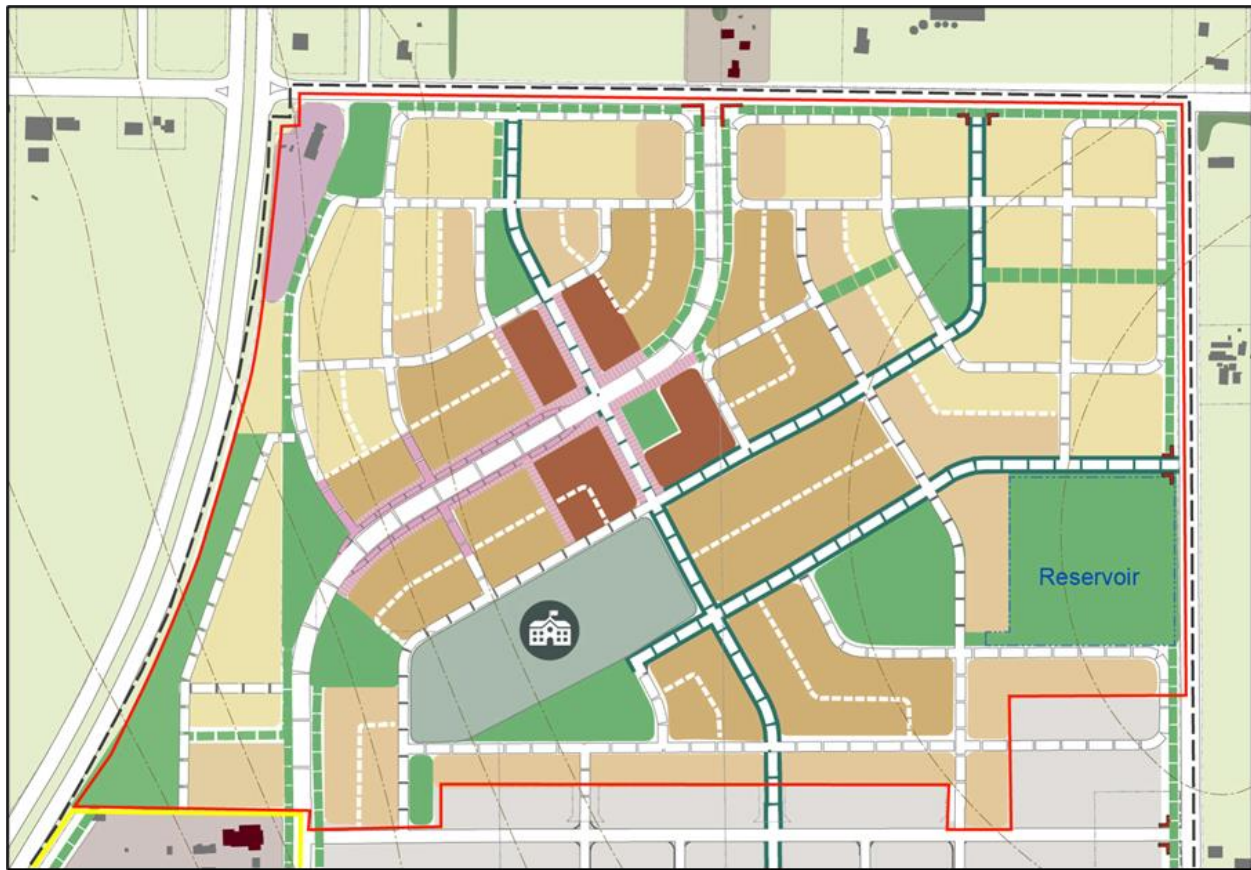


<p>Boundaries</p> <ul style="list-style-type: none"> Study Area Project Area Context Area <p>Existing Context</p> <ul style="list-style-type: none"> Contours Woods Property Line Existing Building Existing Building of Cultural Significance 	<p>Public Realm</p> <ul style="list-style-type: none"> Arterial Road Collector Road with Bike Lanes Local Street Potential Rear Lane Green Boulevard / Enhanced Median Promenade Green Link Gateways Park 	<p>Land Uses</p> <ul style="list-style-type: none"> Low Density Residential Low Density Residential Plus Medium Density Residential Neighbourhood Centre / Mixed Use Highway Commercial School
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Alternative 2 - Four Corners + Green Corridors: Land Use Alternative 2 uses a central hub and green corridors as its organizing elements and locations of greater activity and density. Importantly, Regional Road 17 is animated by creating a pedestrian-focused area around the four corners of the neighbourhood centre, which helps to enliven and urbanize the street



Figure 7: Alternative 2 - Four Corners + Green Corridors

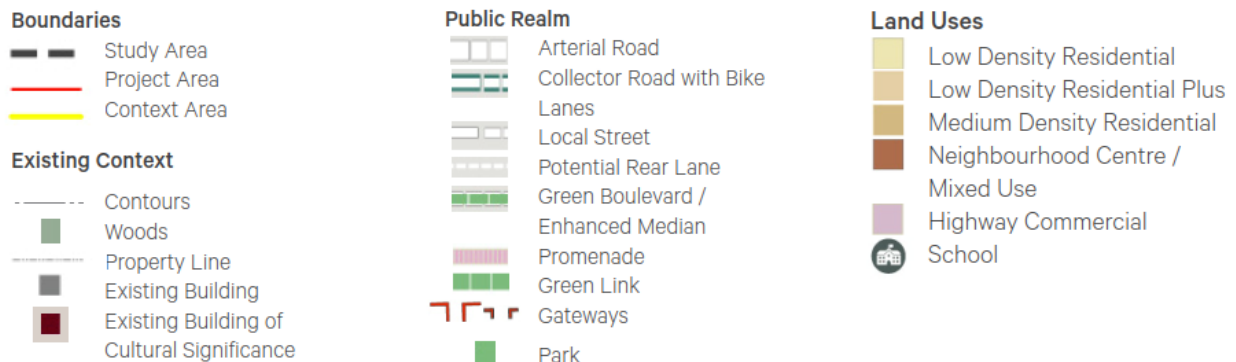
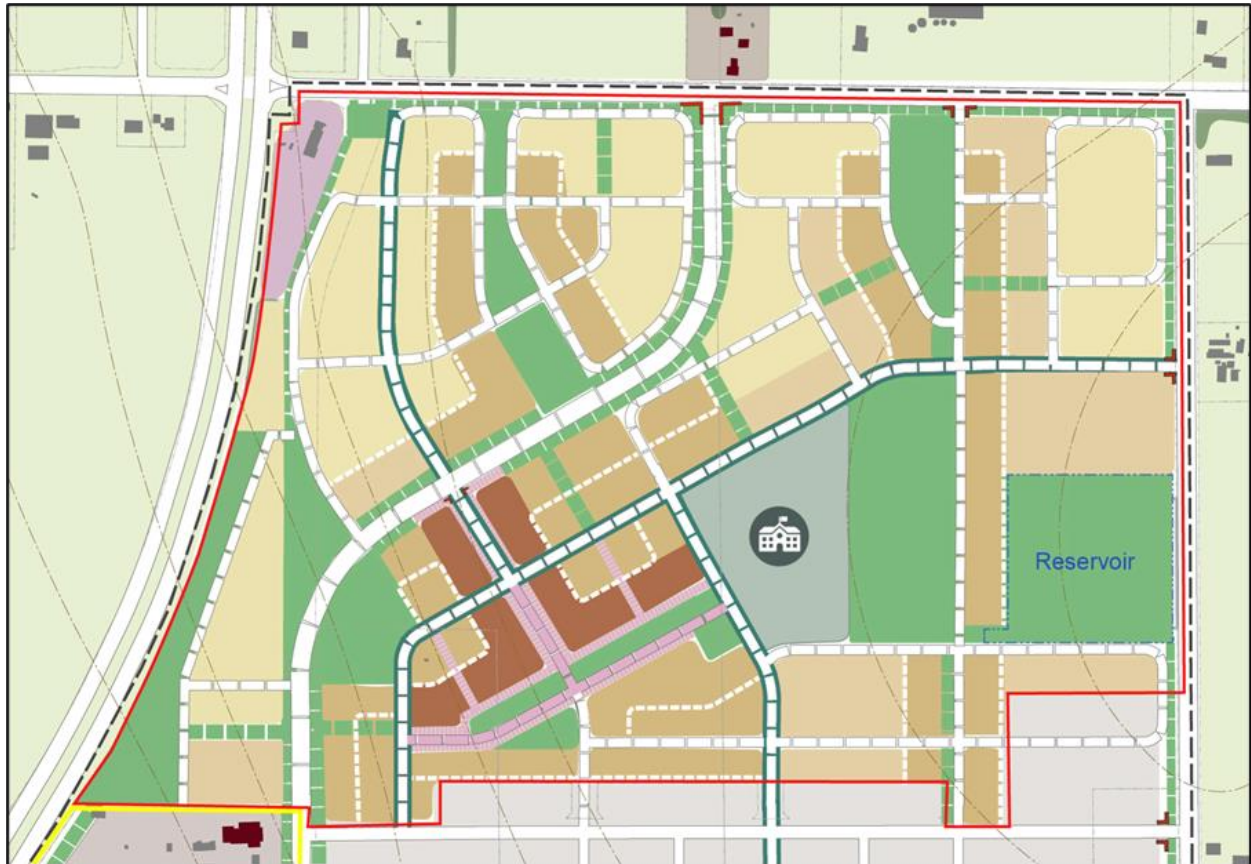


Boundaries	Public Realm	Land Uses
Study Area	Arterial Road	Low Density Residential
Project Area	Collector Road with Bike Lanes	Low Density Residential Plus
Context Area	Local Street	Medium Density Residential
Existing Context	Potential Rear Lane	Neighbourhood Centre / Mixed Use
Contours	Green Boulevard / Enhanced Median	Highway Commercial
Woods	Promenade	School
Property Line	Green Link	
Existing Building	Gateways	
Existing Building of Cultural Significance	Park	



Alternative 3 - Neighbourhood Centre + Promenade: Alternative 3 provides a central hub of activity and density, organized around the neighbourhood centre and a linear promenade and park that are the focal point for community life. These are complemented by several distinct nodes for activity and interconnected linear parks, or “green fingers.”

Figure 8: Alternative 3 - Neighbourhood Centre + Promenade





North Village Secondary Plan
Master Servicing Report – Final Land Use Plan

We completed the servicing evaluation of the above three alternatives based on the evaluation criteria identified in Section 6.1 Concept Development Considerations.

We compared the three alternatives to determine which of the alternatives had the lowest runoff coefficient based on the planned use. It was determined that all three alternatives had the same runoff coefficient of $C = 0.56$ which was compliant with the target of $C = 0.60$ as captured in the Functional Servicing Report for the “Approved Lands”. The follow table captures the assessment.

Table 3: Evaluation of Land Use Alternatives for Compliance with Runoff Coefficient Objectives

Land Use	Land Use Alternative 1			Land Use Alternative 2			Land Use Alternative 3		
	Area (Ha)	C	C x A	Area (Ha)	C	C x A	Area (Ha)	C	C x A
Arterial/Collector Roads	6.73	0.80	5.38	6.6	0.80	5.28	7.29	0.80	5.83
Road Widening	1.34	0.50	0.67	1.34	0.50	0.67	1.34	0.50	0.67
Parks	5.05	0.20	1.01	4.83	0.20	0.97	6.01	0.20	1.20
Water Reservoir	2.37	0.20	0.47	2.37	0.20	0.47	2.37	0.20	0.47
Elementary School	2.72	0.70	1.90	2.59	0.70	1.81	2.67	0.70	1.87
Low-Density Residential	14.56	0.50	7.28	10.43	0.50	5.22	10.63	0.50	5.32
Low-Density Residential +	9.22	0.50	4.61	11.77	0.50	5.89	8.26	0.50	4.13
Medium Density Residential	7.06	0.65	4.59	9.95	0.65	6.47	11.4	0.65	7.41
Highway Commercial	1.04	0.90	0.94	1.04	0.90	0.94	1.04	0.90	0.94
Mixed Use	2.74	0.90	2.47	1.92	0.90	1.73	1.82	0.90	1.64
Totals	52.83		29.32	52.84		29.43	52.83		29.48
Average Runoff Coefficient		0.56			0.56			0.56	
Max Allowable		0.60			0.60			0.60	
<p>Runoff coefficients shall be used based on land use as follows:</p> <ul style="list-style-type: none"> • Commercial lands = 0.90 • Industrial lands = 0.80 • Schools = 0.70 • Townhouses = 0.65 • Semi-detached/link = 0.55 • Single family residential = 0.50 • Parks, open spaces, cemeteries = 0.20 									

We also compared the three alternatives for compliance with the following criteria discussed in Section 6.1, Concept Development Considerations:

- Servicing efficiency (water / sanitary / storm) with the metric being the highest number units per Kilometre of road;
- LID opportunity with the metrics being:
 - the highest linear length of roads
 - the highest length of green links
 - the highest length of Green Blvd.; and
 - the largest park area.



- Opportunity to Mitigate Impacts on the Existing North Drainage on Concession Road 3 with metrics being:
 - The highest linear length of green links
 - The highest linear length of Green Blvds.
 - The largest area of parks / open space
 - The area for a potential SWM facility

The following table compiles the result of the servicing evaluation of the three alternative land use plans.

Table 4: Evaluation of Land Use Alternatives for Compliance with Servicing and Drainage Objectives

Evaluation Criteria	Land Use Plan Alternative 1	Land Use Plan Alternative 2	Land Use Plan Alternative 3	Alt 1	Alt 2	Alt 3	
				Score	Score	Score	
Compliance with Runoff Coefficient C = 0.60				3	3	3	
LID Opportunity Evaluation							
Total Length of Roads (m)	8018	8589	8361	1	3	2	
Green Links (m)	824	237	775	3	1	2	
Green Blvds (m)	2648	2064	2293	3	1	2	
Parks (Ha)	5.05	4.83	6.01	2	1	3	
Servicing Efficiency Evaluation							
Units (Lower)	567	625	618				
Units (Upper)	1432	1616	1666				
Units / Km of Road (Lower)	71	73	74				
Units / Km of Road (Upper)	179	188	199	1	2	3	
North Outlet Drainage Area Evaluation							
Green Links (m)	290	240	150	3	2	1	
Green Blvds (m)	720	710	700	3	2	1	
Parks (m2)	1760	4830	9540	1	2	3	
Potential SWM Facility Area	1760	4830	9540	1	2	3	
				Relative Scoring	21	19	23

In summary Alternative 3 is the preferred servicing alternative on that basis that it best achieves the resilient neighbourhood by minimizing the contribution to climate change by incorporating green design principles related to energy, water, and waste at the building and neighbourhood scale.



7. Emerging Land Use Plan

The collective review and insight from the servicing review and from other technical specialists, as well as insight from the Project Team and through stakeholder and public feedback, will inform the development of an emerging or preferred land use plan that will integrate the best features of the three Alternatives.

Servicing notes on each of the three alternatives are captured on following **Figure 9**, **Figure 10** and **Figure 11**.



Figure 9: Servicing Notes – Land Use Plan Alternative 1

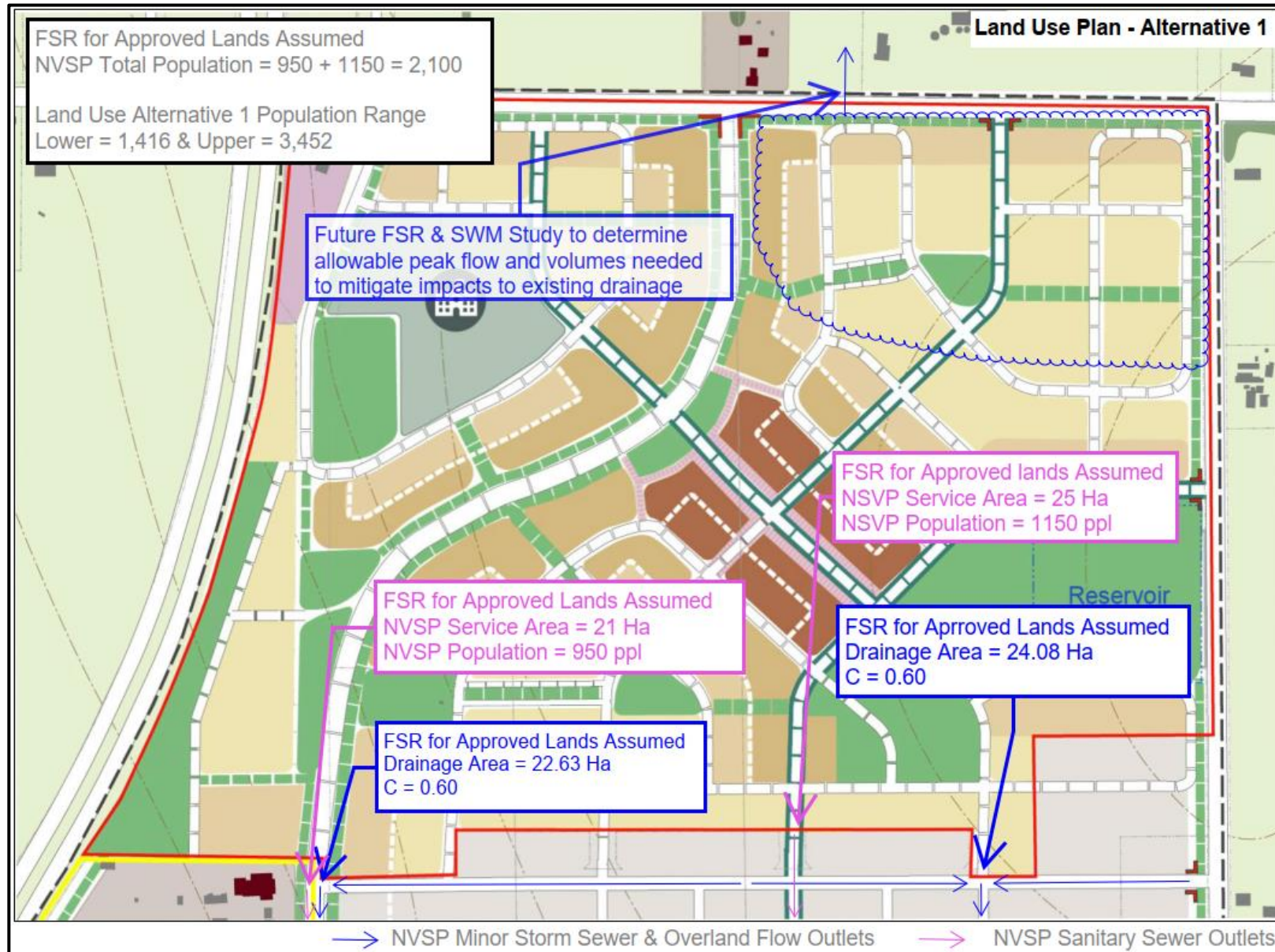




Figure 10: Servicing Notes – Land Use Plan Alternative 2

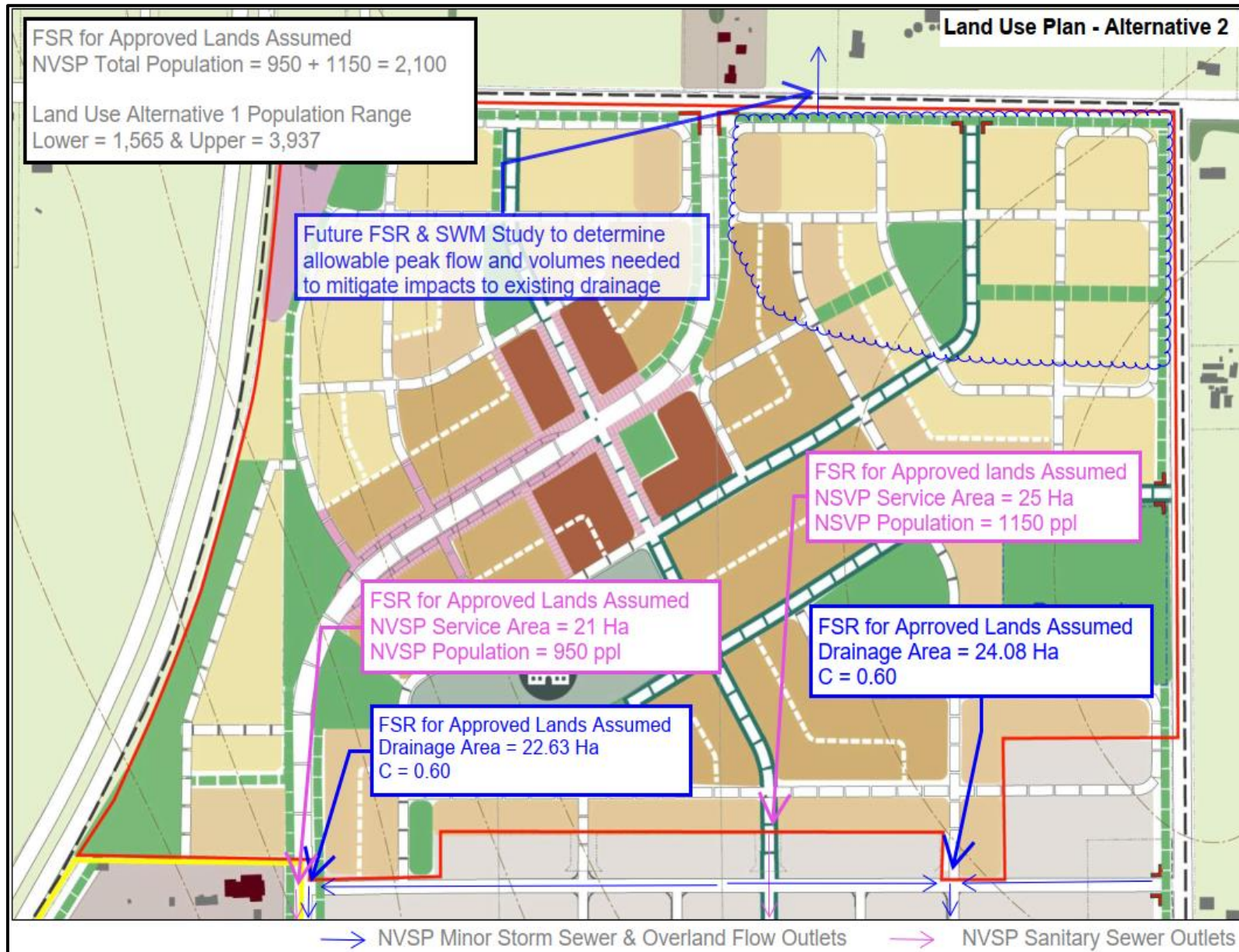
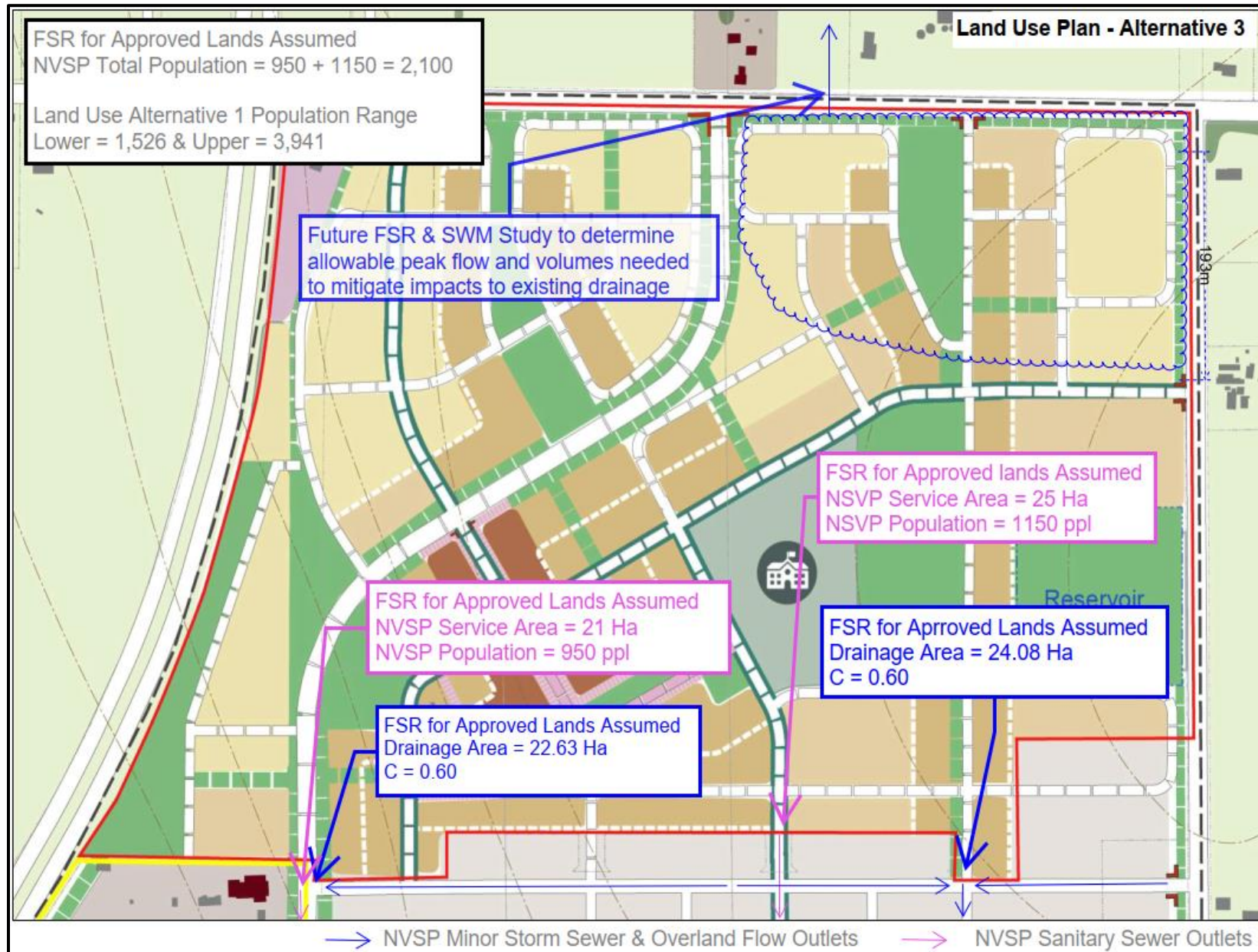




Figure 11: Servicing Notes – Land Use Plan Alternative 3

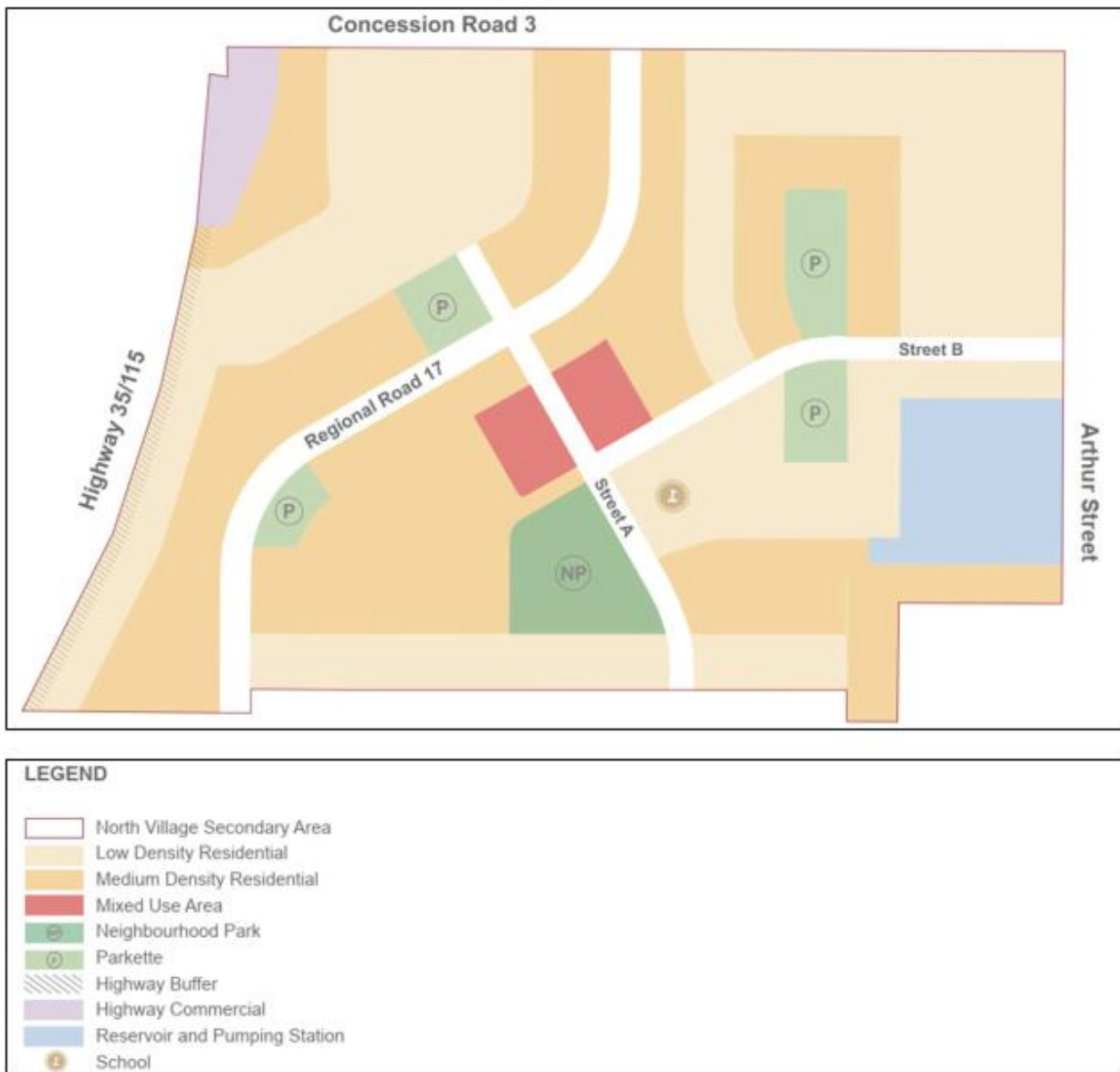




8. Preferred Land Use Plan

Following Public Information Centre #3 held in June 2022, feedback on the three Land Use Alternatives and evaluation results were reviewed to develop an Emerging Land Use Plan (i.e., the Preferred Land Use Plan). A Mixed-Use Neighbourhood Centre will be the centre of North Village, anchored by a school, public park, and small-scale shops and services. Each quadrant of the plan also features a unique park to serve as a community node and gathering place. Medium density housing lines Regional Road 17 and surrounds the Neighbourhood Centre, also dispersed through other areas of the Plan. The school is proposed at a location away from Regional Road 17. The preferred land use plan is shown on Figure 12.

Figure 12: Preferred Land Use Plan



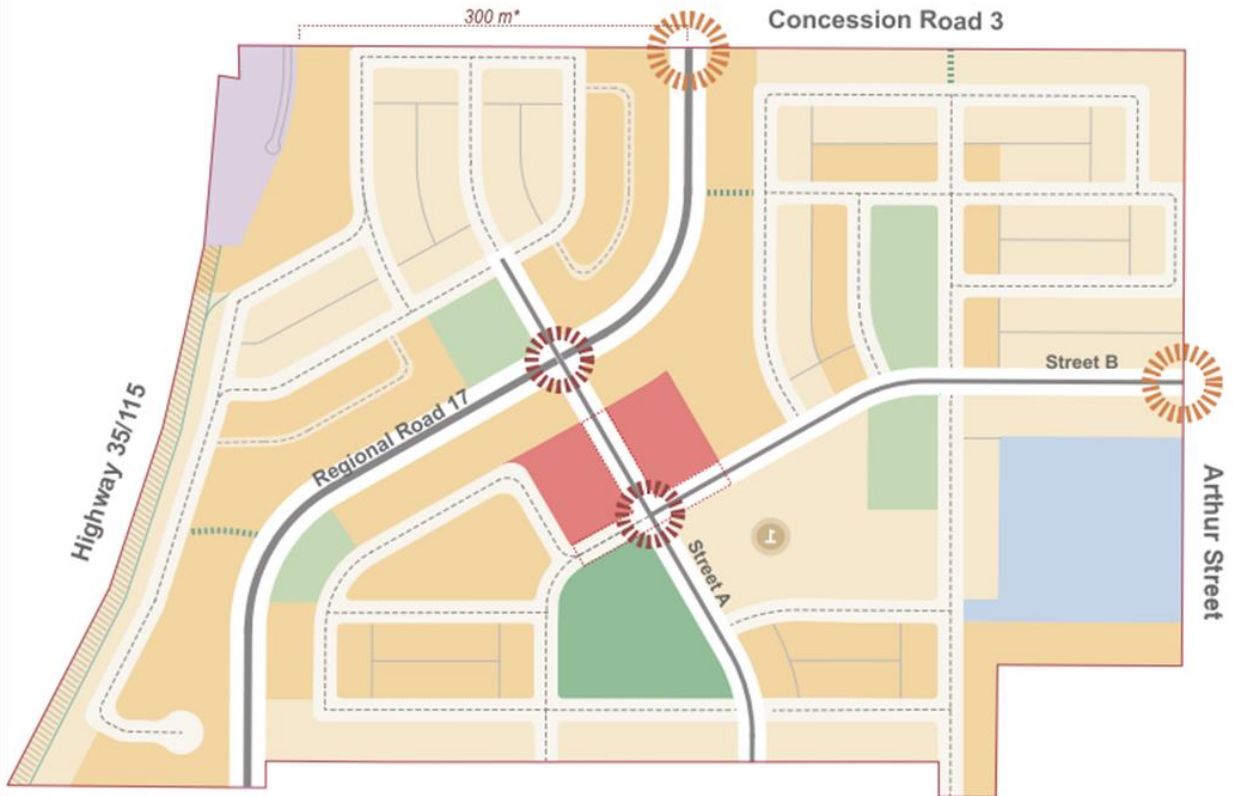
In conjunction with the preparation of the Preferred Land Use Plan SvN prepared a Demonstration Plan to show how the Land Use plan could be implemented. The Demonstration Plan is shown on Figure 13.



Figure 13: Demonstration Plan

Demonstration Plan

DRAFT February 2023



LEGEND

- North Village Secondary Area
- Low Density Residential
- Medium Density Residential
- Mixed Use Area
- Neighbourhood Park
- Parkette
- Highway Buffer
- Highway Commercial
- Reservoir and Pumping Station
- School
- Gateway
- Prominent Intersection
- Arterial Road
- Collector Road
- Local Road
- Enhanced Streetscape
- Rear Lane
- Trail
- Mid-block Connection

(*) the final alignment of RR17 is subject to an Environmental Assessment Study, currently underway. The intersection of RR17 and Concession Road 3 is shown as 300 metres measured from the eastern edge of the existing North Street ROW to the centreline of the future RR17.

The street and block layout shown on this demonstration plan are an illustration of one possible configuration that meets the intent of the Secondary Plan. The final configuration will be determined through detailed study as part of the plan of subdivision approvals process.



9. Functional Servicing Assessment of the Preferred Land Use Plan

The purpose of this section of the master servicing report is to provide further guidance on the implementation of water, wastewater and stormwater infrastructure required to service the Preferred Land Use Plan for the NVSP area.

9.1. Estimated Development Yields on the Preferred Land Use Plan

The estimated development yields provided in Figure 3 below were considered in the completion of this functional servicing report. The development yields in figure 14 were used to assess the servicing needs for the preferred land use plan.

Figure 14: Estimated Development Yields

Use type	Area (m2)	Area (ha)	Efficiency (after local road dedication)	Net Developable Area (ha)	Density Range (units/ha)		Residential Units		Population		Jobs		
					Minimum	Assumed	Minimum	Assumed	Minimum	Assumed	Neighbourhood Centre	Elementary School	
							Area (m ²)	Jobs	Area (m ²)	Jobs			
ARTERIAL + COLLECTOR ROADS	45,227	4.5	N/A	N/A									
ROAD WIDENINGS	13,439	1.3	N/A	N/A									
PUBLIC OPEN SPACE	35,167	3.5	N/A	N/A									
HIGHWAY SETBACK	6,786	0.7	N/A	N/A									
WATER RESERVOIR	24,012	2.4	N/A	N/A									
SCHOOL	22,438	2.2	N/A	N/A								30	
LOW-DENSITY RESIDENTIAL	182,990	18.3	75%	13.7	13	27	178	371	539	1119			
MEDIUM DENSITY RESIDENTIAL	183,893	18.4	75%	13.8	40	50	552	690	1291	1613			
HIGHWAY COMMERCIAL	8,540	0.9	N/A	0.9									
NEIGHBOURHOOD CENTRE MIXED USE	10,438	1.0	75%	0.8	40	60	31	47	45	67	3251.0	81	
TOTAL	526,144	52.6		29.2			761	1107	1874	2799	3251.0	81	30
Density (units/ha)							26.1	38.0					

9.2. Water Servicing

AECOM reviewed the range in the planned population densities for the NVSP as a means to assess if the preferred land use plan can be serviced by the Region’s planned capital expansion program. The range in population densities for the NVSP preferred land use plan are summarized in Figure 15.

The range in population densities, based on the gross area of the NVSP, are relatively low and as such we are confident that they would be compliant with the assumptions made by the Region for the planning of their water servicing capital expansion program.

As noted on page 10 of this report the Region has agreed to allow the developers of the Approved Lands and the NVSP lands to construct temporary water pumping stations to service on their own lands and at their own costs as a means to provide interim water servicing infrastructure to their lands. These temporary facilities would be removed when the Zone 2 Water Pumping Station is operational. The design of temporary facilities will be subject to review and approval as part of the Plan of Subdivision process and these temporary facilities will not have back up power. In the event of a power outage, water pressure and fire protection will be provided by a connection to Water Pressure Zone 1.



Figure 15: Range in Population Densities for the NVSP Preferred Land Use Plan

NVSP Preferred Land Use Plan Estimated Development Yields	Residential	Unit Density		Population		Population Density	
	Areas	Units / Ha	Units / Ha	Pop	Pop	Ppl / Ha	Ppl / Ha
	(Ha)	Min	Assumed	Min	Assumed	Min	Assumed
Low Density Residential	18.3	13	27	539	1119	29.5	61.1
Medium Density Residential	18.4	40	50	1291	1613	70.2	87.7
Neighbourhood Centre Mixed Use	1.0	40	60	45	67	45.0	67.0
Totals	37.7			1875	2799	49.7	74.2
NVSP - Gross Area	52.6					35.6	53.2

AECOM received a copy of the Region’s 2023 Water and Sanitary Sewer Budget and 9 Year Forecast and the following capital expansion programs are currently being designed. This water servicing infrastructure when constructed and commissioned will facilitate the servicing of the NVSP.

- New Zone 2 Feedermain on Arthur St and Zone 2 Pumping Station to the existing Arthur St Pumping Station, Water Budget Item 152, design completion in 2024;
- Zone 1 Feedermain from Arthur St Reservoir to New Zone 1 Reservoir, Water Budget Item 150, design completion in 2024;
- New Zone 2 Pumping Station, Water Budget Item 186, design completion in 2025; and
- New Zone 1 Reservoir, Water Budget Item 185, design completion 2024.

9.3. Wastewater Servicing

Through recent consultation with the Region of Durham we determined that the Foster Creek trunk sanitary sewer has been constructed along North St to the north side of the CPR right of way. AECOM reviewed the as-built drawings for the construction of the trunk sanitary sewer and the Region has constructed a 675mm sewer with a slope of 0.5% at the crossing of the CPR tracks. This sanitary sewer will service the existing urban area located north of the CPR tracks, west of Albert Street and east of Hwy 35/115.

The full flow capacity of the 675mm sewer at 0.50% is 594 L/s.

The 675mm sanitary sewer would be designed to operate at a maximum flow rate of 80% of the full flow condition. As such the design capacity of the 675mm sewer is estimated to be 476 L/s based on a pipe slope of 0.50%

The estimate peak sanitary flow from the NVSP preferred land use plan based on the assumed yield condition of 2799 persons is 50.7 L/s.

As such approximately 10.7% of the design capacity of the 675mm sanitary sewer between Sanitary Maintenance Holes MH-E50-0206, located on the south side of the CPR right of way and MH-E50-0105, located on the north side of the CPR right of way is required to service the NVSP lands.



North Village Secondary Plan Master Servicing Report – Final Land Use Plan

The existing urban residential area north of the CPR tracks, as shown on Map A4 of the Newcastle Village Urban Area , Municipality of Clarington Official Plan is approximately 130Ha. Assuming a population density of 100 persons per gross Ha the 675mm sanitary sewer under the CPR tracks would function at 32% full.

Based on these checks it is evident the Region’s existing trunk sanitary sewer on North Street at the CPR crossing has sufficient capacity to service the NVSP preferred land use plan.

Refer to Appendix A of this report for the Sanitary Design Check sheets prepared during the completion of the assessment.

We received a copy of the Region’s 2023 Water and Sanitary Sewer Budget and 9 Year Forecast and the following capital expansion programs are being constructed or designed and when constructed and commission will facilitate the wastewater servicing of the NVSP.

- Foster Creek Trunk Sanitary Sewer on North St from Wilmot St to north of the CPR tracks has been constructed to the north side of the CPR right of way. The TSS is a 675mm pipe and construction stopped at San MH-E50-0105 with a south invert elevation of 92.26m and a planned north invert elevation of 92.28m. Based on the information received from the Region the section of the TSS under the CPR right of way has been constructed at a 0.50% slope.
- Foster Creek Trunk Sanitary Sewer along RR # 17 from north of the CPR tracks to Concession Road 3 is in the design stage with planned completion in 2024 (Sanitary Budget Item 84). The timing for the completion of the design of this TSS will generally be driven the development community.

Refer to Note 1 on the copy of the Demonstration Plan attached in Appendix B of this report for the maximum sanitary invert elevations needed to be constructed along the boundary of the NVSP and Approved Lands to ensure the NVSP can be serviced.

9.4. Conceptual Lot Grading and Storm Drainage

The planned improvements outlined in Section 4.2 of this Master Servicing Report remain valid for the preferred land use plan.

9.5. Stormwater Management

AECOM received additional background information for the relocation of the west stormwater management facility being designed to service part of both the Approved Lands and NVSP. The west SWM facility is being relocated from the Approved Lands on the east side of North Street to the Context Area on the west side of North Street.

The additional background information is comprised of a stormwater report entitled, North Village Stormwater Management Facility Design Brief – West of North Street, Newcastle, Smooth Run Developments Inc., Brookfield Residential (Ontario) Limited, MDTR Group, Project #21006, April 2022, Revised July 2022.

The design brief states that the SWM facility was relocated to address significant challenges from a construction, operation and long-term maintenance standpoint for a facility in this location due to the presence of an esker across the SWMF block on the east side of the road.

The relocated SWM facility will provide quantity, quality and erosion control for the western catchment of the North Village Secondary Plan Area (NVSP), as well as the already approved Smooth Run Developments



North Village Secondary Plan Master Servicing Report – Final Land Use Plan

Inc. and Brookfield Draft Plans on the east side of North Street and the future development lands owned by MDTR Group on the west side of North Street. The SWMF facility is proposed to be located within the floodplain between the 100 year and Regional (Hurricane Hazel) floodlines.

Refer to Appendix C for the following figures from the SWM Brief for the extent of the lands in the NVSP and located on the west side of the existing North St road allowance that now has a proposed storm water management solution for the future development of these lands.

- Figure 2 – Study Area and Ownership
- Figure 5 – Proposed Drainage Conditions

Consideration will need to be given to the following conditions to ensure the NVSP lands will be serviced by the planned external minor storm sewer systems and external major storm overland flow routes being planned for the Approved Lands and the Context Lands.

- Catchment area 201 on Figure 5 in Appendix C, which includes part of the NVSP lands cannot be developed until the major storm overland route to west SWM facility is constructed;
- Refer to Note 1 on the copy of the Demonstration Plan attached in Appendix B of this report for the maximum storm sewer invert elevations needed to be constructed along the boundary of the NVSP and Approved Lands to ensure the NVSP can be serviced by the east and west stormwater management facilities on the Approved Lands;
- Refer to Note 2 on the copy of the Demonstration Plan attached in Appendix B of this report for the provision of blocks of land for major storm overland flow routes. Consider integrating with trail / walkway connections. Suggested width is 6.0m;
- Refer to Note 3 on the copy of the Demonstration Plan attached in Appendix B of this report for the current proposed approach to the provision stormwater management measures for the lands located west of the existing RR # 17 alignment. The NVSP lands located west of the existing north street road allowance will be serviced by a proposed west swm facility as specified in the North Village Stormwater Management Facility Design Brief – West of North Street, Newcastle, Smooth Run Developments Inc., Brookfield Residential (Ontario) Limited, MDTR Group, Project #21006, April 2022, Revised July 2022. The NVSP lands located west of the existing north street road allowance cannot be developed until the major storm overland route located in catchment area 100 is constructed. Refer to Figure 5 in Appendix C of this report for the location of the overland flow route;
- The developer's consulting engineer responsible for the design of Street K as per General Plan, Dwg No G1.2 for Newbrook Subd Ph1 (S-C-2005-004) by Candevcon dated Sept 16, 2022 shall ensure the proposed grading of Street K will convey the major overland from the NVSP lands in accordance with the approved storm water management report for the east swm facility on the Approved Lands and the North Village Stormwater Management Facility Design Brief – West of North Street, Newcastle, Smooth Run Developments Inc., Brookfield Residential (Ontario) Limited, MDTR Group, Project #21006, April 2022, Revised July 2022 for the west stormwater management facility that is now located on the Context Lands on the west side of North Street and north of the CPR right of way;
- The developer's consulting engineer for the design of the NVSP site grading, minor storm drainage systems and major storm overland flows will need to ensure NSVP minor / major storm drainage systems connect to the minor / major storm drainage systems on the Approved



North Village Secondary Plan
Master Servicing Report – Final Land Use Plan

Lands in accordance with the approved swm reports for the east and west swm facilities servicing the Approved Lands;

- The existing culvert under Concession Road 3, as shown on the Demonstration Plan in Appendix B of this report will need to remain in its current location to continue to function as a major storm outlet for approximately 4.0 Ha +/- of land from the north east corner of the NSVP lands; and
- The planned road cross-section for the reconstruction of the Regional Road 17 will need to give consideration to its function as a major storm overland flow route from Concession Rd 3 to the proposed west stormwater management facility as shown on Figure 5 in Appendix C of this report. The Region of Durham and the road designer will need to assess how the proposed cross-section will convey the major storm flow in accordance with applicable design guidelines for an arterial roadway classification.



Appendix A

Sanitary Sewer Design Check Sheets

- 1) NSVP Preferred Land Use Plan
- 2) The existing urban residential area north of the CPR tracks, as shown on Map A4 of the Newcastle Village Urban Area , Municipality of Clarington Official Plan



REGIONAL MUNICIPALITY OF DURHAM - WORKS DEPARTMENT

**SANITARY SEWER DESIGN SHEET FOR EXISTING CONDITIONS
(METRIC)**

MUNICIPALITY: Municipality of Clarington
 PROJECT: North Village Secondary Plan
 TO:
 CONTRACT NO.:

Prepared By: P. Middaugh
 MANNING'S "n": 0.013
 DATE: 04/24/2023
 PROJECT: 60617636

- NOTES:**
- | | |
|--|--|
| 1) MINIMUM VELOCITY = 0.6 m/s | 5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT |
| 2) MAXIMUM VELOCITY = 3.65 m/s | 6) USE ACTUAL METRIC I.D PIPE SIZE IN mm |
| 3) INFILTRATION 0.26 l/s = 22.5 m ³ /Ha/D | 7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN |
| 4) INFILTRATION 0.52l/s = 45.0 m ³ /Ha/D | 8) 364 l/person/day = 0.004213 l/person/s |
| 4) COMMERCIAL = 180cub.m/gfa/day = 2.08 l/s | |

$$Q_{(d)} = \frac{P \cdot q \cdot M}{86.4} + I \cdot A$$

$Q_{(d)}$ = Peak Domestic Flow(L/s)
 P = Population (in 1000 capitas)
 q = Average daily flow per capita day (L/day/capita)
 M = Harmon Peaking Factor (min 2)
 A = Area (ha)

$$M = \left(1 + \frac{14}{4 + P^{1/2}} \right) > 2.0$$

$$Q_{(p)} = \frac{1}{n} \cdot A \cdot R^2 \cdot S^2$$

$Q_{(p)}$ = Flow Capacity of Sewer(m³/s)
 A = Cross Sectional Area (m²)
 R = Hydraulic Radius (m)
 S = Sewer Slope (m/m)
 n = Mannings Roughness Coef.

I = Infiltration (0.28 L/s / ha)

SUBDIVISION AREA MAINTENANCE HOLE FROM: TO:	RESIDENTIAL				COMMERCIAL			INDUST	INSTIT	FLOW IN LITRES PER SECOND						EXISTING SEWER				PRESENT CONDITION	
	GROSS AREA (HA)	POP DENSITY (PERSON S/HA)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW		COMM.	INDUS.	INSTIT.	TOTAL FLOW Q (d)	PIPE SIZE (mm)	SLOPE %	Q(p) l/s	V m/s	SURCHARGED %	
										INFIL 0.26 l/s	SEWAGE 0.004213 l/s										
NORTH STREET- TRUNK SANITARY SEWER (NVSP - Minimum Population with Pipe Slope of 0.50%)																					
MH-E50-0206	MH-E50-0105	37.70	49.7	1874	3.61	1.90	0.50	0.95		2.20	9.80	28.48	1.98	-	4.58	44.84	675.00	0.50%	594.39	1.66	7.5%
NORTH STREET- TRUNK SANITARY SEWER (NVSP - Assumed Population with Pipe Slope of 0.50%)																					
MH-E50-0206	MH-E50-0206	37.70	74.2	2799	3.47	1.90	0.50	0.95		2.20	9.80	40.89	-	-	-	50.70	675.00	0.50%	594.39	1.66	8.5%

Sanitary MH-E50-0105 is located at the north end of the CPR right - of -way on North Street

675mm Pipe Full Capacity = 594 L/s
 Design Capacity = 80% Pipe Full = 476 L/s
 NVSP Lands share of Design Capacity = 10.7%



REGIONAL MUNICIPALITY OF DURHAM - WORKS DEPARTMENT

**SANITARY SEWER DESIGN SHEET FOR EXISTING CONDITIONS
(METRIC)**

MUNICIPALITY: Municipality of Clarington
 PROJECT: North Village Secondary Plan
 TO:
 CONTRACT NO.:

Prepared By: P. Middaugh
 MANNIN'S "n": 0.013
 DATE: 04/24/2023
 PROJECT: 60617636

- NOTES:**
- 1) MINIMUM VELOCITY = 0.6 m/s
 - 2) MAXIMUM VELOCITY = 3.65 m/s
 - 3) INFILTRATION 0.26 l/s = 22.5 m³/Ha/E
 - 4) INFILTRATION 0.52l/s = 45.0 m³/Ha/D
 - 5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
 - 6) USE ACTUAL METRIC I.D PIPE SIZE IN mm
 - 7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN
 - 8) 364 l/person/day = 0.004213 l/person/s
 - COMMERCIAL = 180cub.m/gfa/day = 2.08 l/s

$$Q_{(d)} = \frac{P \cdot q \cdot M}{86.4} + I \cdot A$$

$Q_{(d)}$ = Peak Domestic Flow(L/s)
 P = Population (in 1000 capitas)
 q = Average daily flow per capita day (L/day/capita)
 M = Harmon Peaking Factor (min 2)
 A = Area (ha)

$$M = \left(1 + \frac{14}{4 + P^{1/2}} \right) > 2.0$$

$$Q_{(p)} = \frac{1}{n} \cdot A \cdot R^2 \cdot S^2$$

$Q_{(p)}$ = Flow Capacity of Sewer(m³/s)
 A = Cross Sectional Area (m²)
 R = Hydraulic Radius (m)
 S = Sewer Slope (m/m)
 n = Mannings Roughness Coef.

I = Infiltration (0.28 L/s / ha)

SUBDIVISION AREA	RESIDENTIAL				COMMERCIAL			INDUST	INSTIT	FLOW IN LITRES PER SECOND					EXISTING SEWER				PRESENT CONDITION		
	GROSS AREA (HA)	POP DENSITY (PERSON S/HA)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW		COMM.	INDUS.	INSTIT.	TOTAL FLOW Q (d)	PIPE SIZE (mm)	SLOPE %	Q(p)	V	SURCHARGED %	
										INFIL 0.26 l/s	SEWAGE 0.004213 l/s										
FROM: NORTH STREET- TSS (Check for the Development of the Urban Area comprised of the Approved Lands, the Context Lands and the NVSP Lands with a population density of 100 persons / Gross Ha and a Pipe Slope of 0.50%)																					
MH-E50-0206	MH-E50-0105	130.00	100.0	13000	2.84	0.00	0.50	0.00		0.00	33.80	155.59	0.00	-	0.00	189.39	675.00	0.50%	594.39	1.66	32%
TO: NORTH STREET- TSS (Check for the Development of the Urban Area comprised of the Approved Lands, the Context Lands and the NVSP Lands with a population density of 150 persons / Gross Ha and a Pipe Slope of 0.50%)																					
MH-E50-0206	MH-E50-0105	130.00	150.0	19500	2.66	0.00	0.50	0.00		0.00	33.80	218.82	-	-	-	252.62	675.00	0.50%	594.39	1.66	43%

SUBDIVISION AREA	RESIDENTIAL				COMMERCIAL			INDUST	INSTIT	FLOW IN LITRES PER SECOND					EXISTING SEWER				PRESENT CONDITION		
	GROSS AREA (HA)	POP DENSITY (PERSON S/HA)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW		COMM.	INDUS.	INSTIT.	TOTAL FLOW Q (d)	PIPE SIZE (mm)	SLOPE %	Q(p)	V	SURCHARGED %	
										INFIL 0.26 l/s	SEWAGE 0.004213 l/s										
FROM: NORTH STREET- TSS (Check for the Development of the Urban Area comprised of the Approved Lands, the Context Lands and the NVSP Lands with a population density of 100 persons / Gross Ha and a Pipe Slope of 0.20%)																					
MH-E50-0206	MH-E50-0105	130.00	100.0	13000	2.84	0.00	0.50	0.00		0.00	33.80	155.59	0.00	-	0.00	189.39	675.00	0.20%	375.92	1.05	50%
TO: NORTH STREET- TSS (Check for the Development of the Urban Area comprised of the Approved Lands, the Context Lands and the NVSP Lands with a population density of 150 persons / Gross Ha and a Pipe Slope of 0.20%)																					
MH-E50-0206	MH-E50-0105	130.00	150.0	19500	2.66	0.00	0.50	0.00		0.00	33.80	218.82	-	-	-	252.62	675.00	0.20%	375.92	1.05	67%

1) Sanitary MH-E50-0105 is located at the north end of the CPR right - of -way on North Street
 2) The existing urban residential area north of the CPR tracks, as shown on Map A4 of the Newcastle Village Urban Area , Municipality of Clarington Official Plan is approximately 130Ha



Appendix B

Newcastle North Village Secondary Plan Demonstration Plan (Draft February 2023) Functional Servicing Comments Captured on the Plan

Demonstration Plan

DRAFT February 2023

**North Village Secondary Plan
Functional Servicing Review of the
Demonstration Plan, Draft February 2023**
AECOM PN 60617636
April 24, 2023
By: Peter Middaugh, P.Eng

Minor Storm from this 4.0Ha +/- area will be collected by a minor storm sewer system that drains south to the east swm facility on the Approved Lands.

Major Storm Overland Flow from this 4.0 Ha +/- area flows north to Concession Rd 3 and outlet to the existing drainage outlet.

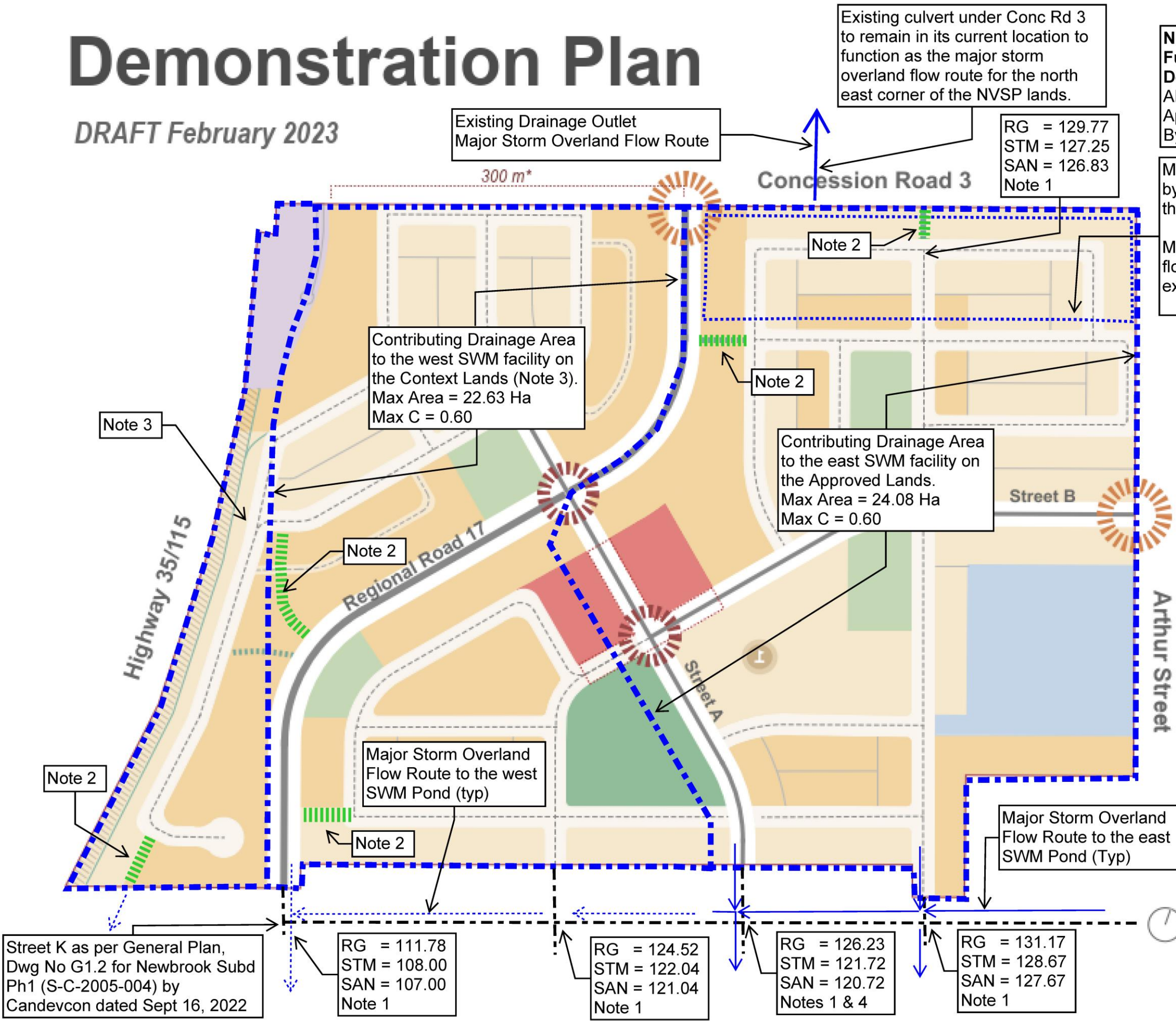
Notes:

Note 1 - To service the North Village Secondary Plans by means of connections to the planned services in the Approved Lands to the south these road grades, storm sewer inverts and sanitary sewer inverts need to be constructed with the development of the Approved Lands. Source: Functional Servicing Report prepared for Smooth Run Developments (Metrus) and Brookfield Homes (Ontario) Limited, revised April 2011, 04319.

Note 2 - Provide blocks of land for major storm overland flow routes. Consider integrating with trail / walkway connections. Suggested width is 6.0m.

Note 3 - The NVSP lands located west of the existing north street road allowance will be serviced by the proposed west swm facility as specified in the North Village Stormwater Management Facility Design Brief – West of North Street, Newcastle, Smooth Run Developments Inc., Brookfield Residential (Ontario) Limited, MDTR Group, Project #21006, April 2022, Revised July 2022. The NVSP lands located west of the existing north street road allowance cannot be developed until the major storm overland route located in catchment area 100 is constructed. Refer to Figure 5 in Appendix C of this report for the location of the overland flow route.

Note 4 - Road grade at this intersection with Street K needs to be a sag condition to ensure the major storm from the east contributing drainage area of the NVSP land will be conveyed to the east SWM facility on the Approved Lands.














Appendix C

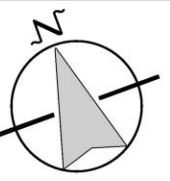
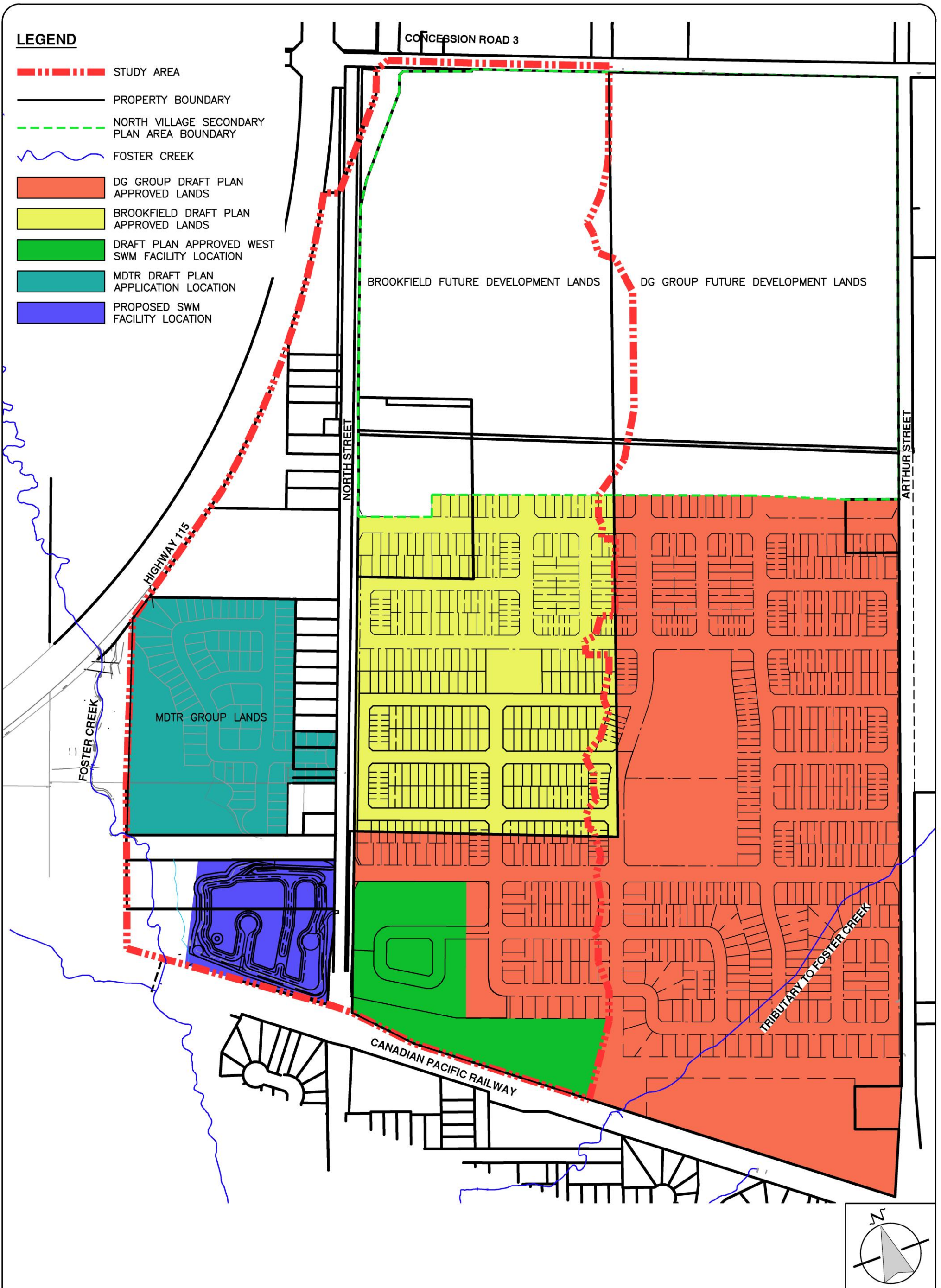
Figure 2 – Study Area and Ownership

Figure 5 – Proposed Drainage Conditions

from the North Village Stormwater Management
Facility Design Brief – West of North Street,
Newcastle, Smooth Run Developments Inc., Brookfield
Residential (Ontario) Limited, MDTR Group, Project
#21006, April 2022, Revised July 2022

LEGEND

-  STUDY AREA
-  PROPERTY BOUNDARY
-  NORTH VILLAGE SECONDARY PLAN AREA BOUNDARY
-  FOSTER CREEK
-  DG GROUP DRAFT PLAN APPROVED LANDS
-  BROOKFIELD DRAFT PLAN APPROVED LANDS
-  DRAFT PLAN APPROVED WEST SWM FACILITY LOCATION
-  MDR DRAFT PLAN APPLICATION LOCATION
-  PROPOSED SWM FACILITY LOCATION



**NORTH VILLAGE STORMWATER
MANAGEMENT FACILITY**
THE CORPORATION OF THE MUNICIPALITY OF CLARINGTON

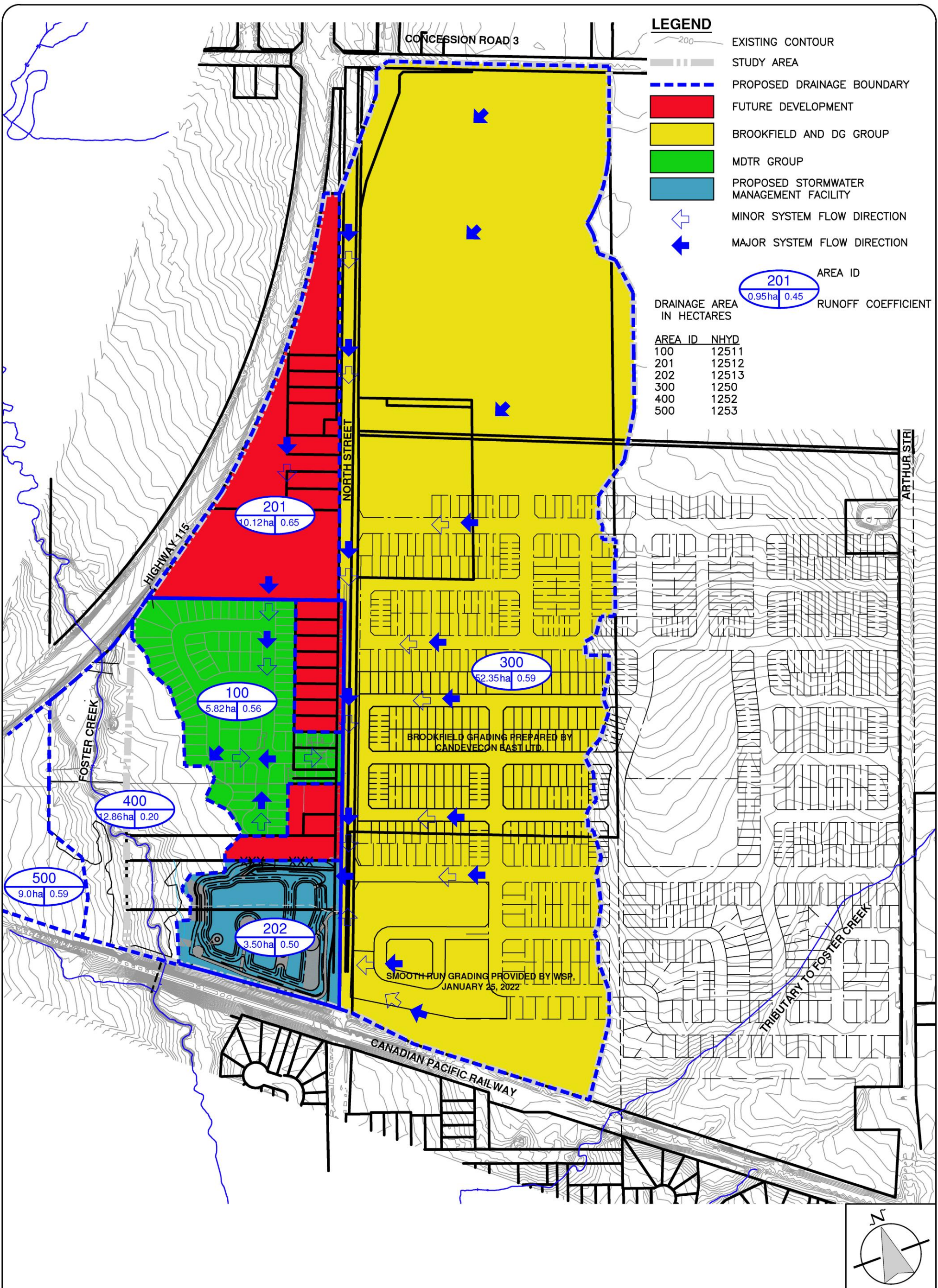
STUDY AREA AND OWNERSHIP

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS

1600 STELLAR DRIVE, SUITE 402
TEL. (289) 315-3680

WHITBY, ONTARIO L1N 9B2
FAX (905) 794-0611

Drawn By:	R.B.	Checked By:	A.K.	Proj. No.	E21006
Designed By:	A.K./L.W.	Checked By:	A.K.	DWG. No.	FIG.2
Scale:	1:3000	Date:	JULY 2022		



**NORTH VILLAGE STORMWATER
MANAGEMENT FACILITY**
THE CORPORATION OF THE MUNICIPALITY OF CLARINGTON

PROPOSED DRAINAGE CONDITIONS

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS

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TEL. (289) 315-3680

WHITBY, ONTARIO L1N 9B2
FAX (905) 794-0611

Drawn By:	L.W.	Checked By:	A.K.	Proj. No.	E21006
Designed By:	A.K./L.W.	Checked By:	A.K.	DWG. No.	FIG.5
Scale:	1:3000	Date:	JULY 2022		