



**HALIFAX REGIONAL MUNICIPALITY
FUTURE SERVICED COMMUNITIES**

**VOLUME 4: WESTPHAL STUDY AREA
REPORT**

May 28, 2025

Prepared for:

Halifax Regional Municipality

Prepared by:

Stantec Consulting Ltd

Project Number: 160410459

HALIFAX FUTURE SERVICED COMMUNITIES – VOLUME 4: WESTPHAL STUDY AREA
May 28, 2025

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0	Draft	M. Smith	4/8/25	J. Heseltine	4/9/25	S. Willis	4/18/25
1	Revised	M. Smith	5/13/25	J. Heseltine	5/14/25	S. Willis	5/22/25
2	Final	S. Willis	5/28/25				

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Executive Summary

Stantec Consulting Limited was retained by Halifax Regional Municipality (HRM) to conduct an analysis of four candidate urban growth areas:

- Sandy Lake in Hammonds Plains/Bedford
- Highway 102 Corridor in Halifax [Northwest Mainland]
- Westphal in Cole Harbour/Westphal
- Morris Lake in Cole Harbour/Eastern Passage/Cow Bay.

Stantec's scope was to prepare studies to support decisions on if and how to proceed with further planning initiatives by reviewing the following for each Study Area:

- environmental suitability of the Study Area and portions thereof for development;
- feasibility and costs of transportation network upgrades that are required to connect the Study Area to surrounding communities;
- feasibility and costs of water and wastewater, and stormwater servicing; and
- density targets, distribution and thresholds needed to support the efficient use of infrastructure investments.

This volume summarizes the four component studies for the Westphal Study Area (Study Area). Please refer to Volume 1: Overall Summary for context for the entire study. The first volume provides background information on the methodology for the study and an overall comparison of the four Study Areas. This and the remaining three volumes of this study are stand-alone reports for each Study Area.

This report concludes that the Westphal Study Area lands are a good candidate for urban development, provided that any new development avoids environmentally sensitive areas and provides suitable buffers, as indicated in the Land Suitability Analysis. The Study Area is adjacent to established serviced communities, which will facilitate its servicing and development.

The transportation network serving the Study Area and adjoining Morris Lake Study Area is already at or near capacity and the modelling forecast identified key areas of congestion that will continue to increase as development continues in the area. The proposed Cherry Brook Bypass will add capacity on a regional level, but further work will be needed to create a complete community within the Study Area so as to reduce the demand for external trips. Further public transit and active transportation improvements are recommended to create alternatives to private automobile use.

The area has considerable servicing challenges. Its development will depend on capacity improvements in surrounding areas. The Wastewater Infrastructure Plan (WIP) (GM Blue Plan, 2020) identified infrastructure needs to maintain the level-of-service goals for existing HRM residents and interests. The FSC growth areas were not considered in the 2020 WIP and can be expected to have an impact on regional infrastructure capacity requirements and their planned upgrades beyond the levels contemplated

by that plan – the most notable components of which are the gravity trunk sewer and Eastern Passage (EP) WWTF.

It will be important to confirm that added flow from the Study Area can be accommodated within the existing and planned configurations for the pressure-gravity system and planned upgrades at other facilities. This consideration merits the use of Halifax Water's updated hydraulic model assessed in context of regional servicing needs within the framework of the IMP. This includes alternative evaluations to determine a preferred strategy for regional servicing and infrastructure upgrades that will best accommodate the broader needs and goals of HRM and Halifax Water while accounting for the cumulative impact of development in both the Westphal and Morris Lake Study Areas considered by the FSC.

Section 3.5 of this report lists the specific recommended infrastructure upgrades. The infrastructure upgrades required to allow development in the Westphal area are significant and affect regional transportation and servicing systems. HRM will need to negotiate further with landowners and potentially the Province for cost sharing. Section 3.6 outlines the recommendations for matters to be considered by HRM in subsequent planning processes.

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Acronyms / Abbreviations

ABM	Agent Based Model
ATPP	Active Transportation Priorities Plan
BMPs	Best Management Practices
BRT	Bus Rapid Transit
DS & SSS	Design Specifications and Supplementary Standard Specifications for Water, Wastewater & Stormwater Systems
FC	Fecal Coliform
FSC	Future Serviced Communities
GIS	Geographic Information System
GLA	Gross Leasable Area
Ha	Hectare
HGL	Hydraulic Grade Lines
HRM	Halifax Regional Municipality
Hwy	Highway (i.e., Provincial Highway)
IMP	Infrastructure Master Plan
IRP	Integrated Resources Plan

JRTA	Joint Regional Transportation Agency
LID	Low Impact Development
LSA	Land Suitability Analysis
LUBMDD	Land Use By-law Maximum Day Demand
MHD	Minimum Hour Demand
NSHCC	Former Nova Scotia Home for Coloured Children
PCSWMMPHD	Personal Computer Stormwater Management Model Peak Hour Demand
PID	Parcel Identification Number
PPA	Person Per Acre
RDP	Regional Development Plan
RFP	Request for Proposals
RMPS	Regional Municipal Planning Strategy
SAR	Species at Risk
SOCC	Species of Conservation Concern
SPA	Special Planning Area
Sq. Ft.	Square Feet
SWM	Stormwater management

TP	Total Phosphorous
V/C	Volume to capacity analysis
WADE	Watershed Association Development Enterprises
WESP-AC	Wetland Ecosystem Services Protocol – Atlantic Canada
WLSAS	Westphal Land Suitability Analysis Summary
WIP	Wastewater Infrastructure Plan
WWTF	Wastewater Treatment Facility

1 Overview of the Future Serviced Communities Project

The Halifax Regional Municipal Planning Strategy Regional Plan (RMPS) provides direction on how future settlement should take place in Halifax Regional Municipality (HRM). The RMPS outlines the Urban Service Designation areas to be considered as potential Future Serviced Communities (FSC); namely, Sandy Lake, Highway 102 West Corridor, and Morris Lake Expansion. The Westphal (Akoma) area is identified as Urban Reserve under the RMPS and is supported for consideration for urban development through the Road to Economic Prosperity Plan for African Nova Scotian Communities.

Stantec won the Request for Proposals (RFP) issued by HRM and have so far collaborated with the HRM Team to complete all the required background studies for each Future Serviced Community. The next step will be for HRM to review the completed studies and determine if comprehensive neighbourhood planning should be initiated, also known as secondary planning.

The scope of work for Stantec is limited to compiling detailed background information needed to inform future decisions about the potential development of the four Study Areas including review of:

- environmental and cultural constraints and opportunities,
- existing transportation infrastructure assets and constraints using multi-modal analysis; and
- existing water and wastewater services infrastructure capacity and constraints.

Stantec will also provide recommendations concerning the potential development of the four Study Areas based on:

- suitability of each Study Area and portions thereof for development,
- feasibility and costs of transportation network upgrades required to connect each Study Area to surrounding communities,
- feasibility and costs of water and wastewater, and stormwater servicing; and
- density targets, distribution and thresholds needed to support the efficient use of infrastructure investments.

This volume summarizes the four component studies for the Westphal Study Area (Study Area). Please refer to Volume 1: Overall Summary for context for the entire study.

2 Overview of the Westphal Study Area

Westphal is designated as a Special Planning Area (SPA) by the Province of Nova Scotia and is subject to the Future Serviced Communities study along with Sandy Lake, Highway 102 West Corridor, and Morris Lake.

2.1 Location

The Westphal Study Area is east of Dartmouth and Cole Harbour. The Study Area defined by HRM covers roughly 416 hectares south of Highway 7, with Robert Lane and Broom Road to the west, and Ross Road to the east. Coleridge Estates, a small community predominantly comprised of single-detached homes, lies to the south. The Westphal Study Area map is seen in **Figure 2-1**.

The Study Area abuts the African-Nova Scotian community of Cherry Brook across Highway 7/Main Street. Farther east and to the north of Highway 107 are the additional African-Nova Scotian communities of East Preston and North Preston. The three communities constitute the largest concentration of African-Nova Scotian population in HRM. The Study Area is culturally important to the communities as the former location of the Nova Scotia Home for Coloured Children (NSHCC). The home has been preserved on its historic site as Kinney Place, a mixed-use community centre. The Black Cultural Centre for Nova Scotia is located across Highway 7, adding to the cultural significance of the area.

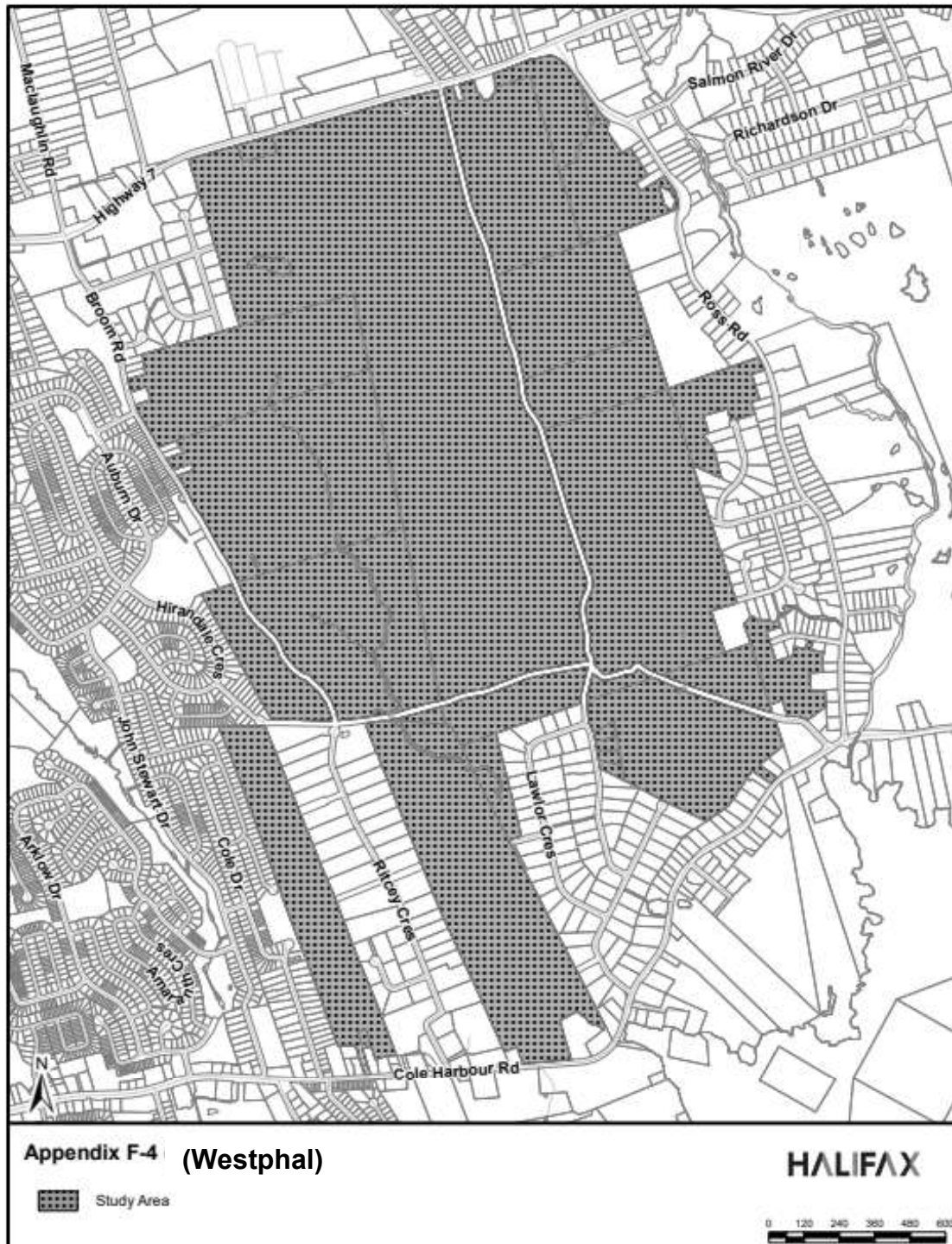


Figure 2-1 Westphal Study Area

(Source: Halifax Regional Municipality)

2.1.1 Existing Land Use

The Westphal Study Area is approximately 416 hectares in area. A cluster of single-detached homes is located outside the Study Area in the northwest corner of the site south of Highway 7 to the east of Broom Road. The homes are characterized by large lots that back onto woodlands. This also includes the Dartmouth Community Church, which is accessed from Highway 7, abuts the western edge of the Study Area on the highway frontage. A Nova Scotia Power electrical substation is across Highway 7/Main Street from the northwest corner of the Study Area.

Much of the land within the Study Area limits is undeveloped. A Nova Scotia Power easement runs through the site, looping around Broom Lake at the western edge of the Study Area. A network of informal trails frequented by ATV users crosses the site from north to south and east to west. Otherwise, the Study Area is covered by dense woods.

Figure 2-2 shows landowners within the Study Area. Three major owners in the northern half of the area have declared their intentions to develop their land. The parcels of land east of Broom Road, north of the Old Lawrencetown Road trail and south of Betty Drive are owned by Annada Properties Limited (in green). They cover approximately 88 hectares. Akoma Holdings Incorporated owns the central piece of land comprised of 125 hectares between Annada Properties and Old Miller Road (in orange). Kiel Developments Limited owns another 106 hectares to the east of Akoma Holdings up to Ross Road (in purple).

Lands within the Study Area, owned by the three organizations, cover a total of 319 hectares. Stantec has consulted several additional owners of lands in the southern portion of the Study Area who have less definite and less immediate plans for development.

Old Miller Road runs north-south through the Study Area connecting to Coleridge Court in the south. It is used as a trail under the management of the Preston & Area Trails Association. A multi-use pathway links Old Lawrencetown Road on the west to Highway 207 (aka Cole Harbour/Lawrencetown Road) to the east. The paved pathway is identified as an Active Transportation Greenway intended for walking, cycling, and other active modes (HRM, 2014) and is managed by the Lawrencetown Cole Harbour Trail Association. Both trail associations are part of the Regional Trail Association, which is involved in the development of trails. **Figure 2-3**, taken from the Making Connections: 2014-19 Halifax Active Transportation Priorities Plan shows Old Miller Road (16) and the Cole Harbour/Lawrencetown Road (13). South of the Lawrencetown trail is a gravel pit that is likely used by ATV riders for outdoor recreation.

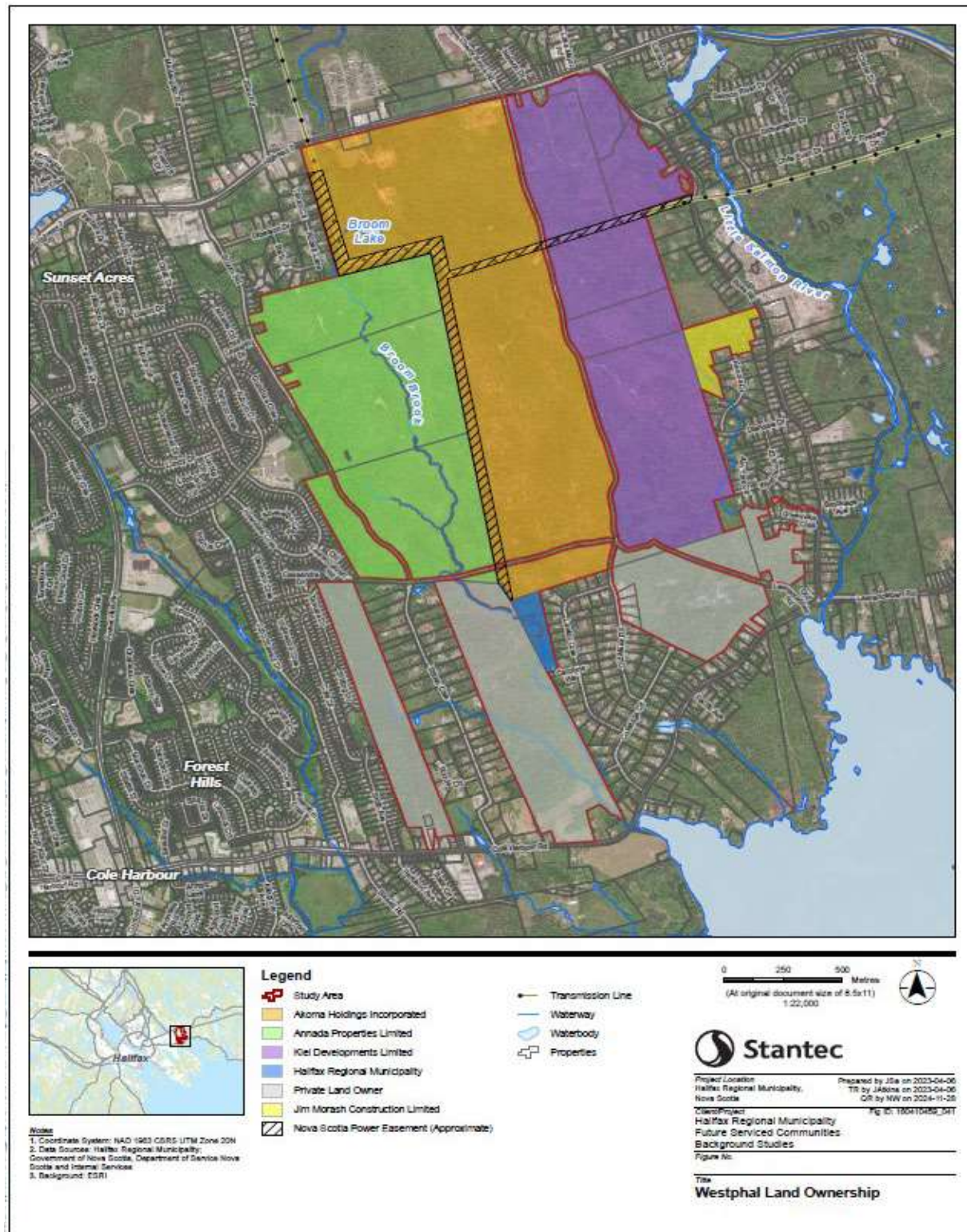


Figure 2-2 Westphal Study Area - Land Ownership Map

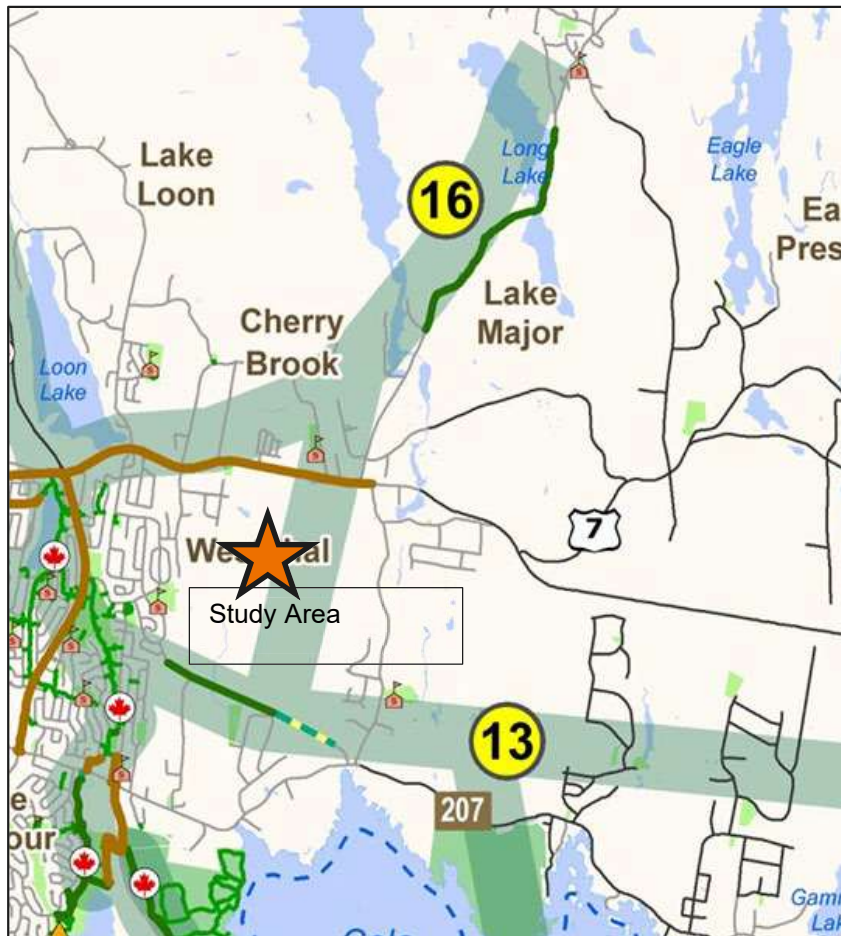


Figure 2-3 Regional Trails Within the Study Area

Akoma Holdings Incorporated is the largest landowner within the Study Area. The non-profit organization was created under the auspices of the NSHCC in 2014 and assumed the assets of the Home for Coloured Children including approximately 125 hectares of property. The land accommodates two residential childcare facilities; a renovated community centre; the Old Home, which was the original NSHCC orphanage; a cottage, where the Home's superintendent resided; and the recently acquired Watershed Association Development Enterprises (WADE) building (Akoma Holdings Incorporated Family Centre, 2023). The Akoma Holdings website states that a long term (99+ years) lease with Nova Scotia Power was signed in 1986 enabling them to utilize a corridor of the property.

The NSHCC was built in 1921 to provide care and education for orphaned and homeless African Nova Scotian children. The facility closed in the 1970s and was replaced by the existing Akoma Family Centre in 2011. The Family Centre is accessed via Dr. Donald Skeir Street and is used as a residential facility for children with special needs. It now includes an outdoor court and playground. The buildings hold historical significance and have a special consideration for the African Nova Scotian community.

Kiel Development, which abuts the eastern edge of land owned by Akoma, showed a strong interest in the development of their land. After an initial discussion with Stantec, Kiel provided a comprehensive plan for their holdings and followed up by preparing coordinated plans for Akoma as well as Annada Holdings, which borders the western edge of Akoma's land. Along with a plan submitted to HRM by Morash Construction for a five-lot subdivision, Kiel's initiative provided Stantec with a complete plan for all lands within the Study Area north of the Old Lawrencetown Road. Landholders south of the Old Lawrencetown Road were less interested in the immediate development of their lands; however, Stantec has assessed the potential development of those properties in the context of three development scenarios assessed for the Study Area (**Figure 2-2**).

2.1.2 Adjacent Land Use

Well established residential communities such as Woodlawn, Cole Harbour, Sunset Acres, and Highland Acres are to the west of the Study Area. These neighbourhoods are densely developed with public schools, parks, commercial and retail uses. They are predominantly characterized by single-detached homes on large lots with mature trees. The communities adjacent to the Study Area on the north, east, and south are likewise predominantly single-detached homes, although lots are larger and frequently back on to woodlands.

Immediately to the north of the Study Area, as noted, is the historically African-Nova Scotian community of Cherry Brook. The associated African-Nova Scotian community of East Preston is farther to the east on Highway 107, separated from the Study Area and Cherry Brook by Lake Major, which is the primary water supply for Dartmouth and other serviced communities on the east side of Halifax Harbour. North Preston is accessed through East Preston. Like East Preston, North Preston is to the east of Lake Major from which it is further separated by Long Lake. North Preston terminates at the southern edge of the Waverley-Salmon River Long Lake Wilderness Area. Substantial portions of the Wilderness Area and the North Preston community are within the Lake Major Protected Watershed Area. The Protected Watershed Area, however, does not extend to Cherry Brook or the Study Area.

The area has access to good quality community facilities. In addition to the Black Cultural Centre for Nova Scotia, Graham Creighton Junior High School is in Cherry Brook. Immediately to the west on Forest Hills Drive in Cole Harbour is Cole Harbour Place, a major community recreation centre with two arenas, an indoor pool, squash courts, fitness rooms, community meeting rooms, community services, a library, and Integrated Health Services. Abutting the Cole Harbour Place site is a variety of sports fields. Cole Harbour High School, furthermore, is on the south side of Forest Hills Parkway and Auburn Drive High School is to the east, close to the western edge of the Westphal Study Area.

2.1.3 Site Background

The Study Area has significant connections to the African-Nova Scotian community. The NSHCC was considered a major accomplishment of the community when it was built. While there are negative associations with its later operation, the orphanage structure and the associated home for its superintendent have been preserved and re-purposed by Akoma Holdings.

Outside of the Akoma Holding Lands where a variety of community-oriented buildings have been renovated or constructed, the balance of the Study Area is largely undeveloped. The trails that have been developed over the Old Lawrencetown Road and Old Miller Road corridors are a large draw to the site. Four single-detached lots have been subdivided and developed on land owned by Louis MacEachern off Old Miller Road just north of its intersection with Lawlor Crescent in Coleridge Estates.

The Study Area is unserviced; however, abutting properties to the west in Cole Harbour have both piped water and wastewater services. Lands to the north, south, and east have water services only. In March 2021, Akoma Holdings applied for a range of planning and zoning amendments required “to allow the appropriate adaptive re-use of the NSHCC building and enable development of a portion of lands surrounding the former NSHCC along Highway 7 and adjacent to Giberson Drive” in the short-term and to review the RMPS in “consideration of Akoma’s longer-term goals to enable development of the interior lands of the NSHCC property.”¹ The staff report noted that HRM water services are available in the Highway 7 corridor and water could be provided to service the immediate Akoma proposal without “upgrades to the local infrastructure.” On May 4, 2021, the Regional Council approved the amendments required to permit redevelopment of the NSHCC building and development of surrounding lands. **Figure 2-4** shows the zoning for the Study Area as of 2024.

2.1.4 Stakeholder Consultation

The Study Area is divided among five major landholders. In keeping with the project terms of reference, Stantec met with Akoma Holdings representatives early in the project to discuss their development intentions. Kiel Developments was also put in touch with Stantec in the same timeframe and initiated similar discussions. Other remaining property owners were subsequently contacted through mail using property owner addresses from Nova Scotia Property Online.

Two landowners responded to our offer to discuss the project and their development intentions. One was Louis MacEachern, who has a large property holding south of lands owned by Kiel, and the other was Val Conrad who lives with her husband in a home on Ritcey Crescent at the southern edge of Annada’s land. Stantec did not speak to an Annada representative until late in the preparation of this report. The company has major holdings between Broom Road and the south and west edges of Akoma’s property. Kiel consulted with Annada and developed a concept for development of their lands that George Daniel of Annada subsequently confirmed to Stantec reflects the company’s interests. We have not had discussions with RJM Brothers or Michelle Geldart, who each own substantial properties at the southern end of the Study Area.

¹ Kelly Denty, Executive Director of Planning and Development, “Case 21875: Amendments to the Regional Plan, Regional Subdivision By-law, Cole Harbour/Westphal Municipal Planning Strategy and the Land Use By-law for the former Nova Scotia Home for Coloured Children site along Highway 7, Westphal,” March 1, 2021, p. 8.

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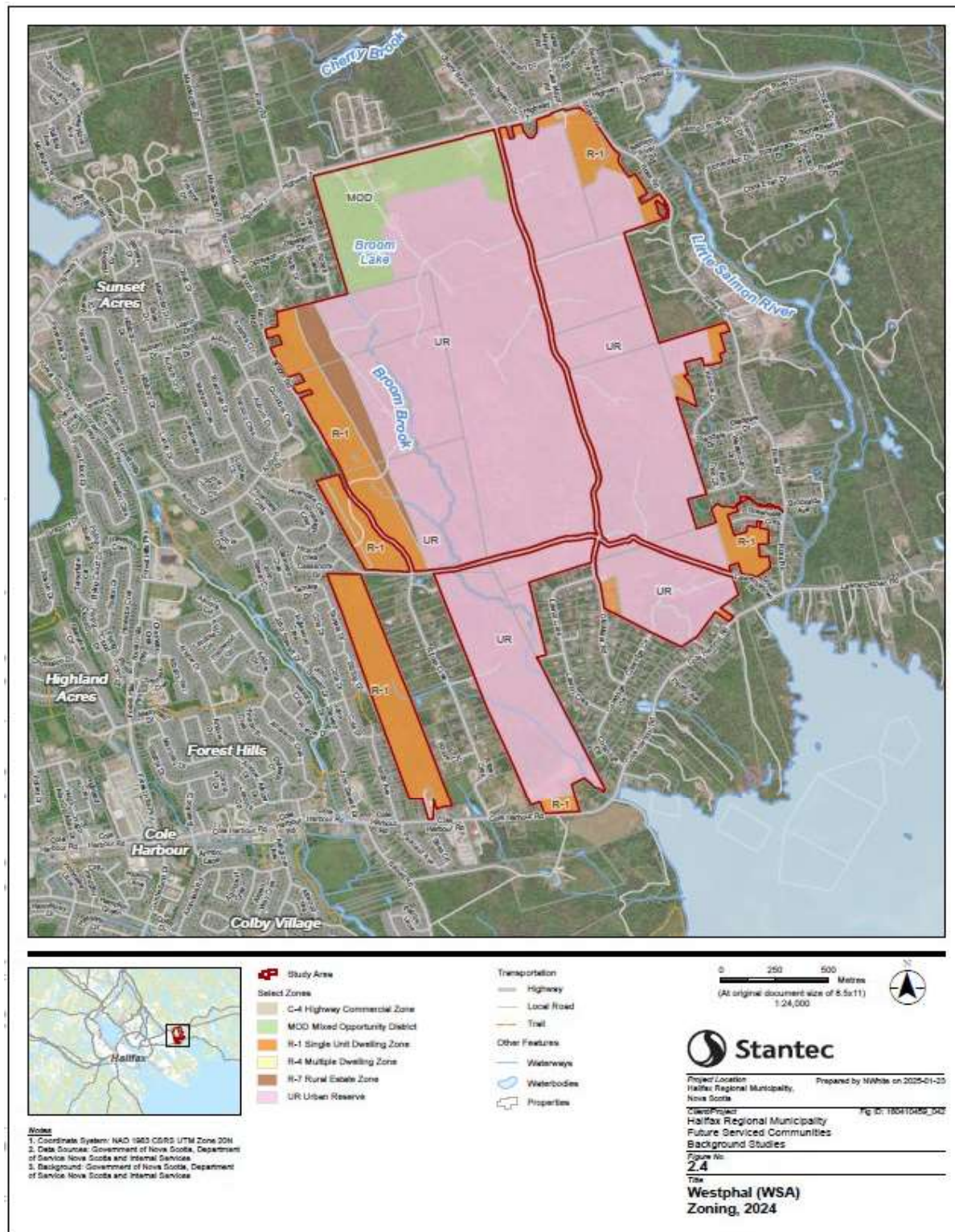


Figure 2-4 Westphal Zoning 2024

Stantec's original meeting with Akoma took place on May 2, 2023, at their offices in the Akoma Family Centre within the Study Area. Representatives from Akoma outlined their intentions, emphasizing discussions with Northwood Care concerning the development of a 96-unit project for senior citizens that has since been approved by the Province of Nova Scotia. The group also raised issues concerning access to water and wastewater services, which they noted surround the site, and access challenges on Highway 7 that apply not only to their property but also to other lands fronting on the highway that must access the roadway directly.

Keil's representative and their consultant zzap architecture + planning (zzap) met with Stantec staff online on May 8, 2023, and Kiel indicated a strong interest in the Future Serviced Communities project process. Shortly afterward, zzap submitted a comprehensive plan for development of Kiel's land and the abutting property owned by Geldart's Property Development, which they have since acquired, as well as a representation of potential development on the Akoma lands. Keil and zzap subsequently had a series of brief online meetings with Stantec. Keil contacted Annada and Akoma and developed an expanded plan covering nearly all the land between Highway 7 on the north edge of the Study Area and Old Lawrencetown Road. Smaller areas extend across and to the south of Old Lawrencetown Road. A small area owned by Louis MacEachern between Old Lawrencetown Road and the Geldart's property is not included in the proposed plan.

As the plan was developed in consultation with Stantec, it is tailored to the requirements of the Future Serviced Communities work with a complete road network and land uses identified by type with a summary of building footprint areas and floor areas as well as the number of dwelling units by type. Stantec has noted that the Old Miller Road and Old Lawrencetown Road right of ways now used as trails have been incorporated in the plan as apparent collector roads and have inquired with Keil and zzap how they envision replacing the connections, which are recognized components of the proposed Halifax Greenway Network. Zzap has explained that they eventually expect to prepare a more detailed plan of trails and roadways with the trail corridors in consultation with HRM. The zzap development plan also provides for realignment of Ross Road to meet Highway 7/107 at a right angle to address what we understand to be an HRM concern with the current oblique angle between the two roadways.

The remaining two landowners with whom Stantec talked were Louis MacEachern and Val Conrad. Mr. MacEachern owns land abutting the southern edge of Keil's land. Mr. MacEachern has lived most of his working life in Calgary, although he has family members living in Dartmouth. He has owned his land within the Study Area for 42 years with the intention of eventually developing it. He and his local partner, Lee Theriault, subdivided the four lots on Old Miller Road, which they have developed and sold. They suggested that they will wait to see how Kiel proceeds with their plans before they determine how to develop their property.

Ms. Conrad owns a home on a three-acre property at 280 Ritcey Road and the abutting 46-acre property between Ritcey Road and Tamara Drive in Cole Harbour. She stated that she and her husband had been approached by developers concerning their property, although she suggested they did not expect to see development for at least five years. She also suggested that she would prefer to see their property developed with access from Tamara Drive, which would involve connecting to services in Cole Harbour and routing traffic through the Cole Harbour street network.

2.2 Development Proposals

Following initial discussions with Stantec, as discussed above, Kiel Developments prepared a plan for the development of their lands within the Study Area. After reviewing with Stantec, Kiel and their consultants zzap architecture + planning prepared a concept plan. The landowners Akoma and Annada later endorsed the proposal for their respective lands. Kiel has stated that the plan reflects the objectives of all three organizations. We discussed the plan informally with Akoma's consultant, David Harrison, who acknowledged it, and also confirmed the support of Annada through conversation with their Principal, George Daniel.

The plan, which is presented below as . covers the landholdings of the three companies extending along the entire frontage of the Study Area on Highway 7 and extending south to Old Lawrencetown Road.

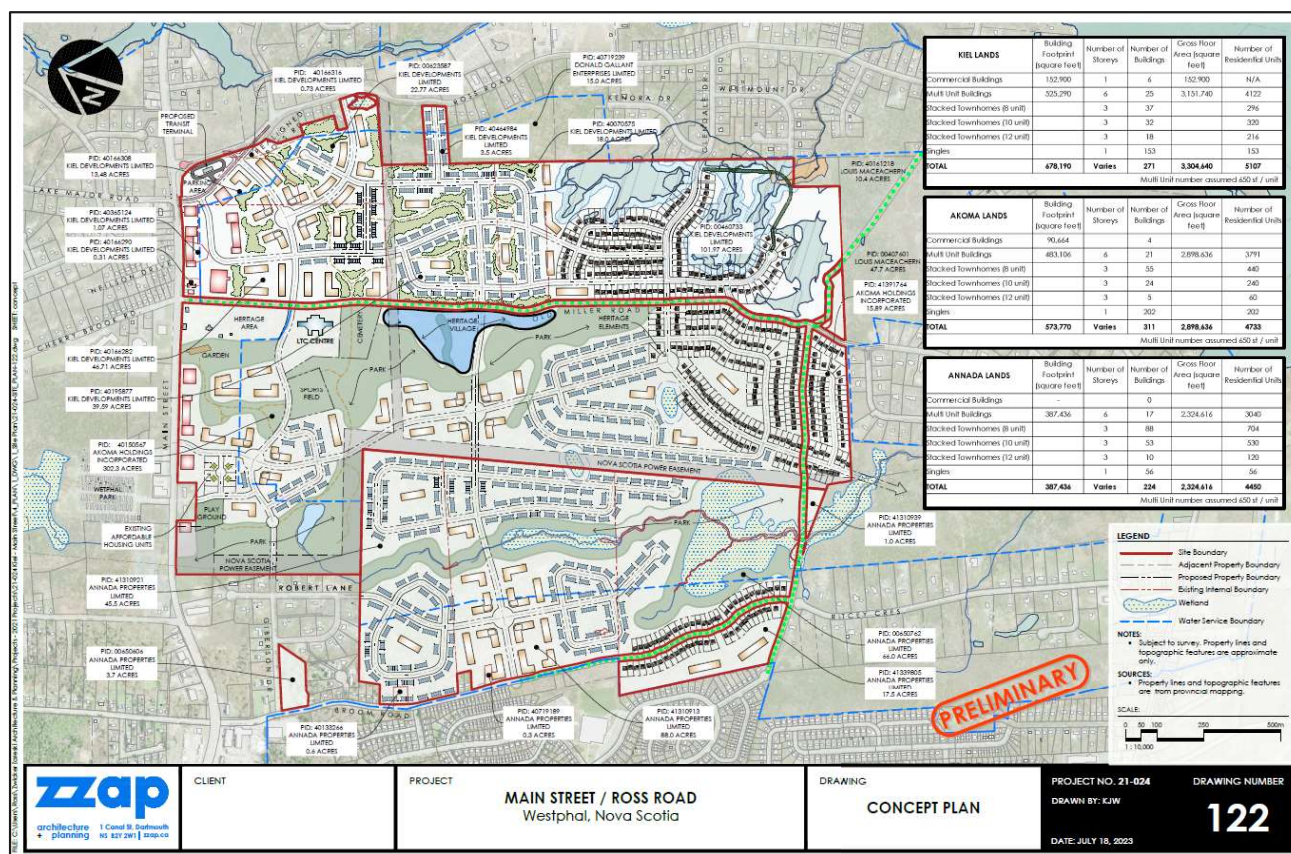


Figure 2-5 Kiel Developments, Akoma Holdings, and Annada Properties Concept Plan

2.2.1 Kiel Developments Limited

Kiel Developments owns PIDs 40166308, 40166282, 40195877, 40166316, and 623587 fronting on Highway 7 to the west of its intersection with Ross Road. Kiel's proposal incorporates a mixture of residential and commercial development spanning approximately 106 hectares. Their concept plan includes housing types ranging from single-unit dwellings to high-rise apartment structures including stacked townhomes, and multi-unit buildings. A small section of the land owned by the developer is located outside the Study Area between the northeast corner of the Study Area and Ross Road. A total of 32 eight-stacked units and 40 ten-stacked units in this area have been subtracted from the total stacked townhome count provided by Kiel on the development plan. Within the Study Area, the plan includes a total of 25 mid-rise multi-unit residential buildings. Assuming an average household size of 2.6 in the ground-based single-detached units and 1.8 in apartments in the stacked townhomes and multi-unit structures based on the 2021 Census Profile for HRM, we estimate the 5,035 residential units proposed by the concept will accommodate 9,793 new residents.

The concept plan shows access to the new community via a new road connection off Highway 7. A transit terminal and parking area are proposed for the northeast corner of Kiel's land. The terminal will be accessible from within the community as well as a new connection to Ross Road. Commercial uses are on the highway frontage where highway users can easily access them. The commercial area is, however, separated from the residential areas behind it.

The concept plan divides the residential development into three areas on Kiel's land providing progressively lower density from the north at Highway 7 to the south. Multi-unit apartment buildings are positioned immediately behind the commercial area and an area of stacked townhomes within which multi-unit buildings are interspersed, follows farther south. The balance of the area to the southern edge of the site focuses on single-unit dwellings.

The concept shows six commercial buildings with a total gross floor area (GFA) of 152,900 square feet. The overall concept does not show any dedicated park spaces, but areas that appear to be reserved wetlands are located on the eastern and southern edges of the single unit dwelling area at the southern end of the development.

Table 2-1 Summary of Kiel Proposed Land Uses

Kiel Development	Number of Storeys	Number of Buildings	Number of Residential Units	Persons per Unit	Total Population
Singles	1	153	153	2.6	398
Multi-units	6	25	4,122	1.8	7,420
Stacked Towns (8 unit)	3	33	264	2.6	1976
Stacked Towns (10 unit)	3	28	280	2.6	
Stacked Towns (12 unit)	3	18	216	2.6	
Commercial	1	6	0	NA	0
TOTAL		271	5,035		9,793

2.2.2 Akoma Holdings Incorporated

As seen in ., Akoma Holdings Incorporated owns the middle portion of the Study Area comprised of PIDs 40150567 and 41391764. The proposal prepared by zzap for Akoma lands mixes commercial, residential, and community uses over an area of approximately 129 hectares. The plan provides single-unit dwellings, stacked townhomes, and 25 mid-rise multi-unit buildings. Applying the average household size of 2.6 persons per ground-based unit and 1.8 per apartment, the concept will add approximately 4,733 residential units with a projected population of 9,273 new residents in the community.

The concept shows four commercial buildings with a total gross floor area (GFA) of 90,664 square feet. Similar to the proposal for Kiel's lands, the commercial component is adjacent to the highway to facilitate access. The concept is not as dense as the Kiel proposal with the inclusion of designated parks, a sports field, water feature, a cemetery, and heritage features. It includes the Nova Scotia Power easement in relation to the substation across the highway. The portion directly south of the highway includes commercial uses and a mix of multi-unit buildings and townhomes as well as the existing affordable housing units.

The Akoma lands are the site of the former NSHCC, which was recently added to HRM's Registry of Heritage Property. As such, the area has elevated significance for the African Nova Scotian and Halifax community. Development of the Akoma Holdings lands is an identified priority of the African Nova Scotian Road to Economic Prosperity Action Plan, which was noted in the RFP as a special consideration in the expected assessment of the Study Area. The concept includes a Heritage Area in the northern corner of the site. Like the Kiel concept plan, multi-unit apartment buildings and stacked townhomes follow the commercial development. The southern portion of the Study Area shows single-unit dwellings. This concept shows a higher number of multi-use apartment units compared to the townhomes and singles combined.

Table 2-2 Summary of Akoma Holdings Incorporated Proposed Land Uses

Akoma Holdings Incorporated	Number of Storeys	Number of Buildings	Number of residential Units	Persons per Unit	Total Population
Singles	1	202	202	2.6	525
Stacked Towns (8 unit)	3	55	440	2.6	1,924
Stacked Towns (10 unit)	3	24	240	2.6	
Stacked Towns (12 unit)	3	5	60	2.6	
Multi-units	6	21	3,791	1.8	6,824
Commercial	-	4	0	NA	0
TOTAL		311	4,733		9,273

2.2.3 Annada Properties Limited

Annada Properties owns 88 hectares comprised of PIDs 41339805, 00650762, 41310939, 00650762, 00650762, 41310921, 41310913, 41310939 adjacent to Broom Road on the western edge of the Study

Area. Broom Road is shown as the primary access to the site on the zzap plan. Secondary access is provided through new street connections to be built for development on the Akoma Holdings lands that zzap has suggested can be joined to Giberson Drive and Robert Lane, which are local roads within the Sunset Acres subdivision that abuts to the south. Residents in Sunset Acres also have access to Broom Road, although it appears to have a secondary role collecting traffic relative to Forest Hills Parkway on the west side of the subdivision.

The concept plan for Annada's lands shown in . consists entirely of residential development including single-unit dwellings, townhomes, and multi-unit buildings. In total, the concept shows 4,486 residential units. Applying the average household size of 2.6 persons per ground-based unit and 1.8 per apartment, the projected population will be 9,232. The northern two-thirds of the property is to be developed primarily with townhomes with three apartment structures interspersed and a cluster of 12 multi-unit buildings in the centre of the townhomes at the western edge of the site. The southern section of Broom Road to the intersection of Old Lawrencetown Road is to be subdivided for single-unit dwellings. Two apartment buildings are to be located behind single-detached properties on the west side of Broom Road. The plan proposes a park in the southeast corner of the site that surrounds a wetland and serves as a buffer. No commercial space is provided in the plan.

Table 2-3 Summary of Annada Properties Limited Proposed Land Uses

Annada Properties Limited	Number of Storeys	Number of Buildings	Number of Residential Units	Persons per Unit	Total Population
Singles	1	56	56	2.6	146
Stacked Towns (8 unit)	3	88	740	2.6	3,614
Stacked Towns (10 unit)	3	53	530	2.6	
Stacked Towns (12 unit)	3	10	120	2.6	
Multi-units	6	17	3,040	1.8	5,472
TOTAL		224	4,486		9,232

2.2.4 Jim Morash Construction Ltd.

In August 2021, Jim Morash Construction submitted a letter requesting to develop a small parcel at the end of Kenora Drive with the intent of subdividing the lot into five single family lots. The concept shows

Kenora Drive ending as a cul-de-sac from which the proposed lots will be accessed. The parcel is between lands owned by Kiel Developments Limited and the eastern edge of the Study Area. Applying the average household size of 2.6 persons per ground-based unit based on the 2021 Census Profile for HRM, the concept will add approximately 13 new residents to the Study Area. The concept proposed by the developer is seen in **Figure 2-6**.



Figure 2-6 Concept Plan, Jim Morash Construction Limited

2.2.5 Other Proposals

Stantec established contact with two owners of properties south of Old Lawrencetown Road. The landowners indicated neither is expecting to develop their lands in the short term. Both also suggested they are more inclined to lower density development than is reflected in the zzap scheme for lands between Highway 7 and Old Lawrencetown Road. Notwithstanding the intention of these current landowners, we have assumed these parcels will be developed in a similar pattern to the Kiel, Akoma, and Annada properties for the Developer-requested and Mid-density Scenarios. In the Low-density Scenario, in which it is assumed the Study Area will be developed without municipal piped services, all residential units are expected to be single-detached homes.

2.3 Development Scenarios

The RFP for this assignment specified that the consultant would assess the Study Area in terms of three scenarios. For each Study Area, Stantec prepared three conceptual development scenarios to estimate the potential developed land area and resulting population and non-residential gross floor area. This was used as background information to the various analyses of infrastructure servicing, water quality, and transportation impacts. These Development Scenarios should not be considered as a land use plan for any of the Study Areas. HRM will undertake further planning assessment as part of future development approvals for lands within each Study Area, if directed to proceed with secondary planning by the Province/Regional Council. The methodology for creating the Development Scenarios is explained in Volume 1.

The three scenarios created for the Westphal Study Area as discussed are:

1. **Developer Requested Density Scenario** – This scenario explores the proposed intentions of potential developers within the Study Area. As discussed throughout the report, Kiel Developments Limited, Akoma Holdings Incorporated, Annada Properties Limited, and Morash Construction Limited together own majority of the lands south of Highway 7 within the Study Area. They have communicated their intentions and propose to develop residential and commercial uses. A detailed review is provided in Section 2.3.1.
2. **Low-Density Scenario** – The Low-density Scenario assumes development with onsite wastewater services (i.e., septic). All development on all properties is assumed to be single-detached dwellings. A detailed review is provided in Section 2.3.2.
3. **Mid-Density Scenario** – As the Developer-requested Scenario was judged to reflect high-density development, Stantec created an intermediate or Mid-density Scenario in which the density proposed by developers was reduced to facilitate assessment of the contrast. The scenario applies low and mid-low-density housing typologies (i.e., single-unit dwellings, townhomes, and low-rise apartments) resulting in density that is roughly half the level achieved by the developer-submitted plans. A detailed review is provided in Section 2.3.3.

In the Water Quality analysis only, a fourth “areal” development scenario was created as a sensitivity test to assess water quality impacts from a smaller built-up land area. This scenario was developed by reducing the footprint of the developed area by 20%, leaving the anticipated population the same as the high-density scenario. The intent of this scenario is to model a new community built more compactly, and leaving more land in an undeveloped/vegetated condition.

Using the initial findings of the background review and updates to previous studies, Stantec has evaluated and identified three development possibilities for the Study Area. The scenarios consider the following criteria:

- Environmental considerations,
- Capacity to create mixed use development comprising residential and commercial uses,

- Creating a complete community following the principles of a walkable and transit-oriented neighbourhood,
- Provision of employment opportunities through incorporation of commercial and office space compatible with residential uses, and
- Inclusion of leisure, cultural, and recreational benefits essential for a wholesome lifestyle.

2.3.1 Developer Requested Scenario

The Developer Requested Density Scenario primarily reflects the intentions of Kiel Developments Limited, Akoma Holdings Incorporated, Annada Properties Limited and Jim Morash Construction Limited. The Kiel, Akoma, and Annada proposals all incorporate shares of apartments ranging from just under 70% to nearly 90%. Although the Morash proposal for five single-unit dwellings on 14 acres, of which roughly 8 acres are assumed to be developable reflects a semi-rural character, the overall Developer Requested Density Scenario is considered a High-Density Scenario. Together, all proposed residential developments within the Study Area under the Scenario total 18,040 dwelling units with an estimated population of 35,821 in a mixture of housing types as summarized in **Table 2-4**.

The large area of vacant, undeveloped land to the south of Old Lawrencetown Road covers approximately 216 acres. The properties belong to private owners who have not indicated immediate intentions to develop in interviews with Stantec team members or did not respond to Stantec's invitation to discuss their intentions. Given limited input from these owners and the positioning of the Developer-requested Scenario as the high-density option, we have assumed the pattern of development on these remaining lands will be equivalent to development north of Old Lawrencetown Road with 76.7% of dwelling units in apartment structures and 20.3% in stacked townhomes with just 2.9% accounted for by single-detached homes. Applying our general assumptions that 21% of the land should be reserved for wetland and watercourse protection and 20% for new street connections resulting in total developable land area of 150.6 acres (69% of 216 total acres), which will accommodate 7,523 residents at 50 ppa.

Table 2-4 Summary of the Proposed Development, Developer-requested Scenario

	Land Area (ac.)		Dwelling Units			Estimated Population		Commercial GLA (sq. ft.)		
Developer	Total	Developable	Unit Type	Unit Numbers	Density	Share by Type	Residents	Density	Per Resident	Total Area
Kiel Development	262	182.8	Singles	153		3.0%	398			
			Stacked Towns	760		15.1%	1,976			
			Multi-unit	4,122		81.9%	7,420			
			All types	5,035	27.5	100.0%	9,793	53.6	15.6	155,000
Akoma Holdings	318	221.8	Singles	202		4.3%	525			
			Stacked Towns	740		15.6%	1,924			
			Multi-Unit	3,791		80.1%	6,824			
			All types	4,733	21.3	100.0%	9,273	41.8	9.8	95,000
Annada Properties	217	151.2	Singles	56		1.2%	146			
			Stacked Towns	1,390		31.0%	3,614			
			Multi-unit	3,040		67.8%	5,472			
			All types	4,486	29.7	100.0%	9,232	61.0	0.0	0
Jim Morash Construction	14	9.9	Singles	5	0.5	100.0%	13	1.3		
Remainder	216	150.6	Singles	111		2.9%	288			
			Stacked Towns	769		20.3%	2,000			
			Multi-unit	2,901		76.7%	5,222			
			All types	3,781	25.1	100.0%	7,523	50.0	8.6	65,000
STUDY AREA	1,028	716.4	All development	18,040	25.2		35,834	50.0	8.6	310,000

Kiel Developments Limited has provided 155,000 square feet of commercial space. Akoma Holdings has proposed 95,000 square feet of commercial retail space, while the proposal for Annada Properties and the Morash plan do not include any commercial space. The overall ratio of commercial space to population for the four properties is 8.6 square feet per person, which we have applied to the population of 7,523 expected south of Old Lawrence to obtain an additional 65,000 square feet. The total commercial space within the Study Area will therefore be 310,000 square feet of gross leasable area or 8.6 square feet per resident.

2.3.2 Low-Density Scenario

The Low-Density Scenario assumed all development would be single-detached housing on on-site services resulting in a density of 1.0 dwellings per acre. Applying the ratio of 8.6 square feet of gross leasable area per person determined from the Developer-requested plans, the commercial space expected to complement the development is roughly 20,000 square feet. The total of 716 dwelling units results in an approximate population of 1,863 people as estimated by Stantec. A summary of the development statistics is shown in **Table 2-5**.

2.3.3 Mid-Density Scenario

Based on the densities assumed for other Study Areas, the assumed density of 25 ppa was applied to develop the Mid-Density Scenario for the Westphal Study Area. The scenario is based on roughly blending settlement patterns D (Urban Low-Density) and E (Suburban Mid Density) from the 2005 HRM document *Settlement Pattern and Form with Service Cost Analysis* also known as the Pattern Book. Applying the density figure to all developable land within the Study Area generated an estimated population of 17,909 occupying 11,673 dwelling units (**Table 2-6**).

Applying the ratio of 8.6 square feet of gross leasable area per person inferred from the Developer Requested Scenario, the commercial space expected to complement the Mid-density Scenario development amounts to 155,000 square feet.

2.4 Cumulative Effects

The lands within the Westphal Study Area are generally undeveloped and the different development scenarios could create significant development opportunities. Development in the Study Area will build on the area's notable history and the aspirations of the African-Nova Scotian community, for which this history has particular importance. It will however share components of local infrastructure with existing and potential development in the surrounding area, particularly the Morris Lake Expansion Study Area, which is subject to this Future Serviced Communities Study and will, most notably, access the same trunk wastewater network as the Westphal lands. Commitment to community needs will have a larger impact on the surrounding neighbourhood.

Table 2-5: Summary of the Proposed Development, Low-density Scenario

	Land Area (ac.)		Dwelling Units			Estimated Population		Commercial GLA (sq. ft.)		
Developer	Total	Developable	Unit Type	Unit Numbers	Density	Share by Type	Residents	Density	Per Resident	Total Area
Kiel Development	262	182.8	Singles	183	1.0	100.0%	475	2.6	8.6	5,000
Akoma Holdings	318	221.8	Singles	222	1.0	100.0%	577	2.6	8.6	5,000
Annada Properties	217	151.2	Singles	151	1.0	100.0%	393	2.6	8.6	5,000
Jim Morash Construction	14	9.9	Singles	10	1.0	100.0%	26	2.6		
Remainder	216	150.6	Singles	151	1.0	100.0%	391	2.6	8.6	5,000
STUDY AREA	1,028	716.4	All development	716	1.0		1,863	2.6	8.6	20,000

Table 2-6 Summary of the Proposed Development, Mid-density Scenario

Developer	Land Area (ac.)		Dwelling Units			Estimated Population		Commercial GLA (sq. ft.)	
	Total	Developable	Unit Type	Unit Numbers	Density	Share by Type	Residents	Density	Per Resident
Kiel Development	262	182.8	Singles	161		3.2%	418		
			Townhomes	799		15.9%	2,078		
			Multi-unit	4,054		80.9%	7,297		
			All types	5,014	27.4	100.0%	4,571	25.0	8.6
Akoma Holdings	318	221.8	Singles	121		4.3%	314		
			Townhomes	442		15.6%	1,150		
			Multi-unit	2,267		80.1%	4,081		
			All types	2,830	12.8	100.0%	5,545	25.0	8.6
Annada Properties	217	151.2	Singles	23		1.2%	60		
			Townhomes	569		31.0%	1,480		
			Multi-unit	1,245		67.8%	2,242		
			All types	1,837	12.1	100.0%	3,781	25.0	8.6
Jim Morash Construction	14	9.9	Ground-based	96		100.0%	249	25.0	
Remainder	216	150.6	Singles	55		2.9%	142		
			Townhomes	385		20.3%	1,002		
			Multi-unit	1,456		76.8%	2,620		
			All types	1,896	12.6	100.0%	3,764	25.0	8.6
STUDY AREA	1,028	716.4	All development	11,673	16.3		17,909	25.0	8.6
									155,000

3 Summary of Key Findings from the Background Studies

3.1 Westphal Land Suitability Analysis

The Westphal Land Suitability Analysis involved both desktop and field evaluations, supplemented by regional and local studies provided by other organizations. The desktop review included data from sources such as the Atlantic Canada Conservation Data Centre, Nova Scotia Department of Natural Resources and Renewables, and HRM. Despite valuable information from these studies, additional desktop and field work was necessary to fill gaps, particularly in wetland functional assessments and forest inventory. Field surveys were conducted from spring to fall 2023 aimed to gather further environmental data and assess cultural significance through an Archaeological Resource Impact Assessment. Final analysis covered wetland habitat, watercourses, water quality, forest habitat, species at risk, landscape connectivity, geology, and topography. Suitability for development was ranked from low (1) to high (3), with lower scores indicating higher ecological function and suitability for conservation and higher scores indicating relatively higher suitability for development. The study also identifies potential contaminated sites and areas with elevated archeological potential, recommending further investigations to manage risks prior to development. The full Land Suitability Analysis (LSA) Report can be found in **Appendix 4A**.

Wetland habitat was a significant focus, with 19 wetlands identified in the Westphal Land Suitability Analysis Summary (WLSAS). All 19 wetlands were evaluated using the Wetland Ecosystem Services Protocol – Atlantic Canada (WESP-AC) method. The analysis revealed that most wetlands scored high for ecological condition and wetland risk, indicating their importance for conservation. Stantec recommends that planners and developers engage with Nova Scotia Environment and Climate Change as early as possible to discuss potential wetland impacts (direct or indirect), the permitting process, and compensation requirements (e.g., potential opportunities for wetland restoration, enhancement, or creation). The full analysis of the wetlands desktop and field data can be found in **Section 3.2** in **Appendix 4A**.

The analysis of watercourses and water quality identified three mapped watercourses and one mapped waterbody. The Westphal Study Area is located within the Coastal Island and Little Salmon River Watersheds. The main watercourse within the Study Area drains from Broom Lake to the Atlantic Ocean. Water quality sampling indicated generally low levels of suspended sediments and concentrations of phosphorous indicative of meso-eutrophic conditions. Bacteria concentrations were frequently noted to exceed Health Canada's guidelines for recreational water quality. The study highlights the importance of protecting riparian zones and maintaining buffer zones around watercourses to preserve aquatic habitats and water quality. Areas within 30 m of a watercourse were considered to have low suitability for development. Areas between 30 m and 100 m from a watercourse were considered to have moderate suitability for development, while areas greater than 100 m from a watercourse were considered to have higher suitability for development. Prior to the development of lands within the Westphal Study Area, it is recommended that dedicated fish habitat assessments be conducted to determine the use of habitats by fish and to provide data to fulfill applicable regulatory requirements at the time of construction. Full

analysis and study details of watercourses and water quality can be found in **Section 3.2** of the LSA report in **Appendix 4A**.

Forest habitats and species at risk were assessed using the Nova Scotia Forest Ecosystem Classification system and data from the Atlantic Canada Conservation Data Centre. The study identified several forest types typically associated with habitats for species at risk, including mature and potential old-growth forests. The Province of Nova Scotia recently released an old growth policy and has desktop data for the entire province showing potential old growth forests. The policy is only applicable to Crown lands; however, they strongly encourage private developers to consider evaluating their forested lands for old growth prior to development. Stand level and species data is in the individual LSA reports Appendix 4A. The analysis underscores the ecological value of these habitats and the need for careful planning to balance development with conservation. Forest habitat and species at risk are the focus of **Section 3.4** in the LSA in **Appendix 4A**. The report also addresses landscape connectivity, proposing wildlife corridors to link habitat patches and facilitate species movement (**Section 3.5 Appendix 4A**).

Stantec divided the final LSA mapping into two cumulative analyses: one focusing on the project's biological components and the other on geological/topographic information. While acknowledging the relationship between these analyses, this approach was chosen to enhance the decision-making process for users from a landscape planning perspective, whether for development or conservation pathways. Areas with higher ecological function, such as wetlands, mature forests, and potential habitats for species at risk, are generally deemed less suitable for development and more suitable for conservation. Conversely, areas with existing disturbances often have fewer ecological features and are considered more suitable for development (**Figure 3-1**). Geological and Topographical mapping highlights potential constraints relating to steeper slopes and potential for acid rock drainage (**Figure 3-2**). The study provides a framework for future planning and decision-making, emphasizing the need for ongoing evaluations and stakeholder engagement to promote sustainable development in the Study Area. The LSA and mapping can be found in **Appendix 4A** of this report.

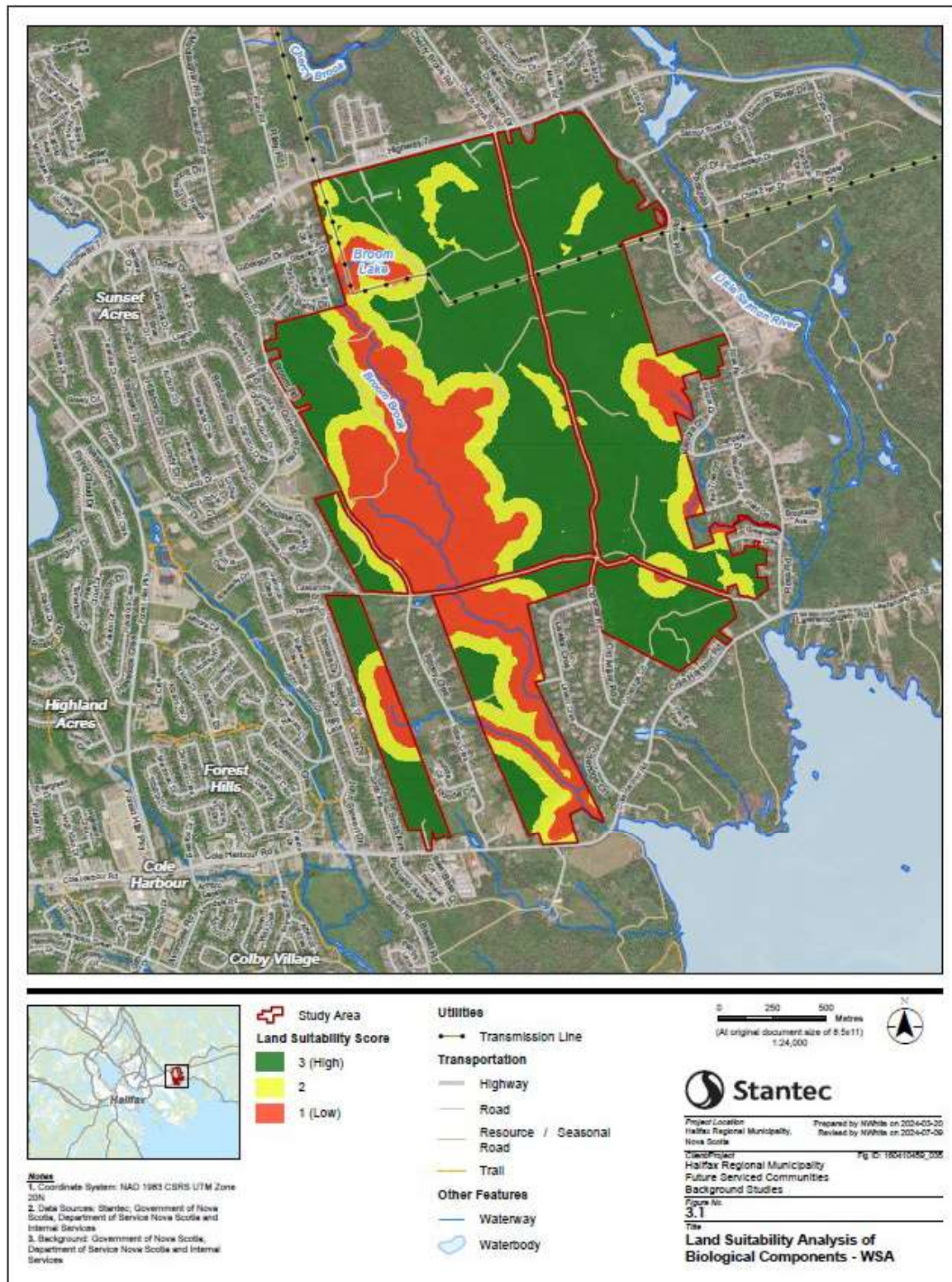


Figure 3-1 Land Suitability of Biological Components

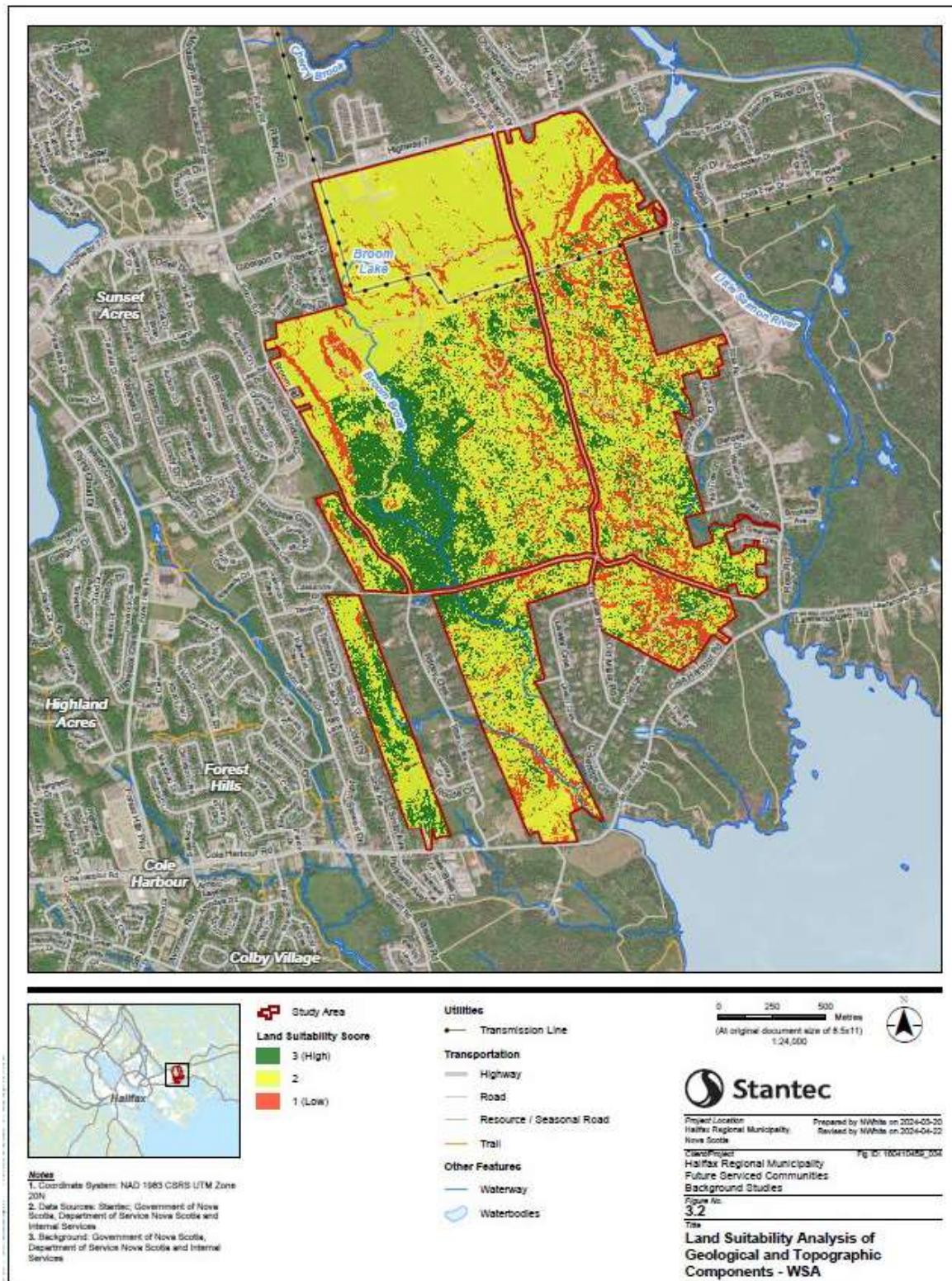


Figure 3-2 Land Suitability Analysis of Geological and Topographic Components

3.2 Westphal Watershed and Stormwater Study

3.2.1 Water Quality Findings

The Westphal Watershed and Stormwater Study, prepared by Stantec Consulting Ltd. for HRM, assessed both the water quality impacts and stormwater runoff quantity impacts of proposed land developments within the Study Area and its contributing watershed. The water quality study focused on three key contaminants: phosphorus, fecal coliform (FC), and sediment, which are known to adversely affect water bodies and watercourses, while the conceptual stormwater management plan focused on developing stormwater management measures to restrict post-development peak flows from the Study Area to pre-development levels up to and including the 100-year storm.

The objective of the Watershed Study is to determine water quality impacts to sensitive or natural receptors within or downstream of the Study Area. The focus of the water quality study is on sourcing and quantifying contaminant loadings of total phosphorus (TP), fecal coliforms, and sediment due to impacts of land-use change and its contributing watershed area from proposed development scenarios. These specific contaminants were selected because of their documented adverse effects on waterbodies throughout the HRM.

In the Watershed Study, contaminant loading models for three land development scenarios (Low-density, Mid-density, and High-density/Developer requested) were evaluated to understand the potential water quality effects resulting from each scenario. In addition to the three development scenarios, a fourth 'areal' scenario incorporates the same housed population as the Developer-requested Scenario; however, this scenario covers 20% less land area compared to the developer-requested scenario. This additional scenario was evaluated to assess the impact of development on the watershed when forested area is conserved within the watershed.

Each scenario was modeled to predict the following changes in contaminant loading and the resulting impacts on water quality:

- **Phosphorus Loading:** Area and concentration-based Total P loadings associated with land uses within the watersheds that include the WSA are largely generated by anthropogenic sources, namely low-density residential and roads. These two land uses contributed approximately 85% of the loading for the existing condition and development scenarios. The annual Total P load in the low-density scenario includes P loading from on-site wastewater systems. Total P loads from residential land use are mitigated in the existing condition and medium density, development scenarios by municipal wastewater services and centralized wastewater treatment, which remove these additional loads from the watershed. The existing condition annual Total P loading was calculated to be 2,039 kg/year. For the proposed development scenarios, the areal land use scenario resulted in the lowest increase in Total P loading for the annual loading calculations with an increase in load of 5.7%. This is compared to annual loading increases of 15.1% for the low-density scenario; 6.1% for the medium-density scenario and 6.5% for the high-density scenario.
- **Fecal Coliform:** The EMC-based model results, area, and concentration-based FC loadings within the WSA are largely generated by residential developments, commercial developments, and

undeveloped/grassed areas for the existing conditions and development scenarios. The increase in annual FC load from baseline conditions for each of the development scenarios was 6.6%, 7.7% and 8.1% for the low-density, medium-density, and developer requested scenarios, respectively, whereas the areal land use scenario was similar to the low-density scenario at 6.6%.

- **Sediment Loading:** Sediment load modelling using MUSLE and RUSLEFAC calculations for the Low-density, Developer requested and High-density development scenarios. The baseline sediment loading was estimated to be 2,056 tonnes per year, with approximately 841 tonnes deposited during a storm event. For the proposed development scenarios, the Areal land use scenario resulted in the lowest sediment load for the annual loading and storm-event loading calculations with an increase in load of 5.5% and 4.8%, respectively. This is compared to annual loading and storm-event loading increases of 6.5% and 5.7% for the Low-density scenario; 6.5% and 5.7% for the Medium-density scenario and 6.6% and 5.8% for the High-density scenario. The addition of roads, and disturbance of soils during construction of the development scenarios have the potential to increase sediment loading in the watershed.

Full analysis and study details of the Watershed Study are included in **Appendix 4B**.

The Watershed Study outlines a number of approaches to reduce the impacts of new urban development on the watercourses in the Study Area. These include:

- For the Low-density Scenario, centralized wastewater treatment should be considered to reduce total phosphorus loads from the on-site wastewater systems;
- Land use management practices - promotion of green space creation or conservation of naturally forested areas, minimizing impermeable surfaces;
- Low-impact design technologies - infiltration trenches, porous pavement, wet pond or wet detention basin;
- Public education initiatives - public education on the management of pet droppings and the risks associated with swimming in areas where wildlife congregates; and
- Ongoing water quality monitoring.

The study underscores the need for careful planning and implementation of mitigation measures during subsequent stages progressing to future development. The findings highlight the importance of balancing urban growth with environmental stewardship to ensure the long-term health of the watershed.

3.2.2 Existing Flood Risk Findings

Existing policies and regulations provide direction to limit development in flood risk areas. The Province of Nova Scotia has adopted a Statement of Provincial Interest Regarding Flood Risk Areas. The goal of the statement is to protect public safety and property, and to reduce the requirement for flood control works and flood damage restoration in floodplains.

Much of the Study Area is within two watersheds (i.e., the Little Salmon River and Shore Direct watersheds) that drain into Cole Harbour, with a small portion draining into the Cow Bay River watershed. The floodplain extents along the watercourse significantly impact the development constraints in the study area. Preliminary flood lines (i.e., subject to change) were provided by HRM from the on-going Regional Flood Mapping Delineation project and were used to estimate boundary conditions for the hydraulic/hydrologic model during various return periods and to delineate preliminary floodplain extents as shown in **Figure 3-3**.

The Statement of Provincial Interest Regarding Flood Risk Areas outlines that planning documents must identify *Flood Risk Areas* consistent with the Canada-Nova Scotia Flood Damage Reduction Program mapping and any locally known floodplain. For *Flood Risk Areas* that have been mapped under the Canada-Nova Scotia Flood Damage Reduction Program, planning documents must be reasonably consistent with a number of guidelines that explain what is permitted and what is prohibited within floodways and floodway fringe areas. The Statement also outlines that there are other areas in the Province that are subject to flooding which have not been mapped under the Canada-Nova Scotia Flood Damage Reduction Program. In these areas, the limits of potential flooding have not been scientifically determined. However, where local knowledge or information concerning these floodplains is available, planning documents should reflect this information and this statement. The Statement does permit development contrary to the Statement provisions, provided a hydrotechnical study carried out by a qualified person shows the proposed development will not contribute to upstream or downstream flooding or result in a change to flood water flow patterns. Given that the Study Area is within the preliminary floodplains of two watercourses (i.e., the Little Salmon and Cow Bay Rivers), the provisions outlined in the Statement of Provincial Interest Regarding Flood Risk Areas should be met.

The Regional Municipal Planning Strategy (RMPS) and Land Use By-law (LUB) for Cole Harbour/Westphal contain recommendations to develop floodplain mapping for the Little Salmon, Bissett, and Smelt Brook River systems, as well as policies and regulations regarding watercourse and coastal area setbacks and buffers, and development restrictions. While this project does not include floodplain mapping for the Little Salmon River or the Broom Brook, the policies and regulations included in the municipal standards should be considered for the Westphal Study Area through future planning reviews.

The PCSWMM software was used to create an existing drainage condition model that includes the existing watercourses and two existing culvert crossings, as identified from the HRM Open data source with the objective of estimating existing peak flows along the watercourses and establishing target peak flows for the post development conditions. As shown in **Figure 3-3**, Culvert 19 is located along Broom Brook, crossing Cole Harbour Road, while Culvert 20 is located along the Little Salmon River tributary, crossing Ross Road. Results from the existing condition stormwater model suggest that Culvert 19 appears to be undersized and will need to be upgraded.

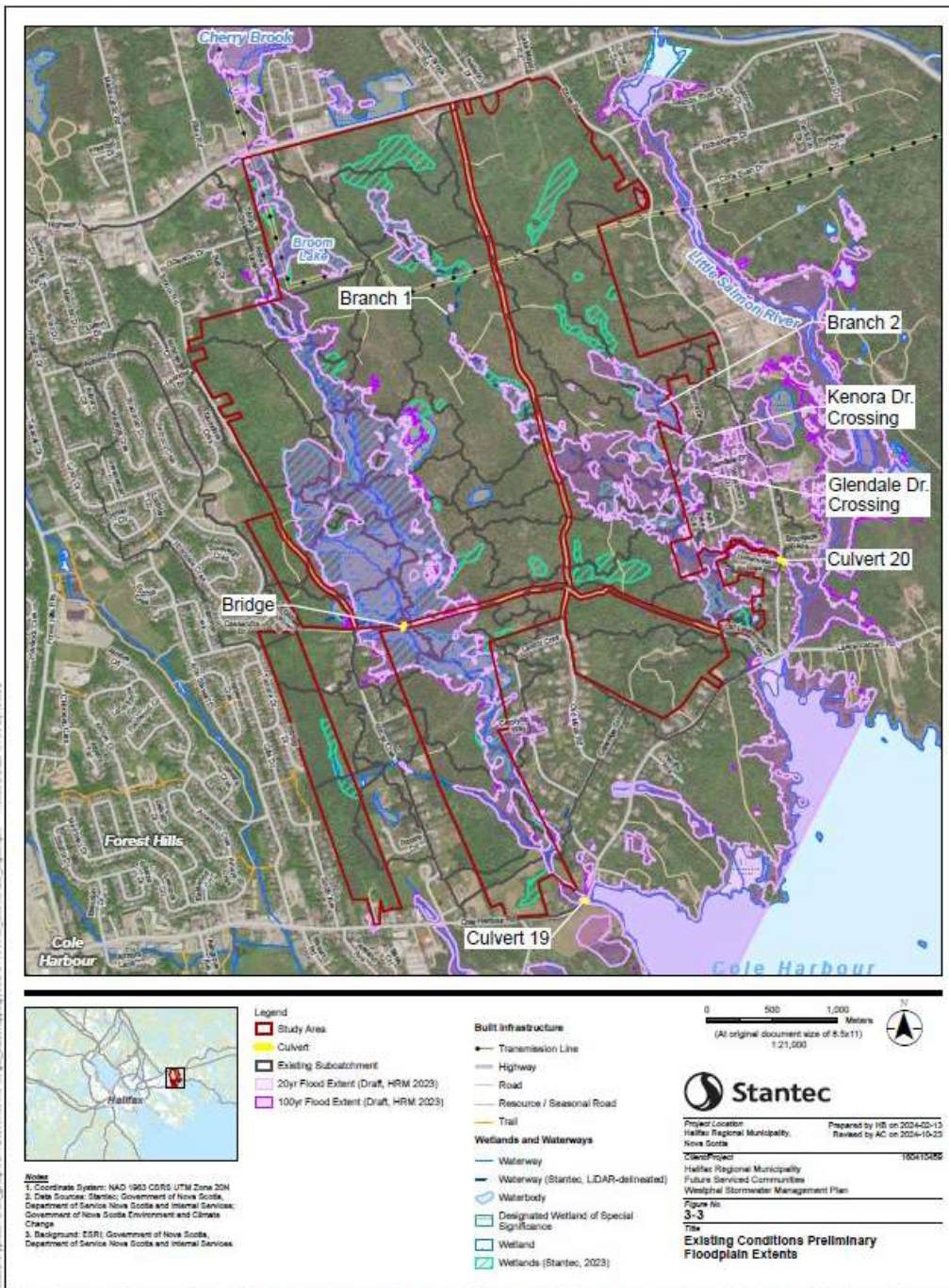


Figure 3-3 Existing Conditions Preliminary Floodplain Extents

However, without finalizing development plans or calibrating the hydrologic/hydraulic model to confirm design water levels and peak flows, upsizing of this culvert was not completed as part of this conceptual design. It is recommended that further hydraulic analyses be completed at the detailed design stage of this culvert upgrade, if the upgrade is considered prudent, to assess flooding impacts downstream. It is important to note that culvert upgrades will result in peak flow increases downstream, during low tide conditions, but will likely reduce the flooding risk of Cole Harbour Road in the vicinity of the culvert. Culvert sizing as a whole should be confirmed during later stages of planning and design.

3.2.3 Conceptual Stormwater Management Plan

To assess stormwater management (SWM) measures and best practices, Stantec developed a conceptual grading plan for the Study Area, based on the road and development concept plans provided by the landowners. This conceptual grading plan will likely change with any subsequent phases of community planning as the concepts evolve. The High-density Scenario, which results in larger impermeable surfaces, was used for planning, with a focus on maintaining existing drainage patterns and incorporating stormwater management measures. It should be noted that the SWM strategies for the High-density Scenario will also be applicable and effective for the Low and Mid-density Scenarios.

Post development sub-catchments were developed based on existing topography, proposed grading, and the High-density Scenario concept plan. A hydrologic/hydraulic modeling exercise was completed in PCSWMM for different return periods based on estimated boundary conditions from the preliminary HRM flood lines to size required storm drainage infrastructure and outline resulting SWM strategies. Please refer to **Appendix 4B** for details on the conceptual SWM plan.

The conceptual SWM plan illustrates conceptual trunk storm sewers at key locations, sized to convey the 5-year storm under free flow conditions. The SWM plan also shows conceptual SWM pond locations and overall drainage areas to the proposed SWM ponds. The final number, location, and size of the SWM dry ponds is to be confirmed based on best engineering principles and detailed floodplain mapping for the area, including flow monitoring and model calibration.

To restrict post-development peak flows to pre-development levels up to the 100-year storm event, seven dry ponds are proposed. The location and sizing of dry ponds presented in this study provide an estimate of storage volumes required to mitigate post development peak flows, based on the information available at the time. However, the pond locations encroach the estimated flood extents and will require revision to avoid flooding risks and backwater effects in the ponds and associated stormwater infrastructure (see **Figure 3-4**).

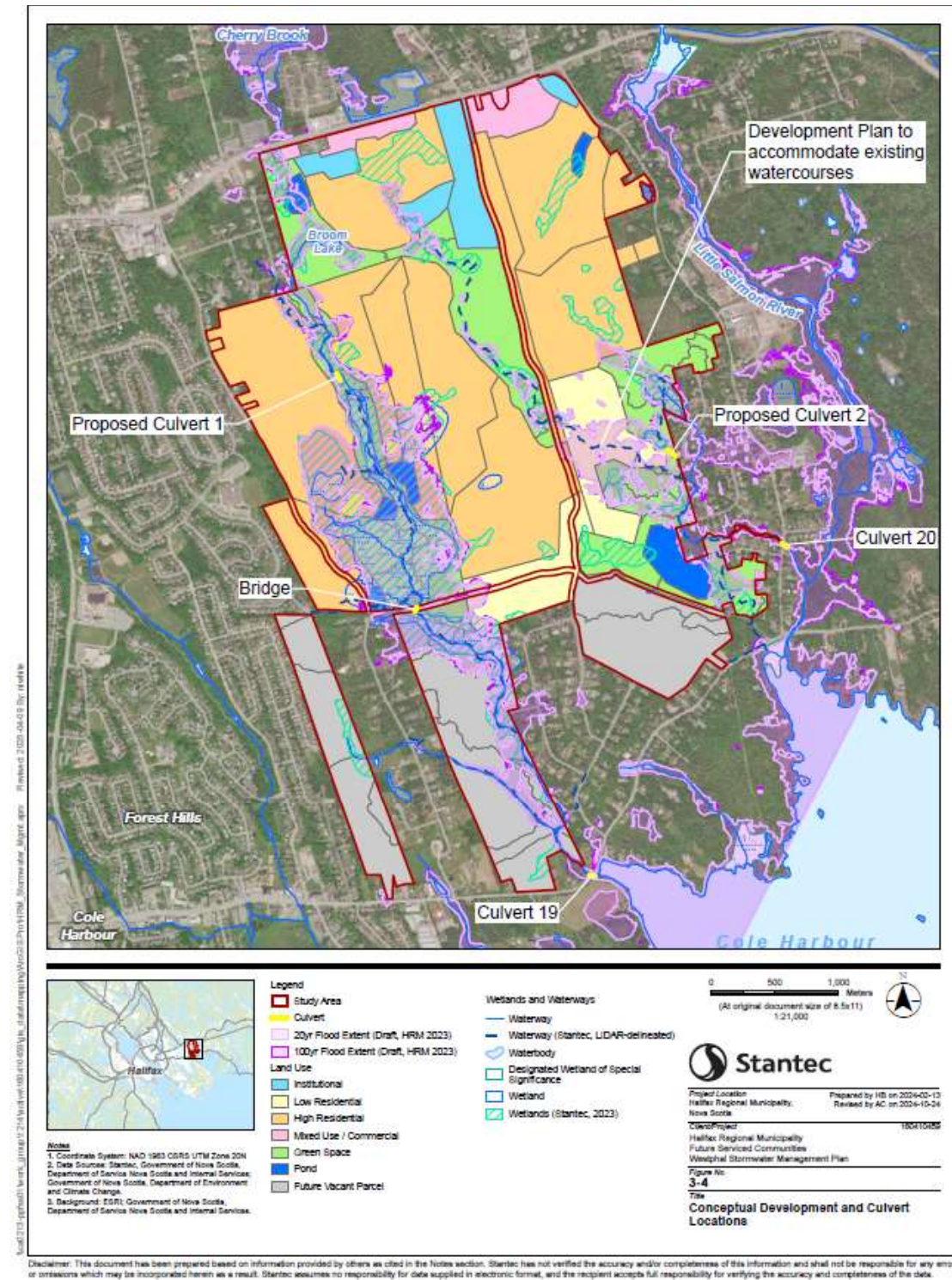


Figure 3-4 Proposed Sub-catchments and Culvert Locations

Given that Halifax Water currently does not have a mandate for water quality and cannot devote the budget for this purpose, quality control of runoff for the Study Area is to be provided by land developers through different techniques as follows:

Best Management Practices (BMPs):

- **Lot-Level Measures:** Directing residential roof runoff to vegetated surfaces and introducing vegetated swales.

Low Impact Development (LID) Measures: Infiltration trenches, bioswales, and other measures to filter and infiltrate runoff before it reaches watercourses.

Green Infrastructure:

- **Vegetated Filter Strips and Swales:** Designed to process and reduce runoff from impervious surfaces.
- **Native Species Plantings:** To absorb stormwater, decrease runoff, enhance water quality, and support biodiversity.

Erosion and Sedimentation Control:

- Implementing measures to prevent sediment from entering watercourses during construction activities

The following is a summary of key points concluded from the stormwater analysis:

- The stormwater management plan for the Study Area includes storm sewers sized for the 5-year storm at 80% full flow pipe capacity, overland flow routing to end-of-pipe SWM facilities and seven SWM dry ponds designed to restrict post-development peak flows to existing watercourses to pre-development values for up to and including the 100-year storm. However, the analysis has identified important limitations and vulnerabilities in the layout provided by the developer. Although this layout was used to assess the feasibility of controlling post-development peak flows, it requires critical consideration of key elements. The proposed development layout and associated stormwater management should be thoroughly revised based on further analysis of the land use distribution and the siting of SWM ponds, as well as detailed hydraulic modeling to confidently mitigate risks of flooding and reduce risks of degradation to the natural assets within the Study Area. High-density land uses can potentially reduce the footprint of development and help to maintain development and stormwater management infrastructure away from flooding risk areas.
- Due to the resulting volumetric requirements of conceptual SWM Pond 3, it is recommended to explore the feasibility of incorporating an additional SWM pond upstream at the detailed design stage to reduce the overall drainage area to the SWM ponds and the resulting volume requirements.

- Two proposed watercourse crossings have been identified within the development area based on the conceptual plans provided by landowners. The proposed culverts were conceptually sized to convey the peak flow during the 100-year design storm event, thereby reducing the risk of flooding and infrastructure damage. However, the final location of watercourse crossings will change as the development plan progresses.
- Part of the current development plans infringe on the preliminary 100-year floodplain and should be revised to satisfy HRM by-laws and the Nova Scotia Statement of Provincial Interest regarding Flood Risk Areas.
- Part of the planned development area overlaps portions of the existing watercourses. These watercourses need to maintain dedicated connectivity to their receiving waterbodies unless otherwise specified in future environmental assessments.

Based on the key points provided above, the following is a summary of stormwater recommendations:

- The conceptual development plan should be revised to accommodate existing watercourses and wetlands, unless otherwise specified in future environmental assessments.
- Flow monitoring in the watercourses and subsequent model calibration should be completed to confirm regulatory floodplain limits, and proposed pond sizes and locations.
- No active development should be permitted within the limits of the 100-year regulatory floodplain. Some reduced risk uses may be considered in agreement with HRM by-laws and the Nova Scotia Statement of Provincial Interest regarding Flood Risk Areas. This is subject to design considerations that effectively mitigate and/or minimize the impact of such development on the floodplain and protect the riparian corridor functions.
- A detailed geotechnical investigation is recommended to be completed at the detailed design stage. Geotechnical recommendations should be provided for the proposed SWM ponds, grade-raise restrictions, and the feasibility of LID techniques in the area.
- The feasibility of implementing an additional SWM pond upstream of SWM Pond 3 should be investigated during future design stages to reduce the current development area tributary to SWM Pond 3.
- Consider a revision of land use distribution to increase high-density uses, reduce development footprint, and facilitate the location of the proposed SWM ponds in order to inform the design of an effective and sustainable stormwater management plan.
- The development concept plan should be revisited to ensure SWM ponds are located outside of the 100-year floodplain and/or delineated wetlands, to maximize the use of natural areas considering the recommendations of the LSA, to consider high-density land uses that reduce sprawl to achieve this purpose, and to inform the revision of the proposed development layout and stormwater management plan to reduce risk of flooding and degradation to natural assets in

the Study Area. The current layout includes SWM ponds in or close to areas under risk of flooding.

- Future development phasing should start in higher areas outside the identified preliminary floodplain and detailed floodplain mapping be completed to confirm floodplain extents and development setbacks as future developments move closer to the identified preliminary floodplain.
- In future stages of site planning and development, the development plan should be revised to relocate residential development and SWM ponds that are currently close to or within the potential floodplain. By pulling back the development, and potentially adding density to the remaining area, the population/development yield of the site could remain similar, and it could reduce the potential risks associated with flooding. The Land Suitability Report outlines that areas within 30 m of a watercourse have low suitability for development. Minimum setbacks to the watercourses in excess of the 30 m identified in the Land Suitability Report must be studied on a site-specific basis during subsequent area planning.
- Retaining native and existing ground cover should be prioritized where possible to preserve ecosystem service function, reduce volume of runoff discharged into watercourses, promote infiltration, and provide an opportunity for evapotranspiration.
- Implementing structural LID measures within public property to reduce contaminant loads for the development area to achieve contaminant loads of existing conditions.
- Implementing erosion and sedimentation control measures to mitigate effects from development during construction, as well as implementing construction sequencing to minimize the quantity of soil exposed at any given time to prevent erosion.

3.3 Westphal Development Servicing Scenario

The Westphal Development Servicing Scenario is detailed in **Appendix 4C**. The report addresses the following with respect to development in the Westphal Study Area:

- Design criteria and regulatory considerations,
- Development scenarios,
- Potable water serviceability,
- Existing wastewater collection system, and
- Development grading.

Conceptual servicing plan measures to meet the established design criteria and upgrades required to regional infrastructure for water and wastewater servicing are also discussed.

3.3.1 IMP – East Region Wastewater Infrastructure Plan Final Report Vol. 5

As noted in the Wastewater Infrastructure Master Plan 2019 (IMP), growth in this region has been considered to be largely tributary to the gravity pressure trunk sewer to the Eastern Passage Wastewater Treatment Facility (WWTF) via the Bissett Lake PS. Only a modest flow increase has been assigned to the nearby Memorial Drive Pump Station, and largely to control local flooding and I/I concerns.

3.3.2 Regional Water

The IMP did not consider the Westphal Study Area a planned growth area; therefore, the need for regional water system improvements to service the subject land has not been previously identified. However, the IMP notes that the Lake Major system supply does not have sufficient capacity to accommodate expected growth to the year 2046. It was estimated that by 2031 75% of the supply capacity will be used, and by 2041 demand will reach 90% of the supply capacity, triggering the need for a new supply source. These proposed timelines did not include servicing the Westphal development.

The IMP noted that it is not possible to increase the withdrawal permit from Lake Major and that there is little or no opportunity to cost effectively develop a new source near the Lake Major network. However, it is possible to alleviate some of the demand on Lake Major through a system connection from the Pockwock network.

Given the relatively small diameter watermain in Main Street (300 mm), Ritcey Crescent (300 mm), and Ross Road (250 mm), it is suspected that the full regional water model will identify the need for improvements to existing infrastructure to service the Westphal development. This should be confirmed through the development of the new IMP.

Two potential infrastructure improvements have been identified that could potentially improve the serviceability of the Westphal development and should be further explored in the regional hydraulic model. These include the following:

- Option 1: A new reservoir at the high elevation point, adjacent to MacLaughlin Road. The tank would be fed from the existing 1,050-mm transmission main in MacLaughlin Road (from the Lake Major Water Treatment Facility). A dedicated transmission main connected to the new tank would then be needed in MacLaughlin Road south to Highway 7, then east along Highway 7 to the Westphal site. The ground elevation of the tank site is approximately 80-85m. Given the highest elevation in the Westphal development is approximately 60m, to establish 50 psi at the 60m the low operating level of the tank would need to be around 95-96m (ignoring friction loss).

Given the significant difference in maximum day demand (MDD) between the low and high population density scenarios (800 Lpm vs 12,251 Lpm, respectively) an approximate tank volume has not been estimated. Transmission main diameter of 600 mm has been assumed but should be further evaluated. **Figure 3-5** illustrates Option 1.

- Option 2: Involves installing a new 600-mm diameter watermain in Main Street (Hwy 7) and Cole Harbour Road from the existing 600-mm watermain on Wildwood Boulevard/Forest Hills Parkway to the Westphal development, as illustrated in **Figure 3-5**.

3.3.3 Wastewater

The Study Area is expected to impact the conveyance upgrades identified in the 2020 WIP; in particular, the pressure-gravity system and the Bissett Lake, Caldwell Road, and Memorial Drive Pump Stations. These linear upgrades were identified as needed between 2031 and 2046 in the 2020 WIP. It may be feasible to incorporate the Westphal land contribution in these upgrades; however, the magnitude of the flow may trigger other options as being more favorable.

This consideration merits the use of Halifax Water's updated hydraulic model assessed in context of regional servicing needs within the framework of the IMP. This includes alternative evaluations to determine a preferred regional servicing and infrastructure upgrade strategy that best accommodates the broader needs and goals of HRM and Halifax Water. This note is also applicable to the Morris Lake Study Area lands and the cumulative impact both these growth areas can have.

It is further recommended that Halifax Water and HRM revisit the technical and financial evaluations of the servicing strategy for the Eastern Passage WWTF. A cost-benefit analysis would enhance confidence that the implemented servicing strategies to come are best aligned with Halifax Water and HRM priorities, while maintaining or enhancing service to existing residents and proactively planning those infrastructure upgrades required to maintain this same level of service to future growth areas. Such an analysis would align well within the context and scope of an IMP update.

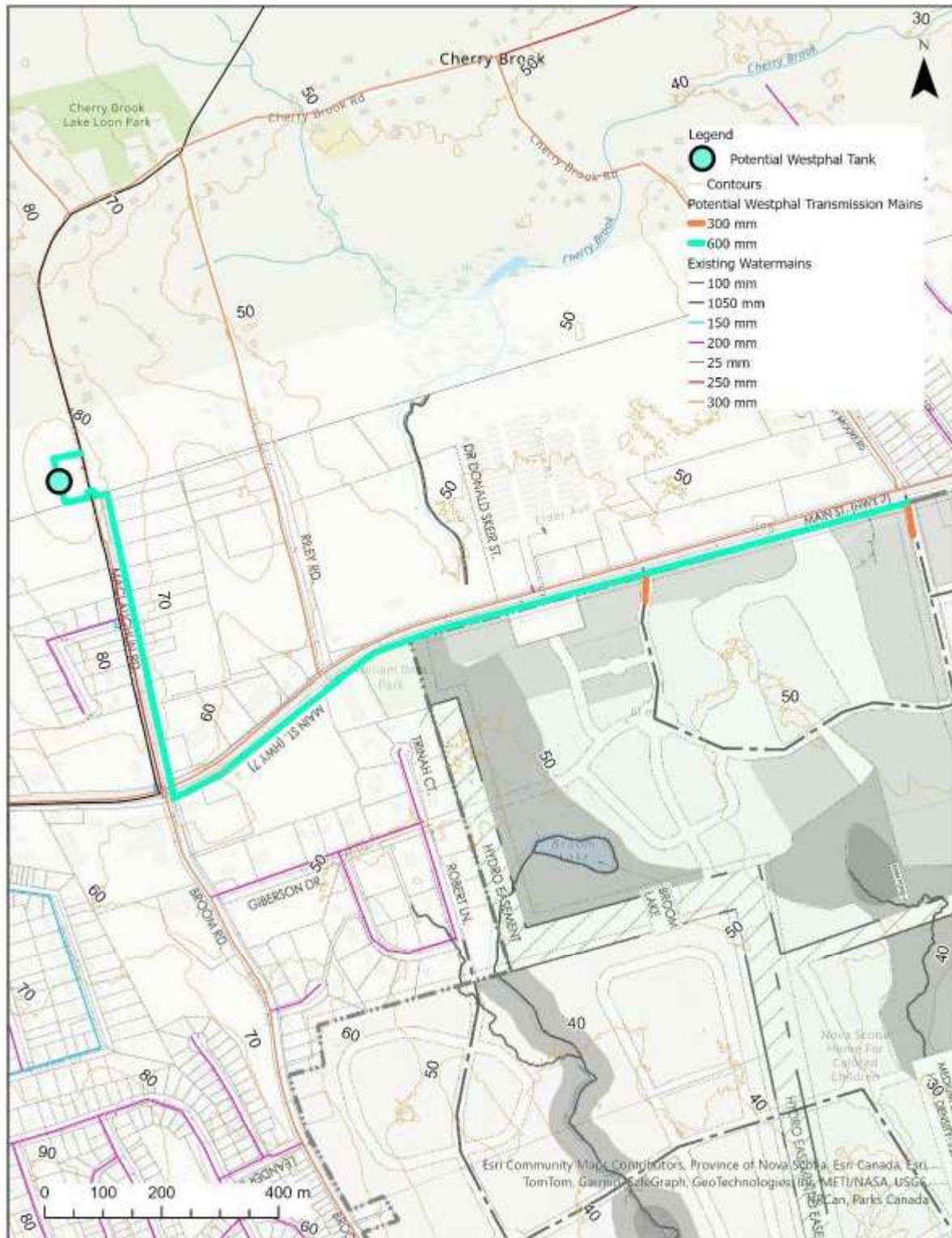


Figure 3-5 Option 1: New Tank and Transition Main

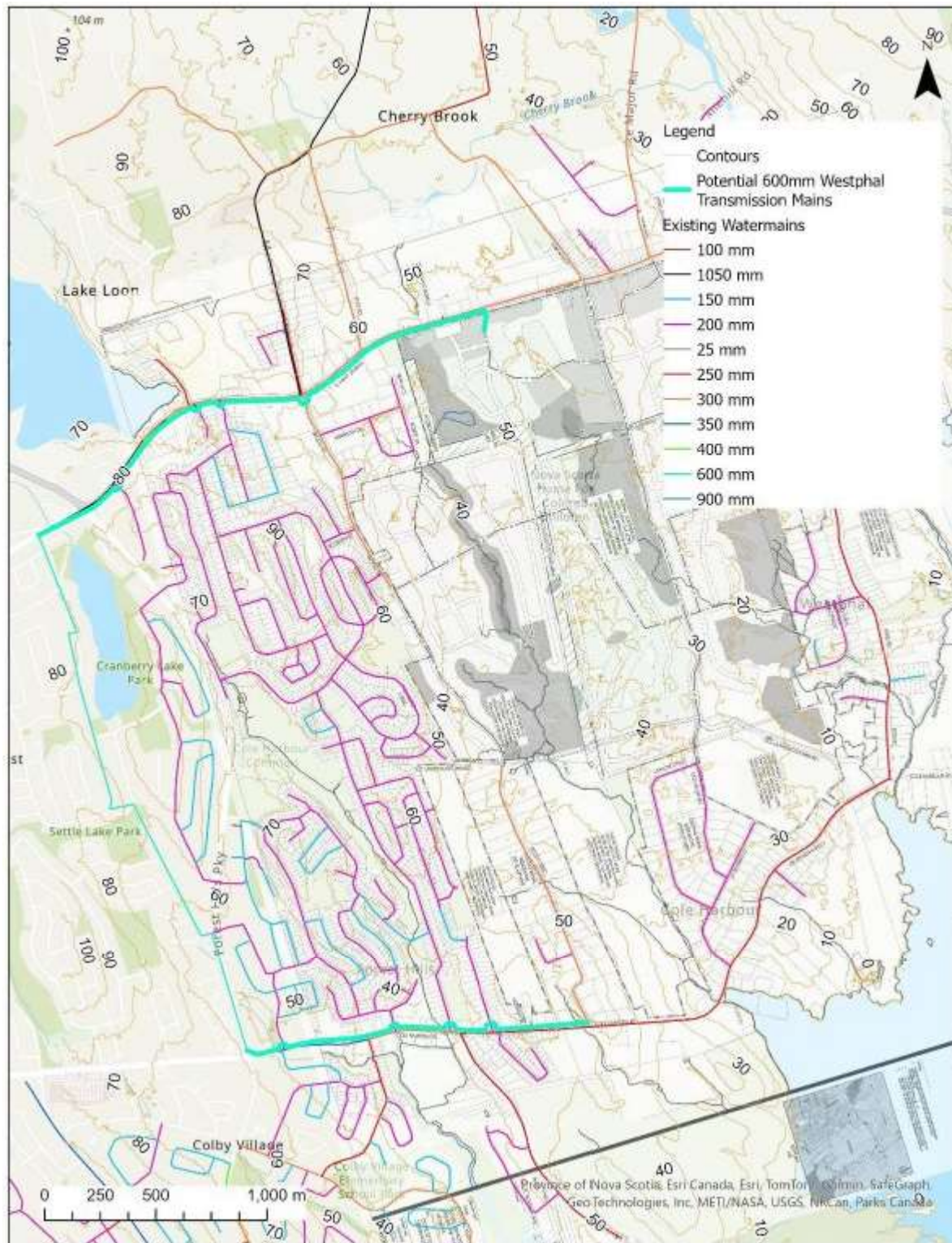


Figure 3-6 Option 2: Upsizing Main Street and Cole Harbour Road Watermains

3.3.4 Potable Water Infrastructure

The proposed Westphal development is adjacent to the Ross Road Low, Ritcey Low, and 24 East High-pressure zones. These pressure zones are included in the Lake Major system and are serviced by the Lake Major Water Treatment Facility.

The hydraulic grade lines (HGL) of the adjacent pressure zones are summarized in the following table and illustrated in **Table 3-1**.

Pressure Zone	HGL (m)	HGL (ft)
Ross Road Low	71-74	233-242
Ritcey Low	88-91	290-300
24 East High	116-119	380-390

Table 3-1 Adjacent Pressure Zones Hydraulic Grade Lines

Comparison of the serviceable elevation ranges of the adjacent pressure zones to the development elevation ranges indicates that the re-delineation of the three pressure zones can accommodate the development from a pressure perspective. However, pressures within the Westphal development area serviced by the 24 East High zone are anticipated to be greater than the range specified in Halifax Water's *Design Specifications and Supplementary Standard Specifications for Water, Wastewater & Stormwater Systems, 2023* (DS & SSS). In these areas pressure reducing valves installed on the water service lines (in accordance with Halifax Water Stormwater Systems Strategy) should be considered. Alternatively, a new pressure zone south of Highway 7 may also be considered during the next design phase. It is assumed the new pressure zone would be controlled by a pressure reducing valve from the 24 East High-pressure zone. The proposed pressure zone re-delineations are illustrated in **Figure 3-7**.

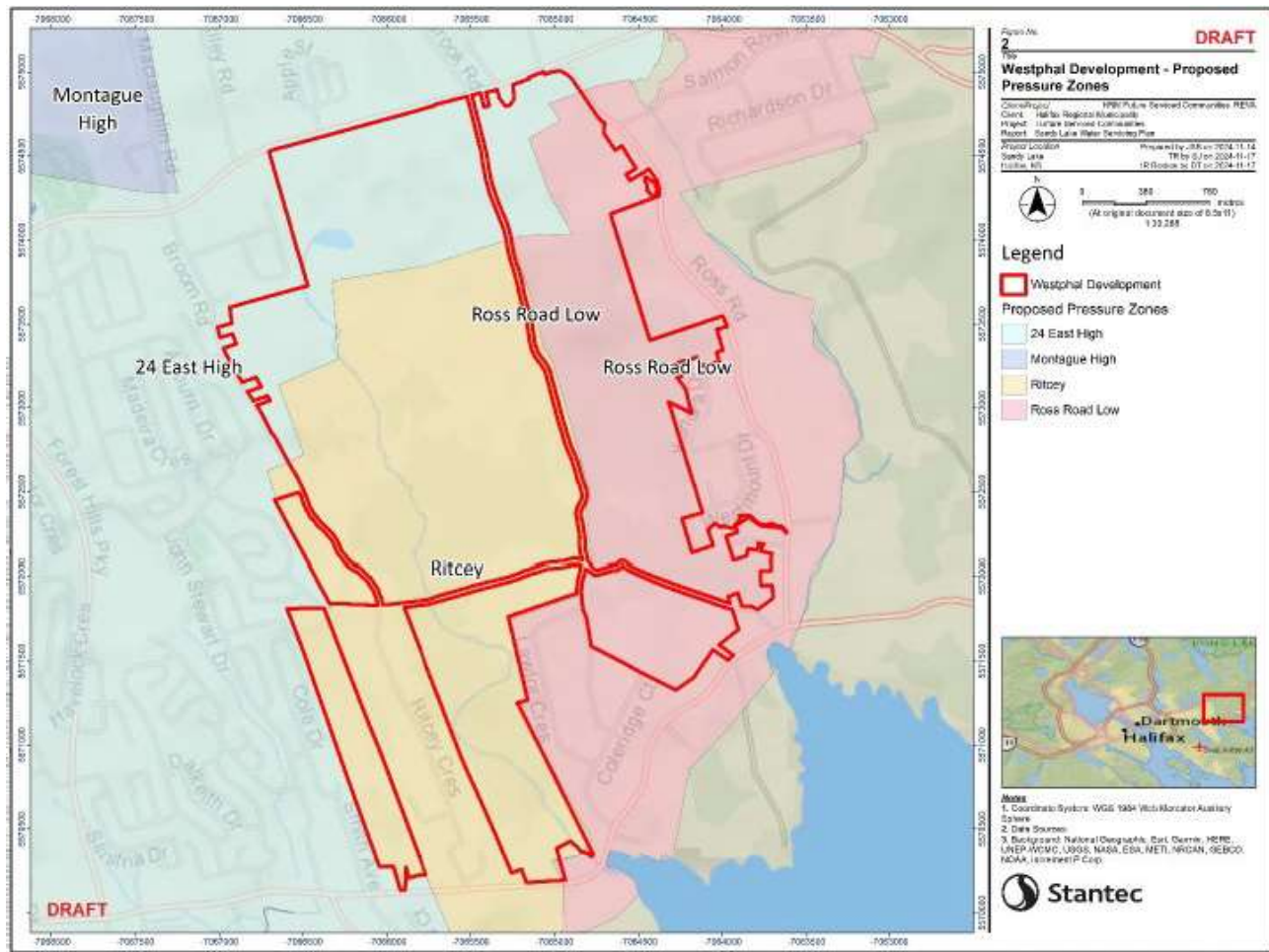


Figure 3-7 Proposed Pressure Zone Re-Delineation

Currently, the three pressure zone extension areas are modeled as being serviced by single feeds. However, it is anticipated that during detailed design/construction the watermain within the new serviced area will be connected and isolation valves and/or pressure reducing valves (PRV) used to maintain the pressure boundaries. Such design allows for redundancy; in the event of a watermain break, the pressure zone boundary valve(s) can be opened to act as a secondary feed until repairs to the watermain can be made. Isolation valves, used to separate the pressure zones are mimicked in the model by “closing” pipes. Additional modeled scenarios are available for review within the Appendix of the Westphal Water Servicing Plan report.

In the absence of a full regional water model, the water model developed assumed that the connection to each existing pressure zone is a constant HGL with unlimited flow (i.e., the connections are modelled as fixed head reservoirs). This assumption does not reflect the actual system; however, in the absence of a full system model, it is a reasonable assumption.

The water model results shown below in **Table 3-2** indicate the following for both the high-density and low-density population scenarios:

Table 3-2 Water Model Results

Flow Scenario	Pressure Range (psi)	Max Velocity (m/s)	Available Fire Flow (Lpm)
MDD High Density	49 – 110	< 1.5	N/A
PHD High Density	48 – 108	< 1.5	N/A
MHD High Density	49 – 110	< 1.5	N/A
MDD + FF High Density	> 22	< 2.4	4,500 - 28,500*
MDD Low Density	49 – 110	< 1.5	N/A
PHD Low Density	49 – 110	< 1.5	N/A
MHD Low Density	49 – 110	< 1.5	N/A
MDD + FF Low Density	> 22	< 2.4	4,500 - 30,000*

** Based on the assumptions of a constant HGL at the connections to the existing pressure zones. Therefore, the values for available fire flow should be considered with a low level of confidence.*

Since the maximum pressures for each scenario exceed the range presented in Halifax Water's Design Specifications, pressure-reducing valves installed on the water service lines (in accordance with Halifax Water SSS) should be considered during the next design phase. It is assumed the new pressure zone would be controlled by a pressure reducing valve from the 24 East High-pressure zone.

Figure 3-8 illustrates the potential future water and pressure distribution in the Developer-requested High-density Scenario. The presented subdivision plan is preliminary and subject to change; therefore, the MHD, MDD, PHD, and required fire flow demands presented in this report may change resulting in changes to proposed water distribution preliminary design. It is recommended that the level of service and distribution system requirements be reassessed during subsequent design stages. Also, during the next stages of design, the sizing and placement of regional water infrastructure should be considered.

In the absence of a full system model, neither the effect of the proposed development on the level of service of the remaining system nor the effect of potential restrictions within the existing system on the proposed development could be assessed. HW's IMP recommended that an all-pipe hydraulic model be developed. An all-pipe model can be used to assess fire flow objectives at each property or node in the system. It is recommended that the proposed development be incorporated into the all-pipe model to perform a more refined fire flow level of service assessment for the Westphal development.

3.3.5 Wastewater Infrastructure

Although not directly indicated in the East Region Wastewater Infrastructure Plan (GM BluePlan, 2019), it is assumed that the development area will ultimately contribute sanitary flows to the gravity pressure main

downstream of the Bissett Lake Pumping Station. Existing sanitary sewers within Cole Harbour Road and surrounding residential subdivisions are sized to meet only local sanitary contributing flow, and required upsizing through development areas should divert sanitary flows through existing sewers to the Bissett Lake Pumping Station. Additionally, a sufficiently deep gravity sewer connection does not currently exist to permit connection to gravity mains for the entirety of the development area either within Cole Harbour to the south or Main Street to the north.

In view of preliminary grading for the development area, it was identified that there is not sufficient grade to permit construction of a network of gravity sewers for the majority of the development contributing to area to a low point, and thus a new pump station at the extension of Kenora Drive. Additional small lift stations are anticipated to be required to service trapped low areas at the extension of Old Lawrencetown Road adjacent to Cole Harbour to service southerly lands west of the Hydro corridor. Discharge from proposed force mains is anticipated to be directed to the downstream Bissett Lake Pumping Station. Development lands adjacent to Main Street are anticipated to contribute to a gravity sewer extension along Main Street to the existing downstream Memorial Drive PS. Further contribution to the Memorial Drive Pumping Station has been avoided to limit capacity impacts to downstream local sewers in the area.

Due to grading constraints in areas adjacent to existing watercourses (particularly on the eastern boundaries of the development area), sanitary sewer depths may exceed the maximum permissible sewer cover of 5.0 m. A local sanitary sewer may be proposed at detailed design to run parallel to the deeper sewer segments.

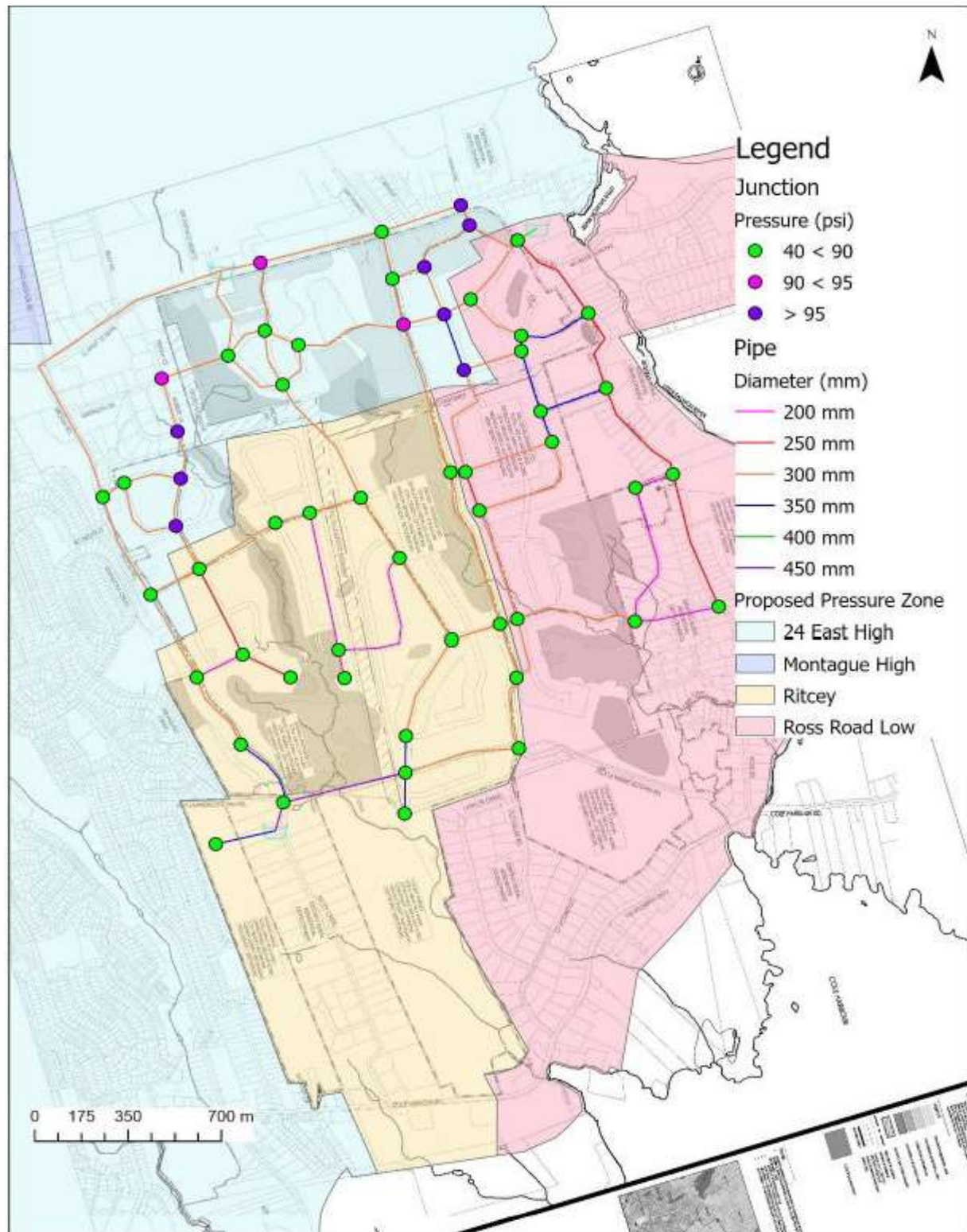


Figure 3-8 Pressure Distribution Under PHD (High-Density Scenario)

3.3.6 Implications & Master Plan Alignment

The Wastewater Infrastructure Plan (GM Blue Plan, 2020) identified infrastructure needs to maintain the level-of-service goals for Halifax’s existing residents and interests. The implications of the FSC growth areas on the WIP recommendations are thus of interest as these growth areas are in addition to those considered in the 2020 WIP. The FSC growth areas represent a significant increase in the service area considered within the planned growth horizon at the time of the completion of the 2020 WIP. As a result, the additional growth areas to be accommodated would be expected to have an impact on regional infrastructure capacity requirements and their planned upgrades - most notably, the gravity trunk sewer and the Eastern Passage (EP) WWTF.

The 2020 WIP identified several upgrades (Strategy 1c: Enhanced Conveyance) in the collection system upstream of the EP WWTF. These are summarized in **Table 3-3** and shown on **Figure 3-9** as taken from the 2020 WIP report.

Table 3-3 Eastern Passage Required Projects (taken from 2020 WIP Tables 24 and 25)

Project	Year	Description
Install new pressure-gravity sewer with pump out stations	2020	Required immediately as main capacity restriction in sewershed and triggered by growth.
RDII Reduction Program	2020-2036	Long-term program expected. RDII reduction was started in the Eastern Passage and Loon Lake areas, as it impacts upgrades to Pumping Stations. RDII reduction in the Cole Harbour area is delayed due to staggering the program and no growth in the area. However, RDII reduction in Cole Harbour area is scheduled to occur before upgrades to Bisset Lake PS are initiated.
Upgrades to Quigley’s Corner Pumping Station and Pumping Station Optimization	2021-2026	Required after RDII Reduction program is completed in EP area, as it will reduce flows to Quigley’s Corner PS and

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Project	Year	Description
		upgrades required to remove spills.
Upgrades to Memorial Drive Pumping Station	2031-2036	Required after RDII Reduction program is completed in Loon Lake area, as it will reduce flows to Memorial Drive PS and upgrades required to remove spills.
Linear upgrades (Forest Hills Parkway, Colby Drive and Caldwell Road)	2031-2046	Local linear upgrades are predominantly to resolve existing issues flagged in the wastewater hydraulic model; however, field verification should be completed to determine how soon these projects will be required.
Upgrades to Beaver Crescent Pumping Stations	2036-2041	Upgrades to Beaver Crescent Pumping Station forcemain were underway in 2020. Initiate after upgrades on Beaver Crescent PS forcemain are complete and new pressure-gravity sewers are installed with forcemains reconnected.
Upgrades to Caldwell Road Pumping Station	2039	Required after upgrades along Caldwell Road to remove flow restrictions upstream of the Pumping Station and triggered by growth in the Morris Lake development.
Upgrades to Bissett Lake Pumping Station	2041	Upgrades to Bissett Lake Pumping Station are impacted by numerous projects, including the installation of the pressure-

Project	Year	Description
		gravity sewers downstream to remove flow restrictions and RDII reduction in catchments upstream of the Pumping Station.
Decommission asbestos pressure-gravity sewer	2043	Decommissioned after new pressure-gravity sewer is installed and operational.

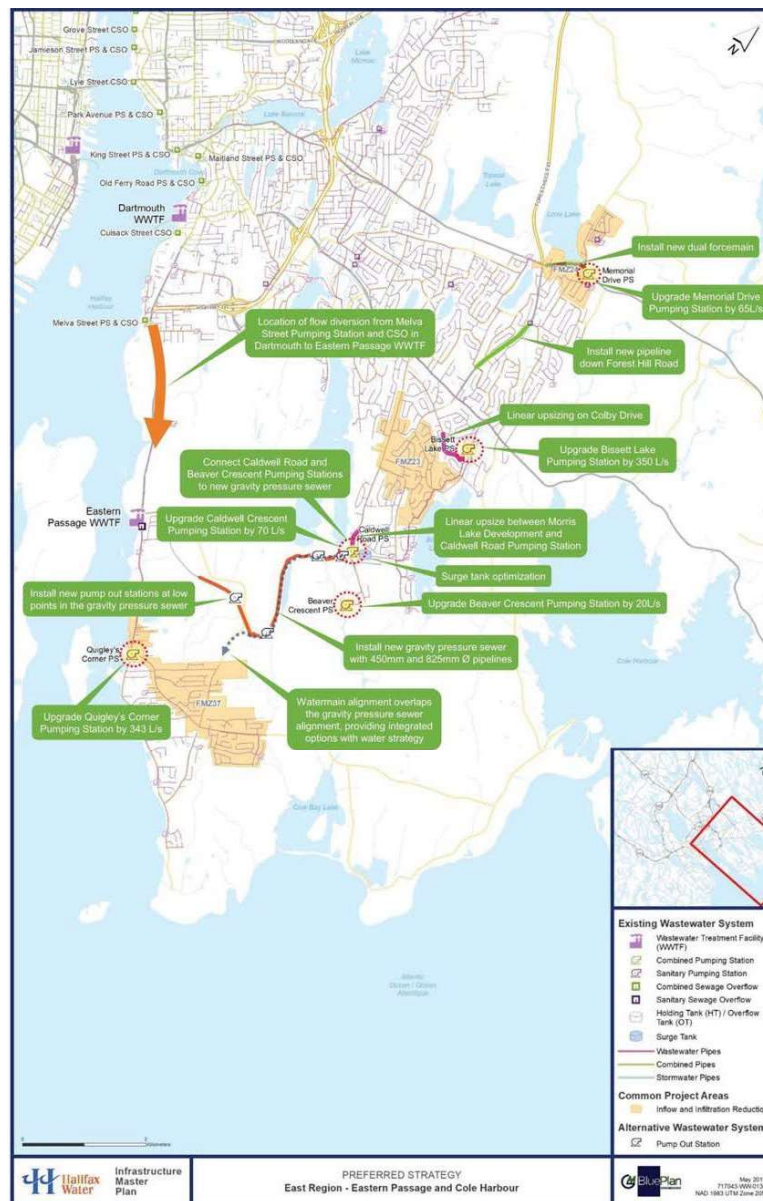


Figure 3-9 Eastern Passage East Region Preferred Servicing Strategy (GM BluePlan, 2020)

3.3.7 Conveyance Impacts

The most significant impact from the Study Area on the conveyance upgrades identified in the 2020 WIP would be on the pressure-gravity system, the Bisset Lake Pumping Station, and storage facility. This system collects flow from a large area and a number of pump stations before discharging downstream towards the Eastern Passage WWTF. Additional considerations for the Study Area on the conveyance system include the impacts on the linear infrastructure between Bisset Lake and Caldwell Road Pumping

Stations, as well as the Memorial Drive and Bisset Lake Pumping Stations. These linear upgrades were identified as needed between 2031 and 2046 in the 2020 WIP. It may be feasible to incorporate the Study Area contribution in these upgrades; however, the magnitude of the flows may trigger other more favorable options. Additional hydraulic and financial assessment is recommended to confirm.

It will be important to confirm that added flow from the Study Area can be accommodated within the existing and planned configurations for the pressure-gravity system and planned upgrades at other facilities. We estimate that the design wet weather flow from Westphal reaches upwards of 655L/s. Combined with the design wet weather flow from Morris Lake (560L/s), an additional 1,108-1,215L/s can be expected. That is, the Bisset Lake Pumping Station would see the full contribution from Westphal, and the EP WWTF would see the combined contribution from Westphal and Morris Lake.

This consideration merits the use of Halifax Water's updated hydraulic model assessed in context of regional servicing needs within the framework of the IMP. This includes alternative evaluations to determine a preferred regional servicing and infrastructure upgrades strategy that best accommodates the broader needs and goals of the HRM and Halifax Water. This note is also applicable to the Morris Lake FSC lands interest and the cumulative impact of both these growth areas should be considered.

3.3.8 Pump Station and WWTF Impacts

The Study Area will need to be serviced by three pumping stations within the development (**Figure 3-10**). These will discharge into the upper portion of the Eastern Passage WWTF catchment and impact the flows seen at several existing pumping stations, including:

- Memorial Drive Pumping Station
- Bissett Lake Pumping Station
- Stratford Dr Pumping Station
- Caldwell Rd Pumping Station

Additionally, there are surge/holding tanks present at the Bissett Lake and Caldwell Rd Pumping Stations. The availability and planned use of the volumes provided at these locations warrants review in consideration of the contributions forecasted for Westphal. Upgrades at the Memorial Drive (2031-2036), Caldwell Road (2039), and Bissett Lake (2041) Pumping Stations should be reviewed for adequacy if the Study Area progresses and connects.

Furthermore, the range of potential flows from the Study Area may significantly surpass the available capacity at the Bisset Lake Pumping Station. Specific attention and further consideration at this location is warranted as part of development planning to accommodate the Study Area and other growth interests. The timing requirements and/or sizing needs may be impacted. Additional hydraulic and financial assessment are needed to confirm.

Ultimately, the Study Area would be conveyed using the existing pressure-gravity system to the Eastern Passage WWTF. As such, the planned upgrading of the gravity-pressure sewer and any infrastructure at

the Eastern Passage WWTF should be revisited to ensure it can accommodate the additional flow from the Study Area. We estimate that the design peak daily dry weather flow from Westphal may reach upwards of 580L/s. Combined with the design peak daily dry weather flow from Morris Lake (500-580L/s), an additional 970- 1,080L/s can be expected.

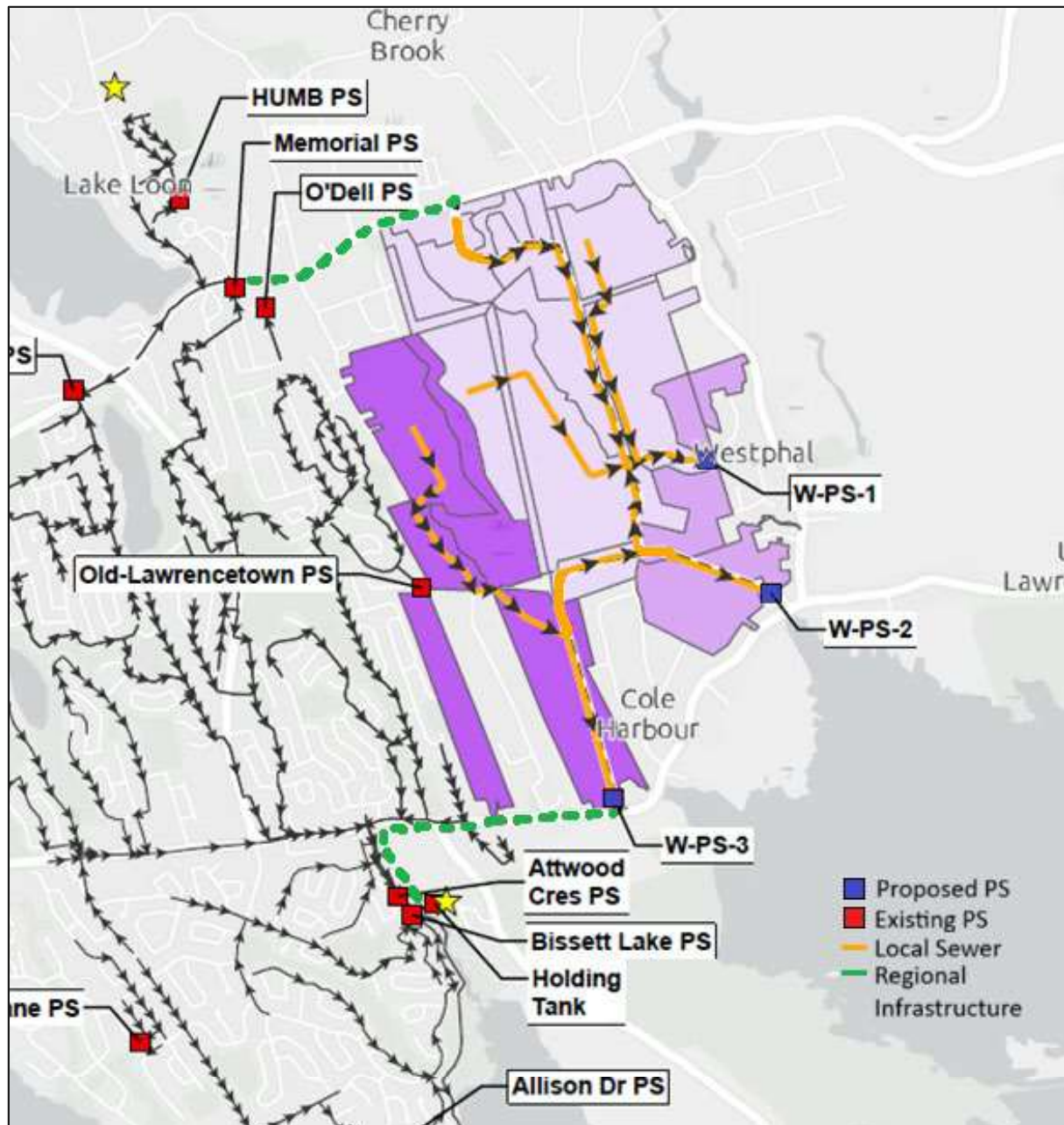


Figure 3-10 Westphal Wastewater Servicing

The conveyance and pump station / WWTF impacts presented explore how the Study Area could integrate into the wastewater servicing strategy that was recommended in the 2020 WIP. Other servicing strategies may, however, merit consideration. The 2020 WIP explored several high-level approaches. The assessed strategies included replacing the pressure-gravity servicing strategy with a range of large trunk sewer tunnelling alignments. These tunnelling alternatives provide the benefit of allowing several existing pumping stations to be ultimately decommissioned in the sewershed upstream of the Eastern Passage WWTF.

Other items of note with the tunnelling strategies include the mitigation of existing identified odour issues that accompany the pressure-gravity system, as well as potential mitigation of required storage volume expansions and prescribed pumping station capacity upgrades. The 2020 WIP considered a range of tunnel alignments feasible, including options that saw the tunnel cross through CFB Shearwater. A transition from pressure-gravity to a deeper tunnel could also be implemented in a phased approach, where the trigger to proceed would consider the ability to expand/upgrade existing infrastructure.

Specific to the Westphal Study Area, it is possible that a tunnel alternative could be introduced at a deeper alignment that would remove or significantly reduce the requirements for pump stations to service development there. Considering there are many pumping stations and storage/holding tanks downstream from the Study Area, decommissioning these after a deeper tunnel servicing option is introduced provides an opportunity for significant operational and maintenance savings. The cost effectiveness and benefits of such a solution could potentially be enhanced when considering a potential need to accommodate servicing within both the Westphal and Morris Lake areas if the servicing improvements can be coordinated to serve both study areas.

Additional evaluation would be required to update the 2020 WIP findings for these tunnel servicing considerations. There are existing constraints that may or may not have been addressed through upgrades to existing pumping station conveyance capacities and available wet weather storage. Introducing a deep tunnel is a significant financial investment and understanding the timeline for the required implementation warrants extensive study. The evaluation of the preferred tunnelling alignment warrants renewed consideration of the extent of the upstream growth considered in this study.

We recommend that Halifax Water and HRM revisit the technical and financial evaluations of the servicing strategy for the Eastern Passage WWTF. A cost-benefit analysis would enhance confidence that the implemented servicing strategies to come are best aligned with Halifax Water and HRM priorities, while maintaining (or enhancing) service to existing residents and proactively planning those infrastructure upgrades required to maintain this same level of service to future growth areas. Such an analysis would align well within the context and scope of an IMP update.

3.4 Westphal Transportation Analysis

The Westphal Transportation analysis is detailed in **Appendix 4D**.

3.4.1 Analysis of Development Impacts

The HRM Integrated Mobility Plan reiterates regional mode share targets originally established in the 2014 RMPS. To be achieved by 2031, the planning targets were only projected to be achievable through incorporation of the Integrated Mobility Plan recommendations. The Integrated Mobility Plan anticipates arrangements and behavior in the various sub-areas of the region to contribute differently to overall regional goals. Within the Outer Suburban area, where the Westphal Study Area is found, the 2031 targets seek at least 10% transit mode share and at least 4% for trips made by walking and cycling.

The Active Transportation Priorities Plan recommends that bicycle facility development outside the regional centre should focus on improved connections to local destinations such as schools, community centres, and transit hubs as well as the completion of the greenway network and the addition of new bicycle lanes where identified.

Implementation actions within the Integrated Mobility Plan define preferred approaches to meet planning targets. Individual approaches integrate and support several of the foundational and mode-share specific policies described in the plan. Large-scale developments like the combined Westphal concept plan present an opportunity to require the application of those approaches to contribute to the realization of regional goals. The Mobility Plan does not, however, characterize major corridors in the immediate vicinity of the Study Area as transit priority corridors, nor does it identify any nearby potential Transit Oriented Communities.

The 2020 Rapid Transit Strategy advances the importance of Portland Street/Highway 207 and the Portland Hills Terminal by routing and terminating the proposed Red Line BRT (Bus Rapid Transit) approximately 3 kilometres from the western edge of the development area, connecting Cole Harbour with Dartmouth and ferries to the Halifax Peninsula. Immediately adjacent to the Study Area, the Draft Regional Municipal Planning Strategy recognizes Main Street (Highway 7/Highway 107) as a Strategic Corridor. Strategic Corridors are intended to integrate regional and community mobility connections with land use planning and are designed to improve public safety, connect communities, and manage congestion by prioritizing sustainable modes of transportation over the use of private motor vehicles.

The Cole Harbour/Westphal Municipal Planning Strategy places a high priority on advancing active transportation through walkway standards and the provision of quality transit service. The emphasis on walkways stems from design and construction issues as well as maintenance responsibility. The strategy recognizes the importance of public transit in managing increased population and energy costs. Stantec developed a GIS-based analytical tool for examination of public and active transportation connectivity and levels of connectivity deprivation to inform investment in transportation infrastructure and services. The primary use of the tool is to determine the quality of pedestrian and transit access to key services and amenities from a neighbourhood in various scenarios. In this case, the tool was employed to identify

connectivity deficiency for the future residents of the proposed Westphal development to predict and prevent access-related deprivation.

The connectivity tool first assessed pedestrian and transit access to 14 key service and amenity categories for an area roughly equivalent to the sum of the Regional Centre and Inner Suburban areas defined in the Integrated Mobility Plan. A second evaluation scenario solely considers the Study Area and assigns it the new residents expected by developer requests. A third and final evaluation scenario adds a new public transit stop (route undefined), a doctor's office, a pharmacy, local shops, an entertainment venue, and a primary school to the future development area to determine relative connectivity improvements for the new population according to intentional land use decisions.

The connectivity analysis outputs indicate that the greatest access benefits realized by the integration of commercial and service destinations within the development site are related to basic medical needs such as pharmacies, primary care physicians, and/or other medical or dental care offices.

The Joint Regional Transportation Agency (JRTA) and HRM (in partnership with WSP Canada and the University of Toronto) have completed a new activity-based travel demand model named the Joint Regional Transportation Simulator. The model provides the ability to interpret development impacts on the regional transportation network through the model's innovative Agent Based Model (ABM) process of simulating travel behavior (where, how, and when people travel), including trip generation, trip distribution, mode choice, and reassignment impacts. These processes are modeled using an ABM framework that captures the behavior of individual agents, such as travelers or households, allowing for a more precise representation of travel demand and network effects at the regional level.

The ABM is a flexible and policy-sensitive tool. A regional-scale travel demand model examines the interactions of population, employment, land use, and mobility options and allows the testing of different possible futures, estimates the future need for travel, and assesses the impact and benefit of different modes of transportation that will be required to serve the region in the future.

To assess the infrastructure requirements for the Study Area, an interim 2031 model was developed as a baseline. The interim model provides a more focused assessment baseline, as the 2045 model incorporates a broader range of infrastructure schemes intended to support wider development, potentially overestimating infrastructure capacity and underestimating the impacts of the proposed Westphal development. This model includes a reduced level of committed infrastructure compared to the 2045 baseline model.

The Westphal development, like all Future Serviced Communities, should prioritize the creation of a well-connected multimodal and complete community to ensure its success. Our connectivity analysis has highlighted the necessity for a more integrated and cohesive community structure in terms of co-located daily needs. Embracing the principles of a complete community, which includes an idealized ratio of residential spaces, commercial spaces, and sustainable transportation modes will be necessary to realize a functional development that reduces the transportation burden of its residents. Macro level connectivity data demonstrates that if key destinations are not located within the new development or connected by frequent and rapid transit, a significant portion of the new population will be unable to access essential services on foot or by public transit within 30 minutes. Current conceptual plans include a low amount of

commercial space relative to residential units, though proximity to Cole Harbour commercial, educational, and community centres present opportunities to integrate additional destinations through transportation facility design and enhancement.

A deeper understanding of detailed development plans, particularly regarding the inclusion of commercial services, is of primary importance for accurately assessing the environmental and social impacts related to transportation access. Our connectivity analysis further showed that access issues can be mitigated from either the land use or transportation planning perspective. Incorporating shopping, entertainment, and basic healthcare options within the commercial areas of the proposed development reduces the average active transportation travel time for new residents to reach common destinations. Strategic land use and siting decisions not only bring daily destinations closer to the community but also reinforce the value of local active transportation networks for short trips. Furthermore, a comprehensive understanding of vehicle parking, including inventory and utilization management, impermeable surface quantification, and an electric vehicle charging program have implications for achieving mode share targets and mitigating environmental impacts. Additional site plan detail also facilitates the evaluation of opportunities to efficiently implement shared mobility services. Micromobility options such as scooters, cargo bikes, golf carts, and shared car services not only provide localized access for neighbourhood residents but also extend access and connectivity to and from adjacent neighbourhoods without requiring personal vehicle ownership.

Travel modelling indicates that the Volume-to-Capacity ratio on segments of Main Street, Portland Street, and the Forest Hills Parkway will exceed 100% by 2031, characterized by severe congestion before the Westphal development is introduced. Mitigation measures should ideally be implemented before or in parallel with the development of the Study Area to mitigate further negative effects of congestion. On buildout of the Westphal development, sections of the Forest Hills Parkway and Cole Harbour Road demonstrate comparable levels of congestion in the absence of modifications to transportation facilities and mobility services.

Modelling further indicates that the proposed BRT Red Line has a role to play in contributing to the handling of increased travel demand in the Portland Street / Cole Harbour Road corridor. While transit services in the area near the Westphal development are projected to absorb most incremental transit demand with the exception of routes currently only served by commuter service, transit service increases and potential extension of the BRT system eastward are necessary to alleviate overall travel demand pressure from new development sites.

Effective on-site transit routing is equally important to increase adoption of transit by residents of new development and requires that developers determine and specify the right-of-way dimensions of proposed internal roadways. Primary corridors should be conceived and aligned to ensure that all new residents live within 400 metres, or a five-minute walk, of a transit stop. Connectivity analysis outputs indicate that without transit more closely servicing the development, the average time required to access public transportation will exceed 10 minutes.

Further, while denser multi-unit residential buildings are distributed evenly between the Kiel, Akoma, and Annada portions of the combined development site, concept plans site a proposed transit terminal at the

northeast corner of the Kiel lands. As people accessing transit generally limit the distance, they are willing to walk to reach bus service, alternative siting for the transit terminal further west and more central within the population distribution of the development should be considered as site plans are refined.

The typologies of active transportation facilities suggested by development concept plans should be clarified and supported through any roadway intersections with protected design features. Further, concept plans do not describe active transportation facilities slated for local roads, which leaves a gap at the point of origin and destination for all trips. Future plans should include greater detail related to any on-street bicycle facility, sidewalk, and other pedestrian path routing.

While the Main Street / Highway 7 corridor along the northern edge of the development area currently features dedicated facilities for people both walking and cycling, creating external active travel connections from the development area to activity centre at Cole Harbour Road and Forest Hills Parkway would be highly beneficial. These connections could link the internal active travel infrastructure within the development to nearby destinations to support the usefulness of active transportation mode choices.

3.4.2 Conclusions and Recommendations

The needs summarized in the conclusions correspond to specific transportation infrastructure and service implementation recommendations. Transportation corridors that carry general traffic and transit vehicles, parallel active transportation opportunities, and intersections expected to experience significant increases in use form a sub-network of routes and nodes that require enhancements (**Figure 3-5**).

As compound factors due to the proximity of the Westphal and Morris Lake developments have been previously identified through transportation demand modelling, the Morris Lake Transportation Plan restates recommendations related to traffic impact mitigation and transit service increases for the Portland Street / Cole Harbour Road corridor but does not imply duplication of actions and associated costs. The Westphal Transportation Plan otherwise limits facility and service recommendations to locations north of Cole Harbour Road / Portland Street.

Modelling additionally shows heavy congestion in a non-development baseline scenario along Portland Street / Highway 207 from the area near the Portland Hills Terminal west to Highway 111, coinciding with the planned Red Line BRT route, whose 10-minute frequency will provide the person moving capacity needed to absorb vehicular demand above capacity.

Introduction of development in the Westphal Study Area intensifies capacity constraints on previously named corridors in addition to creating new capacity bottlenecks along Forest Hills Parkway and Cole Harbour Road closer to southern access roadways to the Westphal development. These roadway segments possess more flexibility to add width and/or undertake right-of-way reprioritization.

Transit

As proposed, the BRT Red Line would terminate at Portland Hills Terminal, south and west of the Westphal development area, along a corridor identified to experience heavy traffic congestion in background projections. Thus, the Westphal development does not directly contribute to the justification

to build initial BRT lines. Extending the BRT Red Line east to Caldwell Road would align the Red Line terminus with a node expected to experience heavy travel demand contributions from both the Westphal and Morris Lake Future Serviced Communities.

In addition to the introduction and any possible extension of BRT routes, an increase in regular bus frequency and implementation of transit priority measures along Main Street / Highway 7 (current Routes 61, 68, 161, 168) and Cole Harbour Road (current Route 401) represents an alternative solution to accommodate the anticipated increase in general travel demand. If physical constraints and/or policy constraints preclude the addition of general-purpose travel lanes, high level analysis informs the level of transit service necessary to deliver a major mode shift from vehicle drivers to bus passengers. Combining traffic and transit demand as well as traffic and transit capacity at the corridor level allows for a more holistic determination of transportation needs.

Analysis finds comparable transit service needs along the Main Street / Highway 7 corridor between the Westphal development and Highway 111 as well as the Cole Harbour Road corridor between the Westphal development and Portland Hills Terminal or any future terminus of the Red Line BRT. Preliminary analysis related to the Forest Hills Parkway corridor reveals that current bus service levels along that corridor provide sufficient capacity to accommodate modal shift from modelled vehicular traffic demand to transit ridership where modelling predicts vehicular congestion.

Absorbing the 2031 combined development scenario travel demand volume over capacity in the Main Street / Highway 7 corridor would require 3 to 4 additional buses during the AM peak hour, 6 to 7 additional buses during the PM peak hour, and 3 additional buses per hour during non-peak periods. Likewise, the southern and eastern development transit access along the Cole Harbour Road / Ross Road corridor, or a routing through the development, requires 3 additional buses during the AM peak hour, 6 to 7 additional buses during the PM peak hour, and 2 to 3 additional buses per hour during non-peak periods.

The range of added bus needs is based on occupancy per bus of either 40 or 50 passengers. Also note that this calculation does not apply a factor to adjust for the average number of people per vehicle. It effectively and conservatively treats each vehicle as containing only its driver in terms of its contribution to transit demand. Furthermore, the calculations only attempt to reduce the V/C ratio to 1, which remains a severely congested condition.

Active Transportation

Consistent with the Active Transportation Priorities Plan (ATPP), the study team identified a need for active transportation enhancements in the Cole Harbour Road corridor. In addition, the plan calls for bicycle lanes or a paved shoulder along the entire extent of Ross Road. As facilities along these corridors would be geared toward transportation functions more so than recreation, dedicated bicycle facilities are preferred to multi-use paths. The ideal bicycle facility for such corridors would be a uni-directional cycle track, a bike lane raised, and curb separated from the roadway, parallel to, but separate from the pedestrian sidewalk. Technical and practical considerations related to curb/sidewalk presence and other right-of-way reassignment factors may dictate alternate facility type selection.

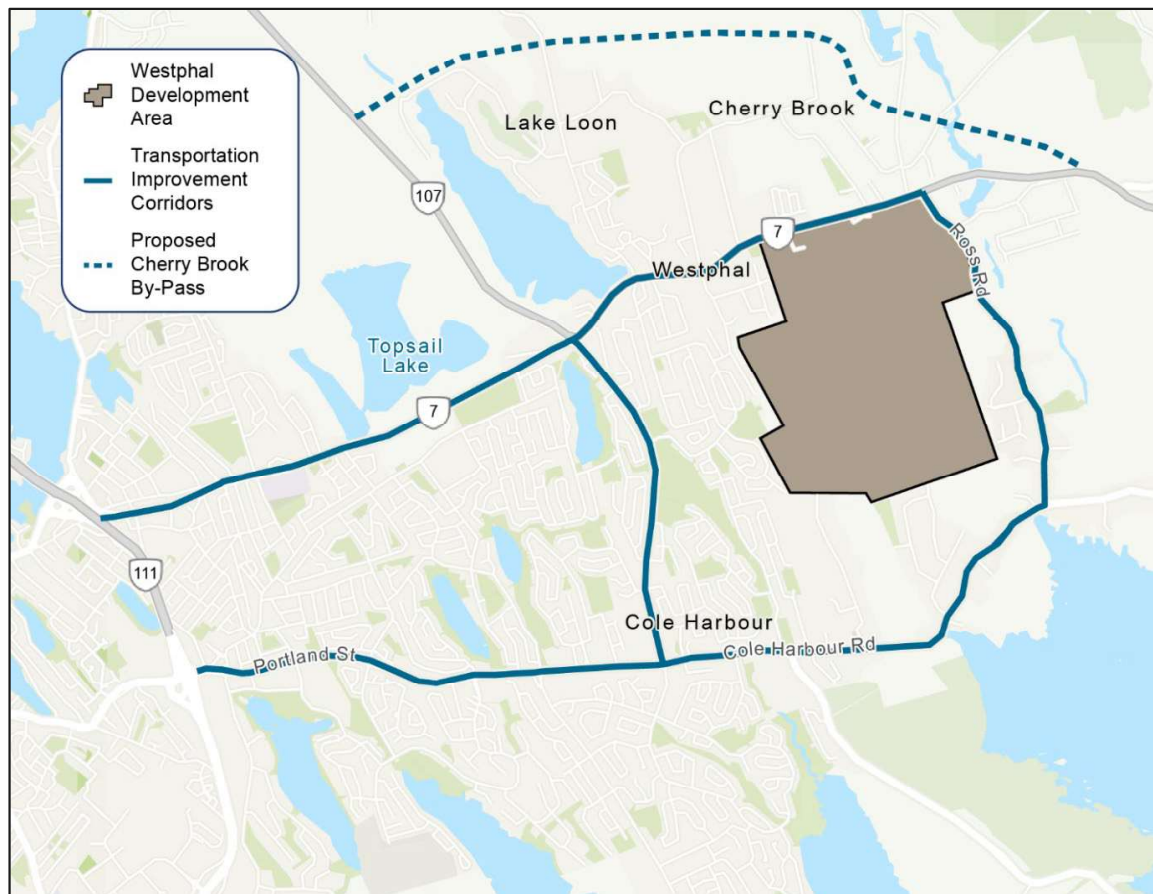


Figure 3-11 Recommended Transportation Improvements

3.5 Infrastructure Costing

The order of magnitude costs of providing the conceptual servicing are shown in **Table 3-4**. The cost estimates are Class E estimates. A Class E cost estimate is typically used in the early stages of a project to provide a rough order of magnitude estimate. This type of estimate is based on limited information and is often used for initial screening and feasibility studies. It helps in making preliminary decisions about whether to proceed with a project and provides a basis for comparing different project options. The various infrastructure requirements in this report have not been studied to a functional level of design that will occur in future planning processes.

The relative difference in cost for on-site infrastructure between the three development scenarios will be negligible, since the major earth moving costs to create linear infrastructure will be the same regardless of development density. All cost estimates that follow are based on the high-density scenario unless stated otherwise. The differences in cost between pipe sizes to accommodate differing population levels are a relatively small portion of the cost. There may be some minor variations in the sizing of storm ponds, but the differences could be erased during detailed planning if high density land uses had a lower impermeable lot coverage.

Table 3-4 Estimated Order of Magnitude Costs for Infrastructure

Servicing Component	Estimated Order of Magnitude Cost²
Provincial Responsibility	
Highway 107 (Cherry Brook) By-Pass	Provincial Responsibility – requires further scoping – not costed
HRM Responsibility or Halifax Water Responsibility (costs may be shared, in whole or in part, with developers as part of future capital cost contribution programs)	
Portland Street Construction of initial Red Line BRT to Portland Hills Terminal Extension of Red Line BRT from Portland Hills Terminal to Forest Hills Parkway	Scoped per the 2020 Rapid Transit Strategy \$0.48 million (station), \$2.18 million (1.3 km transit priority lanes and intersection enhancements, which would be \$3.82M with inflation. \$0.74 million annual (operating) which would be \$1.06M with inflation
Cole Harbour Road	Potential lane additions – \$5.14 million based on \$3,835,000 per linear kilometre.

² Construction inflation estimates are based on Statistics Canada for the Halifax Census Metropolitan Area for Q3. [Building construction price indexes, by type of building and division](#)

Main Street / Highway 7 Lane reallocation to transit priority from Highway 111 to Ross Road	Requires further scoping related to signalization in addition to pavement marking.
Forest Hills Parkway	Potential lane additions – \$10.35 million based on \$3,835,000 per linear kilometre.
Main Street / Highway 7 Transit Upgrades	\$1.54-1.60 million annual based on \$100.85 operating cost per hour for new service
Cole Harbour Road Transit Upgrades	\$1.11-1.58 million annual based on \$100.85 operating cost per hour for new service
Ross Road Active Transportation Bicycle lanes/paved shoulders from Main Street / Highway 7 to Cole Harbour Road	\$988,000 - \$1,126,000 dependent on level of pavement marking and paved buffer area
Cole Harbour Road Active Transportation Bicycle lanes from Ross Road to Coleridge Court Paired one-way cycle tracks from Ross Road to Bissett Road Sidewalk from Morash Drive to Coleridge Court	\$40,000 for signs, pavement markings in existing paved shoulders \$1,085,000 excluding design and signal modifications 482,000 based on 1.8m width, site prep, minor drainage modification.

Ritcey Crescent Active Transportation	\$602,000 based on 1.8m sidewalk width, site prep, minor drainage modification. \$476,000 assumes road reconstruction required for added pavement width
Old Miller Road / Coleridge Court Active Transportation	\$463,000 based on 1.8m sidewalk width, site prep, minor drainage modification. \$366,000 assumes road reconstruction required for added pavement width
Lake Major System WTP Capacity Upgrades	Not costed. Insufficient information available at this time. Need to be confirmed by Halifax Water
3.4ML to 8.6ML (depending on development population) water storage reservoir and Pump House at MacLaughlin Rd.	\$50.0 Million
600mm dia. Transmission main on MacLaughlin Rd and Main St.	\$13.4 Million
PRVs within Westphal (six)	\$4.5 Million
Install new gravity pressure sewer to 1055mm with 450mm and 825mm dia. pipelines	\$20.3 Million
Install new pump out stations at low point in the gravity pressure sewer	\$0.7 Million

Surge tank optimization	Not costed. Insufficient information available at this time. Need to be confirmed by Halifax Water
Upgrade Bissett Lake Pumping Station and Forcemain	\$64 Million
Upgrade Memorial Drive PS	\$0.4 Million
Developer Responsibility or Shared Responsibility	
New Wastewater Pump Station W-1 and forcemain	\$12.5 Million
New Wastewater Pump Station W-2 and forcemain	\$20.1 Million
New Wastewater Pump Station W-3 and forcemain	\$3.4 Million
Development Site Primary Transit Corridor(s)	Developer responsibility – not costed
On-site grading/earthworks and stormwater management works	Developer responsibility – not costed
On-site water distribution and sanitary sewer collection, including temporary pump stations and pressure reducing valves	Developer responsibility – not costed
Roads and primary transit corridor internal to the Study Area	Developer responsibility – not costed

It is important to note that some of the recommended infrastructure upgrades, particularly for sanitary sewer servicing, are upgrades that would benefit both the Westphal and Morris Lake Study Areas.

3.6 Considerations for Future Planning

The following are integrated observations from the various reports that elaborate on the principal conclusions above:

Community Design and Development Phasing

While certain portions of the Study Area are not suitable for development for a variety of reasons, including flood risks and ecological sensitivities, a sizeable part of the site is suitable to support HRM's rapidly growing population in new residential and mixed-use communities.

Based on the consolidated findings of the four technical studies for the Study Area, as discussed in further detail below, should HRM proceed with secondary planning, the Municipality should work with landowners to try and achieve as much density as possible on lands farthest from the natural features to concentrate development on a smaller footprint and achieve density levels that support a more integrated mixed-use community that is transit supportive. In addition, higher densities will spread the high cost of servicing the Study Area over more dwelling units to reduce the cost of individual homes.

The Provincial Housing Needs Assessment, 2023, recommended that 40% of all new housing be single unit housing with the remaining 60% being a combination of different forms of multi-unit housing. The Provincial Housing Needs Assessment is a practical set of targets that could be used in further community planning. The share of multiple-unit dwellings in developer proposals for the Westphal Study Area exceeds 75%.

The Old Lawrencetown Road creates a clear and critical divide within the Westphal Study Area. All the most interested landowners in the Westphal Area about Highway 7 at the northern edge of the Study Area. While development within the Study Area on the south side of the highway is limited to the former Home for Coloured Children structure and associated uses on the Akoma lands, the north side of the road is well-developed with a variety of residential, commercial, and institutional uses on the highway frontage and in the community of Cherry Brook located behind.

The lands owned by the leading prospective developers (i.e., Akoma Holdings, Kiel Developments, Annada Properties, and Morash) extend south to the Old Lawrencetown Road, which is better characterized as a recreational trail rather than a roadway. Owners south of the Old Lawrencetown Road have limited interest in development in the short run. The strongest prospect is Louis MacEachern, who has developed several lots on Old Miller Road for single-detached homes. Mr. MacEachern has indicated that he and his associates would prefer to wait for development planned by Kiel to reach them. At present, Mr. MacEachern and others south of Old Lawrencetown Road appear to be thinking in terms of further low-density development similar to Coleridge Estates, which Mr. MacEachern developed at the southern edge of the Study Area.

It is very possible that landowner views – if not landownership itself – may change if development to the north proceeds as Kiel, Akoma, and Annada have proposed. Currently, the southern portion of the Study Area is on the periphery of the suburban ring around Dartmouth.

From a servicing perspective, the study area is far easier to service from south to north. While water can be provided to the study area from either direction, significant sanitary sewer upgrades are needed to the downstream sanitary infrastructure. Sewers within the study area are most economical where oriented with existing topography progressing from north to south by nearly 30m in elevation towards the downstream Bissett Lake Pump Station. In the past, there have been landowners who have proposed minor developments connected to sanitary sewers to the north, ultimately directed to the Main Street corridor. There isn't sufficient information at this point to be conclusive, but it is likely that no major addition to sanitary drainage in that area is possible without completing an existing condition capacity analysis of the sanitary conveyance system in the Main Street corridor, which may well include further upgrades to existing infrastructure between Main Street and Bissett Lake. If the landowners in the northern portion of the Westphal study area are motivated to develop early, HRM could enter into discussions with them to advance the analysis and prepare an interim servicing plan, which would include front-ending some of the downstream sanitary conveyance system upgrades taking into account development in the Morris Lake study area and full development of the Westphal area.

The development plan for the Study Area will need to accommodate stormwater management (SWM) measures in the form of end-of-pipe SWM dry ponds designed to restrict post-development peak flows to existing watercourses to pre-development levels and will require coordination and further technical investigations to ensure that SWM ponds are located outside of the regulatory 100-year floodplain and/or delineated wetlands. High density land uses can potentially reduce the footprint of development and help to maintain development and stormwater management infrastructure away from flooding risk areas.

Ecology and Water Quality

From an environmental perspective, avoiding lands shown to have low development suitability will improve protection of ecological systems and addresses terrain-based constraints. From a water quality perspective, the number of people living in the Study Area has less impact in comparison to the amount of hard surface coverage created. In other words, the amount of land area left in its natural or unurbanized state will provide a greater service to the maintenance of water quality than converted lands with more extensive impervious areas. Low density development normally has low lot coverage for buildings, and paved areas per hectare, but houses fewer people. Medium and high-density development often result in higher lot coverage and more impervious surface; however, the area of impervious surface per person is usually considerably less than low density developments.

Watercourses should be buffered from development, with these areas preserved in as natural a condition as possible. The LSA recommends that areas within 30 meters of a watercourse be classified as having low suitability for development. In some cases, setbacks larger than 30 meters may be appropriate to achieve objectives such as maintaining riparian habitats, enhanced water quality protection, or landscape connectivity. Whenever possible, retaining native or existing vegetation within these buffer zones is crucial to maintaining ecosystem services (e.g., nutrient cycling, soil formation, water purification, and pollination), reducing runoff, promoting infiltration, and enabling evapotranspiration.

No new development should be permitted within the limits of the 100-year regulatory floodplain. Some reduced risk uses may be considered in agreement with HRM by-laws and the Nova Scotia Statement of

Provincial Interest regarding Flood Risk Areas. This is subject to design considerations that effectively mitigate and/or minimize the impact of such development on the floodplain and protect the riparian corridor functions. Detailed hydraulic modeling of the watercourses should be completed to better understand flooding risks.

The Halifax Green Network Plan identifies an Essential Corridor passing through the WSA, connecting relatively undisturbed habitats between Eastern Passage and Bissett Lake to areas east of the Salmon River. This corridor extends from Ross Road southwest to Carolyn's Way Park, then south along Broom Brook to Cole Harbour Road. Additionally, the HGNP identifies an Important Corridor at the northern end of the WSA, which is not connected to other corridors. There is also an isolated patch of Important Corridor in the center of the WSA, almost surrounded by the Essential Corridor. The HGNP recommends that Essential Corridors be at least 1 km wide and Important Corridors at least 100 m wide to facilitate wildlife movement. Field surveys suggest that the WSA currently provides habitat connectivity, as evidenced by American black bear tracks (Figure 3-11 Appendix 4A)

The HGNP's recommended wildlife corridor would help preserve approximately half of Broom Brook and a substantial proportion of the wetland habitat in the WSA, protecting areas with high concentrations of potential SAR habitat. However, the corridor's efficacy is reduced where it crosses Ross Road due to a large auto salvage facility. Modifications to the corridor, such as extending it to encompass the entire wetland complex along Broom Brook and incorporating areas around Broom Lake, could improve its effectiveness. This would allow the corridor to extend to Highway 7 at the northern end of the WSA and connect to an undeveloped area flanking a tributary to Cherry Brook, providing a secondary corridor to the protected area around Lake Major. A second spur of the wildlife corridor would extend from Broom Lake towards Ross Road along a transmission line route, connecting Broom Brook to the Little Salmon River and the Important Wildlife Corridor east of it. This spur would enhance east/west connectivity and protect wetlands.

To minimize disturbance to proposed wildlife corridors, it is recommended that roads and utilities enter development areas using existing roads and utility corridors. This approach would enhance public safety and maintain ecological connectivity by reducing the number of intersections between roads or utilities and wildlife corridors, thereby minimizing traffic and wildlife interactions. Additional details can be found in the WLSA report in Appendix 4A.

Transportation

Noting that current policy direction encourages investment in sustainable modes rather than additional vehicle capacity, automobile transportation system needs persist in the area of the Westphal development site based on the magnitude of predicted stress on transportation network capacity. HRM may opt for an approach that leans more heavily on other enhancements to person travel. Additionally, physical constraints may preclude the addition of general purpose or transit priority lanes.

As modelling is link-based rather than based on intersection analysis, the extents of required capacity upgrades given in the Transportation Plan are broad. With or without the Westphal development, predicted congestion is particularly visible along Main Street/Highway 7 adjacent to the Study Area leading to the intersection with the Forest Hills Parkway, which similarly experiences volumes exceeding

capacity immediately south of that intersection. Further west along Main Street/Highway 7, beyond Topsail and Lemont Lakes and nearing Highway 111, analysis shows volume nearing or exceeding capacity with the forecast background increase in overall regional population. As the Main Street/Highway 7 corridor already has two general traffic lanes in each direction along its entire length to the eastern edge of the Westphal development, redesignation of lane purpose or periodic transit priority measures may be a more practical intervention than the addition of any conventional traffic capacity.

Analysis of modelled travel demand suggests that the proposed Cherry Brook By-Pass, which is included in the 2014 RMPS and draft updates as a potential future provincial connective project, should be beneficial and enhance the ability to divert traffic from Main Street and the over capacity intersection of Main Street and Forest Hills Drive. Such a project has potential to alleviate traffic pressure immediately adjacent and attributable to the new Westphal development that exacerbates baseline expected capacity constraints along Main Street. Final decisions, which may consider repositioning of the eastern terminus of the bypass, require in-depth evaluation of environmental, community, and fiscal impacts.

To better serve people walking, sidewalks along Cole Harbour Road should be extended to primary southern accesses of the new development. As is it likely to split primary southern access between Ritcey Crescent and the Coleridge Court/Old Miller Road corridor, pedestrian facilities should be added along those roadways. As roadway traffic volumes are better understood, primary access roadways should also feature dedicated cycling facilities to link apparent paths in concept plans to new facilities along Cole Harbour Road.

Major new development should properly site a mobility hub to serve as a transportation anchor in a new community and offer a safe, comfortable, convenient, and accessible space to seamlessly transfer between different travel modes. Costs of mobility hubs are highly variable depending on amenities provided and modes accommodated. Potential co-location at a commercial or transit centre within this and other Future Serviced Community development sites can centrally provide a mix of transportation options to users to reduce car dependence for internal trips within new neighbourhoods.

To adequately meet the mobility study goals of the Future Serviced Communities initiative, HRM and Study Area developers must perform further investigations, analysis, and planning. The Westphal development, due primarily to its distance from existing commercial, educational, and civic destinations, is expected to demonstrate a personal vehicle orientation. While modelling indicates that the new development is likely to nearly meet the Integrated Mobility Plan's grouped active transportation mode goals, this largely due to a larger anticipated percentage of people walking than people taking transit and potential overstatement of internal trips to commercial destinations. Additional efforts may be necessary to achieve the objectives of HRM policies supporting individual sustainable transportation modes, especially transit use for external trips.

Connectivity analyses will require repetition as different assumptions, particularly the inclusion of specific uses and destinations on site. These analyses should consider the distribution of residents throughout the development area and the cumulative effects of new commercial development in tandem with the existing commercial portions of nearby activity centres.

To fully understand traffic volume and congestion mitigation needs, supplementary analysis focusing on junction performance is necessary to ensure a more complete assessment of network impacts and potential bottlenecks. Additionally, the transportation impact study should be updated to include the most recent combined development concept plan of housing and commercial space estimates.

More detailed transit demand modelling is required to predict transit mode share more accurately for the new development, the associated increase in demand for service adjacent to the Study Area, and capacity needs for an on-site route. Needed adjustments relate to the physical arrangement of residential development and the inclusion of an example route travelling along primary corridors within the developments that provide proximate access for all new residents. Using a more detailed development plan, further modelling should determine ideal on-site routing, stop siting, and potential terminal siting for high quality transit service as well as micromobility options such as CommunAuto and bicycle and scooter rental programs that link to regional destinations.

Current concept plans do not describe bicycle or pedestrian facilities slated for local roads and intra-development connections, which contributes to difficulties in routing and siting other transportation enhancements. Future plans should explicitly include intended pedestrian and bicycle circulation pathways.

Servicing

Stantec was provided input on the regional water and sanitary sewer system capacity by Halifax Water. Stantec is not in a position to analyze the differences between the Mid-density and Developer-requested/High-density scenarios as it does not have access to the water and sanitary regional hydraulic model, or information pertaining to available capacities of the regional infrastructure.

One of the most important next steps for the Westphal Study Area is to confirm that added flow from the Study Area can be accommodated within the existing and planned configurations for the pressure-gravity system and planned upgrades at other facilities. This consideration merits the use of Halifax Water's updated hydraulic model assessed in the context of regional servicing needs within the framework of the IMP. This includes alternatives evaluations to determine a preferred regional servicing and infrastructure upgrades strategy that best accommodates the broader needs and goals of HRM and Halifax Water. This note is also applicable to the Morris Lake FSC lands interest and the cumulative impact of both these growth areas should be considered. This step should be completed as soon as possible before any further work is completed, as recommended in this section.

FINANCIAL

Opening the area for development, in Stantec's high-level order of magnitude estimate, requires an investment of approximately \$213.25M from a mix of developer, HRM, Halifax Water, Provincial, Capital Cost Contribution, and shared infrastructure investments at the high end of the range of estimates. This does not include the costs for the Cherry Brook By-Pass. Some infrastructure upgrades, particularly for sanitary sewer service, support both the Westphal and Morris Lake Study Areas. Should both study areas proceed, the cost of those upgrades could be shared between the two. For the purposes of this study, the

full costs are included in both study areas for consistency with costing portrayed in the Sandy Lake and Highway 102 Corridor FSC studies.

On a “per door” basis (total cost divided by the estimated number of housing units) development of the Westphal Study Area should cost approximately \$128,300 per door for the Low-density Scenario (which assumes the area is not serviced with sanitary sewers), approximately \$18,300 a door for the mid-density scenario, and approximately \$11,800 a door for the High-density/Developer requested Scenario, excluding increased annual operating costs. Admittedly, the infrastructure investment could be reduced slightly for the Low-density Scenario since the Highway 107 (Cherry Brook By-pass) would not be warranted, but many of the infrastructure upgrades are still required regardless of the scenario. These per door costs could be lower if infrastructure upgrades that benefit both the Westphal and Morris Lake Study Areas are shared between the two.

The High-density/Developer-requested Scenario would be ideal to share infrastructure costs and make transit more viable, provided Halifax Water can address any additional downstream sanitary sewer conveyance concerns.

NEXT STEPS

The next step in the FSC process will be for HRM to review the completed studies and determine if secondary planning, , should be initiated. The secondary planning process should include an updated master servicing study. In any subsequent planning steps, it will be essential for landowners to coordinate servicing strategies with regional infrastructure as noted by Halifax Water and summarized in the detailed Development Servicing Scenario report. This will be a major complexity of confirming the overall density and population for the Study Area. It needs to be carefully integrated with community design since there are significant interdependencies.

APPENDICES

