



**HALIFAX REGIONAL MUNICIPALITY
FUTURE SERVICED COMMUNITIES**

**VOLUME 3: HIGHWAY 102 WEST
CORRIDOR STUDY AREA REPORT**

April 4, 2025

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Halifax Regional Municipality

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Volume 1: 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 West 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 servicing, upstream water infrastructure upgrades, and downstream upgrades,
- density targets, distribution and thresholds needed to support the efficient use of infrastructure investments.

This volume summarizes the four component studies for the Highway 102 West Corridor 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. The remaining four volumes of this report are stand-alone reports for each Study Area.

This report concludes that the Highway 102 West Corridor lands are good candidate lands for urban development as they have already been disturbed through quarrying activities, and they could be rehabilitated to create a new community to support HRM's growing population. The Highway 102 West Corridor Study Area can be integrated into the various modes of the regional transportation system and the regional sanitary sewer and water services. There are existing capacity issues on the major highway and road systems such as Highway 102 and the Bedford Highway, which exist regardless of the development. Our study identifies potential mitigation strategies that have been discussed by the JRTA, HRM and the Province.

The site requires additional community planning work and depending on the physical alterations to the former quarry, further environmental investigations are likely to be needed, particularly if significant water diversions are contemplated. One key issue for further evaluation is the role of the former quarry pits as future lakes that the landowners suggest could serve a stormwater function. Stantec does not presume that this is viable and has modelled alternative stormwater management strategies for the area. The



community development boundaries will also need to be adjusted to remove any development from flood-vulnerable lands.

The concluding section of this report provides recommendations for HRM's consideration in any subsequent planning processes.



Acronyms / Abbreviations

Ac	Acre
BMBCL	Blue Mountain-Birch Cove Lakes
BRT	Bus Rapid Transit
CCME CWQG-FAL	Water Quality Guideline for Protection of Freshwater Aquatic Life
CDAT	Community and Deprivation Audit Tool
CFAD	Canadian Forces Ammunition Depot
CMHC	Canada Mortgage and Housing Corporation
FC	Fecal coliform
FF	Fire flow
FSC	Future Serviced Communities
GIS	Geographic Information System
GLA	Gross leasable area
Ha	Hectare
HGL	Hydraulic Grade Line
HOV	High Occupancy Vehicle
HRM	Halifax Regional Municipality
HSA	Highway 102 West Corridor
HW	Halifax Water
Hwy	Highway (i.e., Provincial Highway)
IMP	Infrastructure Master Plan
IRP	Integrated Resources Plan
JRTA	Joint Regional Transportation Agency



KLPS	Kearney Lake Pump Station
LID	Low Impact Development
LSA	Land Suitability Analysis
LUB	Land Use By-law
MAPC	Metropolitan Area Planning Committee
MDD	Maximum Daylight Demand
MHD	Minimum Hour Demand
MPS	Municipal Planning Strategy
PHD	Peak Hour Demand
PID	Parcel Identification Number
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
WESP-AC	Wetland Ecosystem Services Protocol – Atlantic Canada
WWTF	Wastewater Treatment Facility



1 Overview of the Future Serviced Communities Project

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

Stantec won the Request for Proposals (RFP) issued by HRM and has 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 when, if, and in what order of secondary planning should be initiated for each Study Area.

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 which includes review of:

- environmental and cultural constraints and opportunities,
- existing transportation infrastructure assets and constraints using multi-modal analysis,
- 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 servicing, upstream and water infrastructure upgrades, and downstream upgrades; and
- density targets, distribution and thresholds needed to support the efficient use of infrastructure investments.

This volume summarizes the four component studies for the Highway 102 West Corridor Study Area (Study Area). Please refer to Volume 1: Overall Summary for context for the entire study.



2 Overview of the Highway 102 West Corridor Study Area

2.1 Location

The Highway 102 West Corridor Study Area is on the west side of Bicentennial Drive (Highway 102) and generally to the east of Birch Cove Lakes. Lacewood Drive forms the southern boundary while Kearney Lake and Kearney Lake Road lie to the north of the Study Area. Washmill Lake is wholly contained within the northern end of the Study Area, and small portions of Quarry and Susies Lakes are located at its western edge. Several lakes (i.e., Ash Lake and Crane Lake) are west of the Study Area and are key features of the Blue Mountain-Birch Cove Lakes (BMBCL) regional park now being considered for development as a National Urban Park. Portions of the Susies Lake shoreline are included in the area being considered.

2.1.1 Existing Land Use

The Study Area is undeveloped other than the Gateway Materials Quarry in the northeast corner, which is still an active operation. A dedicated, gated access driveway, Crusher Road, connects the quarry site to Kearney Lake Road. The quarry has been a long-time supplier of aggregate for construction in the region. B. D. Stevens, the current owner of the quarry, owns all the property abutting Highway 102 between the northern and southern boundaries of the Study Area. The remainder of the Study Area is owned by the Annapolis Group whose holdings abut the western edge of Stevens' lands and extend to the western limit of the Study Area taking in the remainder of Quarry and Susies Lakes as well as Fox Lake to the north and west of the other two lakes.



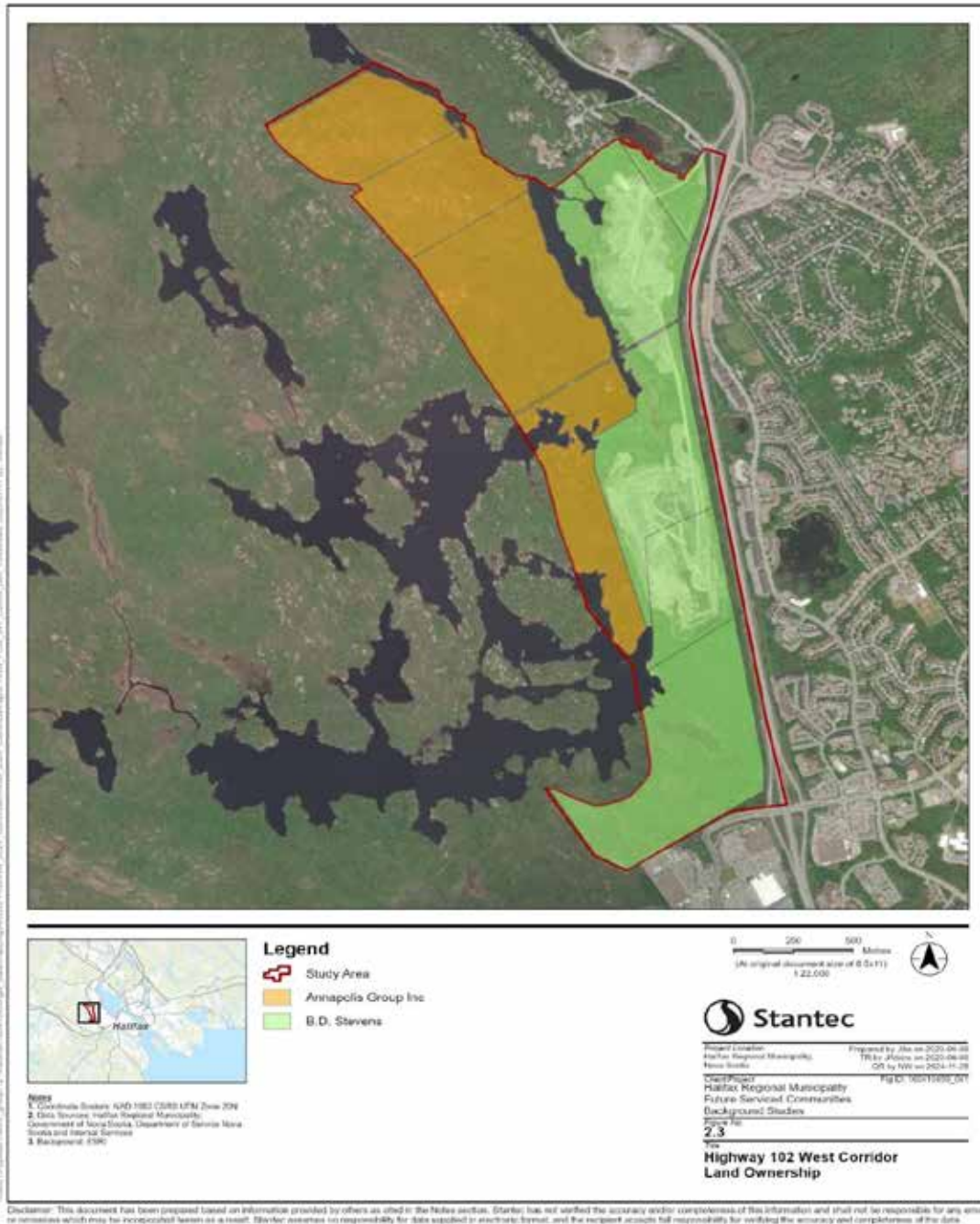


Figure 2-1 Land Ownership, Highway 102 West Corridor



The water level in Quarry Lake is regulated by a dam built in the early 20th century that, along with dams at Kearney Lake and Paper Mill Lake, was part of a system that drove a turbine at Moirs Mill in Bedford. The system powered a refinery and box mill owned by Moirs Ltd., which is now defunct, but is best known as a producer of chocolates at several plants that once operated in the Halifax area. While the power plant and related facilities no longer operate, the dams, which are all owned by the Annapolis Group, continue to have a role in maintaining the water level in the three lakes. Two studies completed by SGE Acres in 2003 and 2004 addressed the maintenance of the dams, which are critical to the recreational use of the lake system (Halifax, 2022).





Source: Halifax Regional Municipality

Figure 2-2 Highway 102 West Corridor Study Area



2.1.2 Adjacent Land Use

The Glenbourne neighbourhood is on the east side of Bicentennial Drive across from the Study Area. Properties abutting the highway in Glenbourne are generally occupied by mid-rise apartment buildings including some specifically for seniors. Most of the apartment structures are accessed from Parkland Drive and include surface grade parking. On the east side of Parkland Drive single-detached homes are dominant, along with supporting public parks and schools. Glenbourne is part of Clayton Park West, which extends to Dunbrack Street. Clayton Park West was developed in the 1980s and 1990s and includes well-established neighbourhoods such as Sherwood Heights and Farnham Gate. It is adjacent to Clayton Park, of which it is an off-shoot to the east, and the even longer-standing communities of Wedgewood Park and Rockingham to the north and northeast respectively. Glenbourne was developed by the Annapolis Group.

Single-detached homes, tree-lined streets, shopping plazas, and well-established schools characterize the neighbourhoods. Although most of Clayton Park West is 20 to 40 years old, and surrounding communities date from the 1950s and 1960s, the area is still developing. Rockingham South on the east side of Dunbrack Street facing Farnham Gate has been developed over the past decade as has the extensive area accessed from Regency Park Drive to the south of Lacewood Drive. These more recent residential developments consist primarily of apartment structures like those referred to between the west side of Parkland Drive and the Bicentennial.

Lacewood Drive is the primary collector road serving lands in the area. The street is the primary shopping and service area with two substantial shopping centres at the intersection of Lacewood and Dunbrack as well as additional local shopping uses and a large Home Depot store to the west. In addition to more medium-rise apartment buildings, Lacewood also provides a transit terminal and important cultural and recreation facilities. The Keshen-Goodman Library is located at the intersection of Lacewood and Thomas Raddall Drive. Thomas Raddall Drive accesses the Canada Games Centre, which offers a swimming pool, gym spaces, and a track, and abuts major outdoor sports fields comprising the Mainland Common. The BMO Soccer Centre and Halifax West High School with their related grounds and fields also access Thomas Raddall Drive.

Lacewood Drive continues under the Bicentennial Highway into Bayers Lake Business Park, which abuts the southern edge of the Study Area. The Business Park is the largest commercial area serving the Halifax Mainland. It offers a wide range of retail and service uses, including Costco Wholesale, directly across Lacewood Drive from the southern edge of the Walmart Supercentre, and Atlantic Superstore, as well as restaurants, a movie theatre complex, and industrial operations such as HRM's Materials Recycling Facility.

The business park is actively expanding. Areas close to the park's northern boundary have been recently cleared and new municipal infrastructure installed. New commercial structures are beginning to go up on the many lots that have been subdivided. Residential development originating from St. Margaret's Bay Road in Beechville and extending to Flatrock Crescent is now visible at the edge of the park boundary.



Immediately to the north of the Study Area is a long-standing residential community connected to Hamshaw Drive and Saskatoon Drive on the west side of Kearney Lake extending from the Study Area boundary to Maskwa Aquatic Club, which is roughly at the mid-point of the lake's western shore. The area is a mix of older seasonal residences and more recent year-round homes and is designated as Sub-area 11 in the Bedford West Secondary Planning Strategy. Recent construction on the lake includes several large, high value homes.

Large, high-value residential properties have also been developed in a newer subdivision at the north end of Kearney Lake. On the east side of the lake is a mix of commercial, industrial, and residential uses that access the east side of Kearney Lake Road. A prominent feature at the south end of this stretch is a large former quarry now owned by Kearney Lake Developments; a Clayton Developments affiliated company (PID 00289223). A major apartment building, the View, was recently completed at the north end of the lake where Kearney Lake Road meets Larry Uteck Boulevard. The area on the east side of Kearney Lake Road from the new apartment complex to Highway 102 is designated as the Bedford West 10 Special Planning Area. In January 2024, Kearney Lake Developments registered a plan for development of 647 residential units on their land in seven or eight multi-unit apartment structures ranging from four to twelve stories.

2.1.3 Site Background

Regional Planning

As noted in the Introduction, above, the Regional Plan adopted in 2014 designates the Highway 102 West Corridor as an Urban District Growth Centre.

Future serviced communities are potential growth areas. HRM growth projections have been adjusted in the face of an unprecedented and unanticipated surge of in-migration to the municipality since 2014 that has resulted an abrupt increase in demand for housing. In the draft Regional Plan now under public review, the Highway 102 West Corridor continues to be recognized as a future serviced community. It is not, however, among the special planning areas that the Province of Nova Scotia has designated in HRM to help accelerate an increase in the supply of housing.

The lands within the Highway 102 West Corridor are surrounded by highly developed residential and commercial areas where expansion is continuing. As noted, extensive lands within the Bayers Lake Business Park have recently been cleared and can be expected to accommodate considerable new construction. While Clayton Park West is almost entirely developed, Regency Park Drive on the south side of Lacewood Drive will gradually be extended farther south to accommodate additional high-density residential development. To the north of the Study Area, the Bedford West 10 Special Planning Area appears to be preparing to develop a substantial high-density residential development where low-density residential uses and industrial operations currently prevail. Sub-Area 11 of the Bedford West Secondary Planning Strategy on the southwest side of Kearney Lake is also a strong candidate for infill and renewal if policies to enable its development are adopted.



Regional Park

In 2021, HRM signed a statement of collaboration with Parks Canada to consider lands in the Blue Mountain-Birch Cove Lakes (BMBCL) area shown on **Figure 2-3** as a candidate National Urban Park, under a new federal program. Several background studies have been completed with stakeholder and public input to assess the opportunity and its feasibility.

Among these studies is the Blue Mountain-Birch Cove Lakes Regional Park Update prepared by Stantec in 2023. The study incorporated the following assessments of the regional park area:

- **Ecology** – Stantec environmental team members documented the presence and importance of rare ecosystems, freshwater ecosystems, aquatic connectivity, wildlife habitat connectivity, ecological connectivity, water quality, and habitat for species of concern/at risk in the BMBCL Study Area. The study identified 23 Species at Risk (SAR) and 61 Species of Conservation Concern (SOCC), including lichens, vascular plants, invertebrates, birds, fish, mammals, and reptiles. The dominant vegetation in the area includes softwood and mixedwood. Establishment of the regional park will promote ecological connectivity for wildlife between the BMBCL Study Area and other adjacent wilderness areas. Further, wildlife crossing and other measures to support ecological connectivity will be immediate benefits of the regional park.
- **Archaeological and Cultural Conditions** – Stantec archaeology staff identified several sites within the BMBCL Study Area with high potential for Pre-contact and/or Historic Period archaeological resources. These locations include the head of Frasers Lake and the mouth of Maple Lake, the watercourse between Maple Lake and Upper Sheldrake Lake, the Fraser Sawmill Site, the Coxs Lake Potential Sawmill Site, Blue Mountain, Hobsons Lake, and the Granite Quarry and Dam Site.
- **Land Use and Settlement** – Stantec planners described a diverse mix of economic and cultural activities in areas adjacent to the proposed park, with residential urban settlement features dominating interfaces between public and private lands. Lands associated with the proposed BMBCL Regional Park are currently owned by the Nova Scotia Trust, the Province of Nova Scotia, HRM, and the Crown (**Figure 2-2**). It will be important to ensure future development near or adjoining potential parklands is compatible in terms of use and scale.

Earlier studies by Porter Dillon in 1996 and EDM in 2006 have made positive statements concerning residential development next to the park. Both studies recognized that the land in the area would be expensive to develop because of the lack of soil cover and the frequent presence of rock at the surface, the proximity of the site to established residential communities in Mainland North as well as to lakes and valued natural amenities in the Birch Cove Lakes area would support higher prices. The EDM report, furthermore, saw future residents in abutting subdivisions as likely users of the park who would be committed to its preservation. The report also suggested that residents would provide surveillance at the



edges of the park and, particularly, its access points in keeping with CPTED (Community Prevention Through Environmental Design) principles.

HRM issued a Request for Proposals (RFP) seeking consulting services to develop a park concept plan that closed on August 3, 2023. The contract was awarded the Calgary-based consulting firm O2 Planning and Design, who are supported by the local consulting firm Upland Planning and Design Studio.

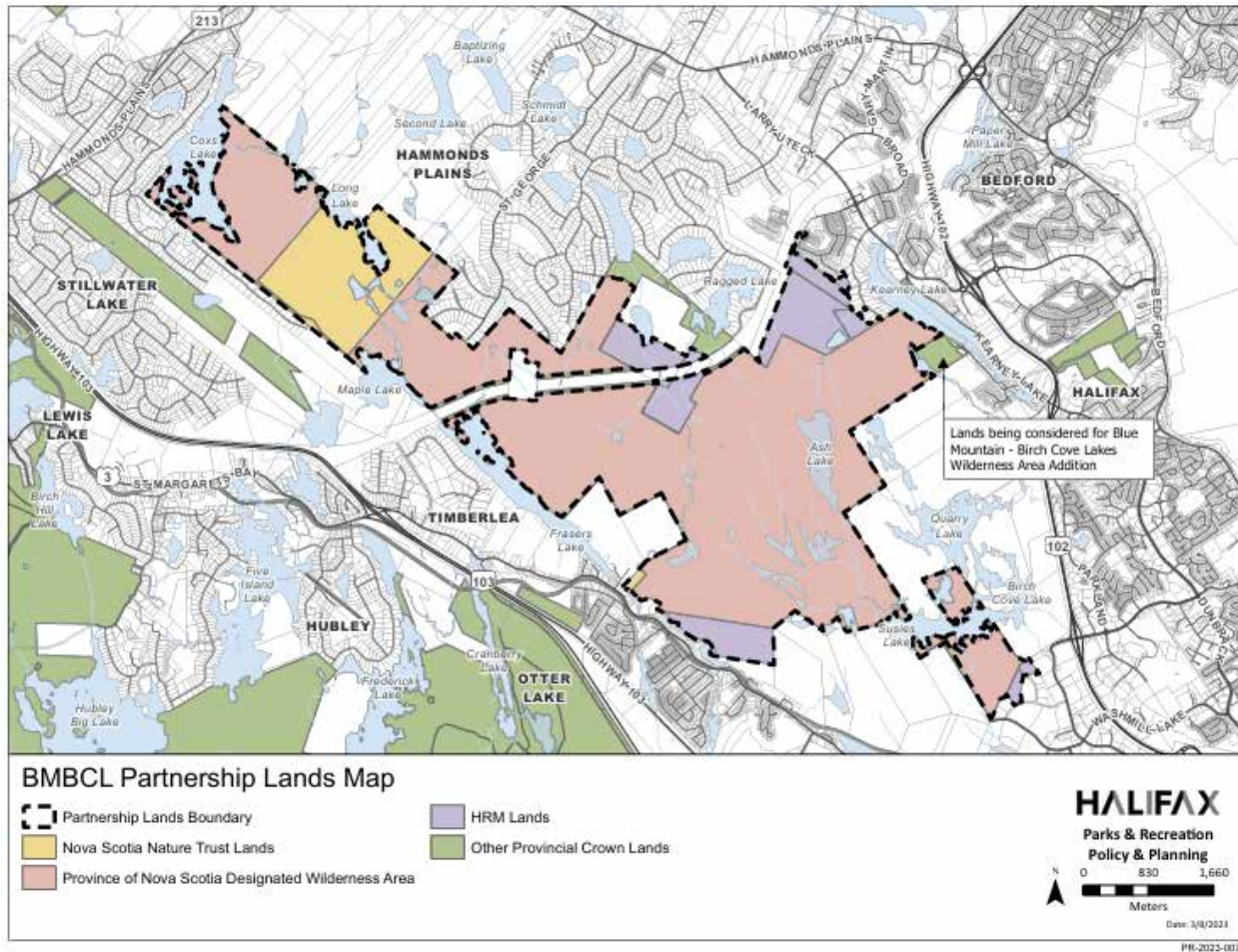


Figure 2-3 BMBCL Partnership Lands Map, 2023

2.1.4 Stakeholder Consultation

Other than a small Crown Land parcel in the southern portion of the Study Area and a right-of-way belonging to HRM, land within the Highway 102 West Corridor Study Area is owned by either the B. D. Stevens Group or the Annapolis Group. **Figure 2-3** shows the land holdings of each owner.

Stantec contacted B. D Stevens at the outset of the project to determine their development plans. The B. D. Stevens Group provided the concept plans as described in the following section and met with Stantec team members to discuss the main features of their proposal. This development titled as ‘The Lakes’ was originally created in 2014 on behalf of B. D. Stevens Group by the planning consulting firm Upland Planning and Design Studio who updated it in December 2020 and provided a further update for HRM staff in April 2023. The plan includes a comprehensive assessment of the company’s lands and their development potential. The B. D. Stevens Group shared traffic and environmental studies they commissioned to assess their development proposal as well as estimates of dwelling units and population for their concept design.

Annapolis Group holdings lie to the west of lands held by the B. D. Stevens Group and extend significantly beyond the western edge of the Study Area. Annapolis Group representatives met with Stantec team members to discuss a concept plan created for the company’s entire holding in 2014. Their plan was integrated with the Upland Planning and Design Studio scheme for the B. D. Stevens Group; however, roughly half the area to which the Annapolis Group plan applies is land designated as Urban Reserve under the Regional Plan that is outside of the Study Area delineated in the RFP for this assignment. Stantec has calculated the proportions and types of dwelling units within the Study Area for consideration in the following development scenarios presented.

2.2 Developer Proposals

2.2.1 B. D. Stevens Group

The B. D. Stevens Group is a privately owned Halifax-based company with interests in contracting, building materials, land development, and property management among other businesses. The company owns the lands of the former Gateway Quarry at the northeast corner of the Highway 102 West Corridor Study Area as well as contiguous lands abutting Highway 102 that extend south to Lacewood Drive. Their lands are bordered by fully serviced areas on three sides with Bayers Lake Business Park to the south, Clayton Park West to the east, and Kearney Lake Road to the north. Undeveloped lands belonging to the Annapolis Group abut the western edge of the Stevens lands. While the Birch Cove Lakes Wilderness Area to the west of the Annapolis property is being considered for park planning as part of the Parks Canada’s National Urban Parks program, a definitive park boundary has not yet been set. The current conceptual planning process will presumably determine the extent of land to be incorporated in the park.

A breakdown of the development lands as provided by B. D. Stevens Group is as follows in **Table 2-1**:

Table 2-1 Breakdown of B. D. Stevens Group Development Lands

Land Area	Ownership
85 ha/210 acres	Gateway Quarry Lands



9.3 ha/23 acres	Susie Lake Development lands
28.3ha/70 acres	Lands owned by Susie Lake Development that have been set aside for potential regional parkland acquisitions

Upland Planning and Design Studio's plan for the B. D. Stevens Group's lands within the Highway 102 West Corridor Study Area envisions a high-density, mixed-use community called The Lakes shown in **Figure 2-4**. According to the proponents, the concept plan calls for transit integration, an active transportation network, a linked system of natural areas, and continuous public frontage on the lakes providing a window on the proposed regional park. Integrating the concept of the five-minute neighborhood, the development plan calls for a critical mass of density around three neighborhood nodes that support transit and local services. They suggest that residents of the development will benefit from the existing public facilities such as the Keshen Goodman Public Library and the Canada Games Centre as well as the commercial opportunities and amenities available in Bayers Lake Business Park.

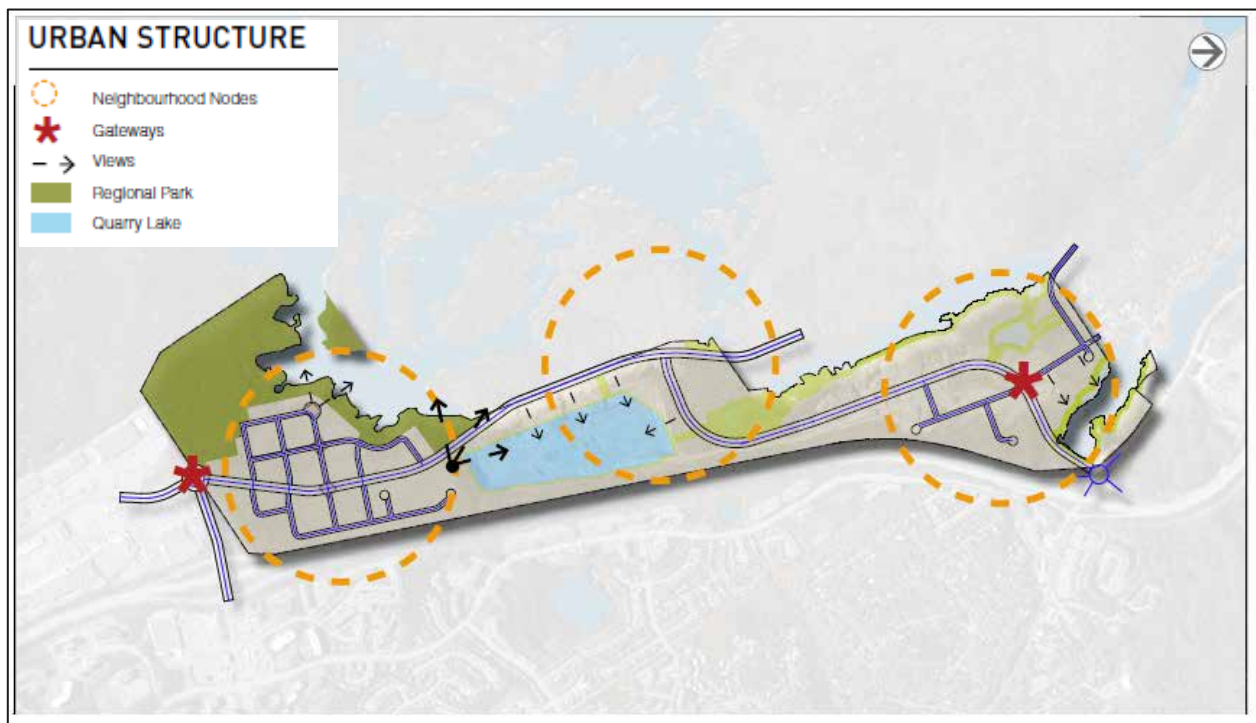


Figure 2-4 B. D. Stevens, Proposed Land Use Concept

The predominant character of the new development is multi-unit, compact urban housing. No single-detached dwellings are planned for the site. The proposed concept includes four- to-six-storey buildings

with a mix of unit sizes suitable for a range of household sizes. The concept provides commercial uses with ground floor retail and office space to create opportunities for a work-life balance within the community.

The development is divided into three distinct neighborhood nodes distributed along a new collector road that connects Kearney Lake Road and Lacewood Drive/Chain Lake Drive. Commercial services, small-scale office space, and transit nodes are concentrated in each neighborhood within a five-minute walk from surrounding medium-density housing. The multi-unit housing configurations create informal public and semi-public open spaces between buildings expected to function as green space extensions into the neighborhood where they will act as transitional areas from the natural setting of the park to the urban environment of the community.

Commercial activity is concentrated in the southern portion of the site near Lacewood Drive across from the Business Park. A neighborhood centre featuring multi-storey housing and office space above retail uses, as well as mid-box or big box retailers adjacent to Highway 102 and Lacewood Drive will augment the established commercial character of the Lacewood/Chain Lake Drive corridor.



Figure 2-5 B. D. Stevens, Proposed Density



Figure 2-5 shows expected population densities across the development lands, which Upland estimates will support a total population of 20,095.

A breakdown of the new community is as follows in **Table 2-2**:

Table 2-2 Proposed Density Breakdown for B.D.B. D. Stevens Group Development Proposal

Use	Area	Total Units	Population
Commercial Retail	22,199 m ²	N/A	N/A
Mixed-Use Commercial (ground floor commercial GFA)	84,357 m ²	N/A	N/A
Residential (total residential GFA)	931,929 m ²	8,737	15,727

The new community is divided into four large ‘parcels,’ also seen in **Figure 2-5**. Development yield by parcel is described below in **Table 2-3**:

Table 2-3 B. D. Stevens Group Anticipated Development Yield

	Total Residential GFA (m ²)	Total Commercial GFA (m ²)	Average Unit Size (m ²)	Total Units	Typical Persons/Unit	Total Population
Parcel 1	341,320	82,598	80	3,200	1.8	5,760
Parcel 2	N/A	N/A	N/A	N/A	N/A	N/A
Parcel 3	209,388	8,012	80	1,963	1.8	3,533
Parcel 4	381,221	15,946	80	3,574	1.8	6,433

Parcels 1, 3, and 4 are all predominantly residential with local commercial uses in Parcels 3 and 4, and the more substantial regional commercial component in Parcel 1. Parcel 2 consists of approximately 70 acres set aside for potential contribution to the Regional Park (**Figure 2-6**). The plan proposes providing access for visitors to the park via a proposed roundabout on Lacewood Drive and another through an unnamed internal road. The open spaces are intended to transition to the new Regional Park. Commercial and residential uses in the balance of the development will be connected to the park by a trail system to create a recreational focal point for the community.



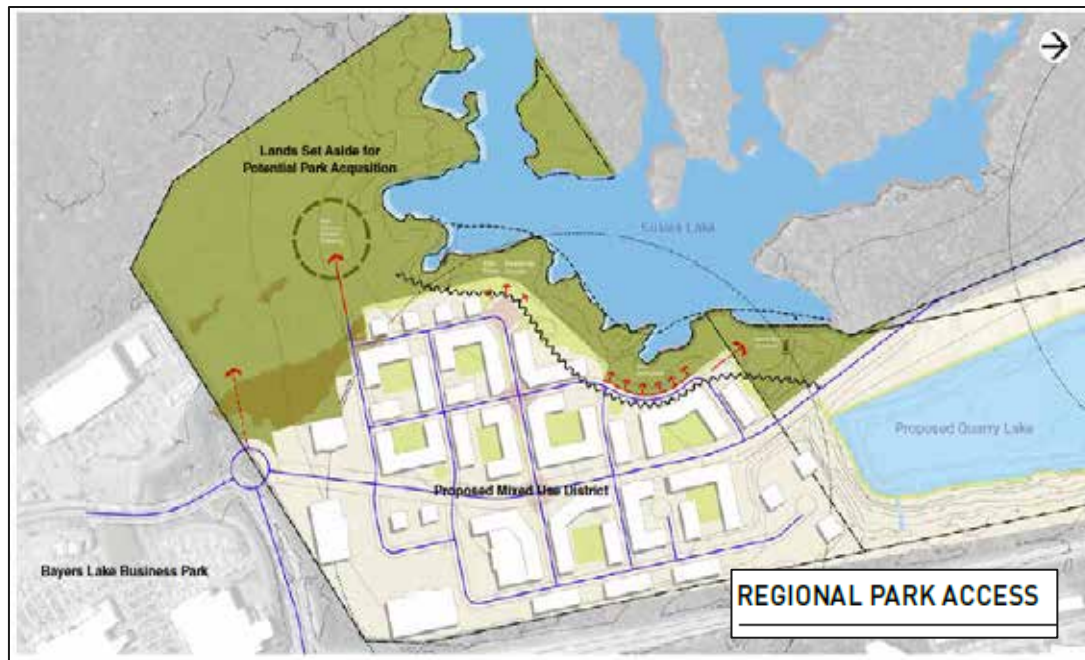


Figure 2-6 B. D. Stevens Group, Regional Park Access

2.2.2 Annapolis Group

The Annapolis Group owns approximately 965 acres (390 hectares) surrounding Susies Lake, Quarry Lake, and Fox Lake between the B. D. Stevens Group lands and the Blue Mountain Birch Cove Lakes Wilderness Area. The Annapolis Group proposes to develop a mixed-use community comprised of lower-density, ground-level housing (i.e., single-detached, townhouses) and low-, mid-, and high-rise apartment buildings, as well as retail and commercial space and a school. According to the developer, the development will be enhanced by frontage on the lakes within the Annapolis lands and the views they will provide. They feel the development should also benefit from the development of the Blue Mountain-Birch Cove Lakes Wilderness Area, which abuts to the west, and is proposed to be incorporated in the BMBCL Regional Park.

An excerpt from the Facilitator's Report Regarding Negotiation of the Proposed Boundaries for the Blue Mountain/Birch Cove Lakes Regional Park in Relation to the Highway 102 West Corridor shows the proposed Annapolis Group development (**Figure 2-7**). The area in orange on the plan is the mixed-use Lakes development proposed by the B. D. Stevens Group.

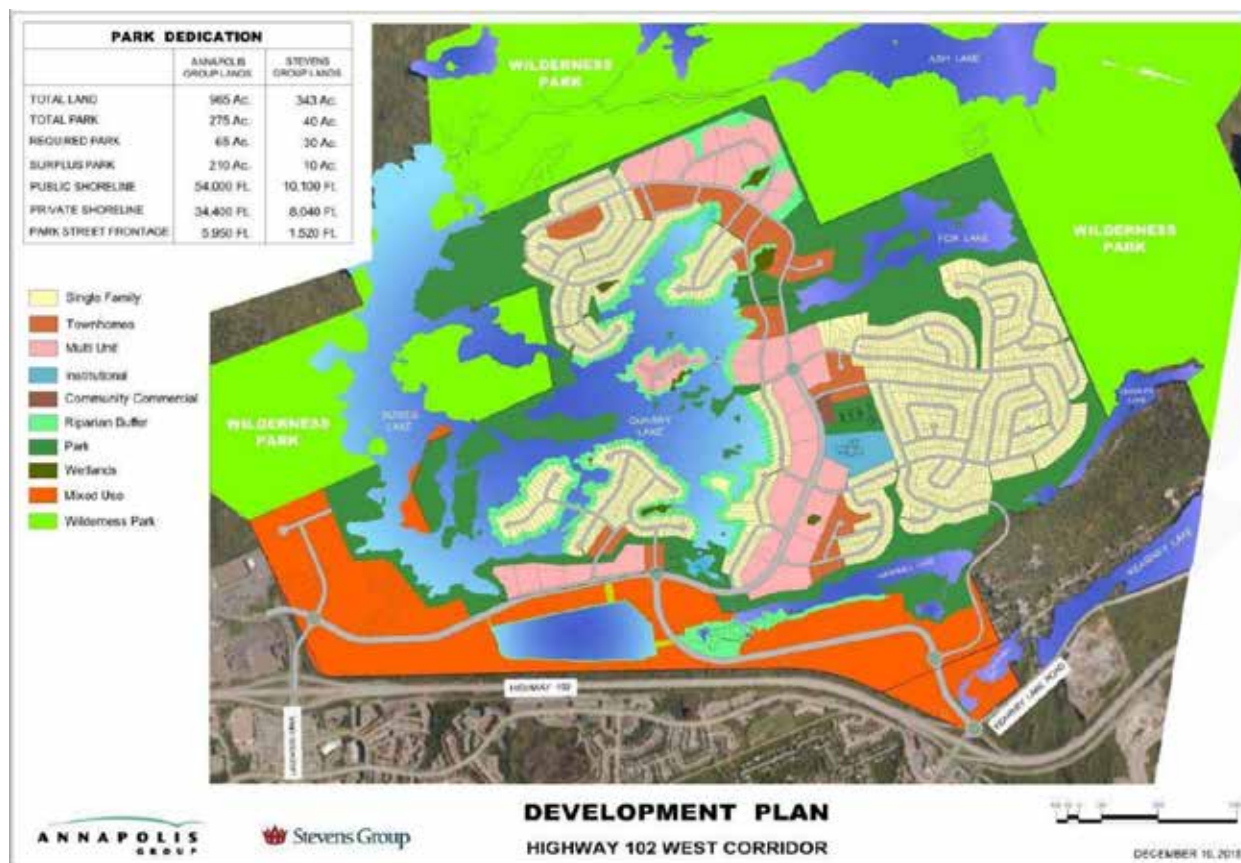


Figure 2-7 Annapolis Group, Concept Plan

A large portion of the Annapolis lands is outside the Study Area as noted above. The curved boundary of the Study Area follows the divide between the Urban Settlement and Urban Reserve designations applied through the Regional Plan and Halifax Mainland LUB. Development scenarios presented below apply only to the portion of land contained within the Study Area.

The proposed development is broken into three sectors:

West Sector	This sector consists of lands north of Birch Cove Lake. The proposed development includes single-unit dwellings and townhouses. It is proposed that some portion of the single-unit dwellings will back onto Birch Cove Lake with a 30-metre riparian buffer provided between the dwellings and the lake. The remainder of this sector is a mix of multi-unit apartments bordering the wilderness area.
North Sector	This sector consists of lands to the east of Quarry Lake and is the largest of the three sectors. The proposed development includes single-unit dwellings,



	townhouses, multi-unit apartments, institutional, and park uses. The majority of lands in the sector are dedicated to single-unit dwellings.
East Sector	This sector is the smallest and comprises of lands between Quarry Lake and Susies Lake. The majority of development will include single-unit dwellings along the lake shoreline, which will include a riparian buffer between the dwellings and the lake. Multi-unit apartments and townhouses are also included in this sector.

For the purpose of this study, the Stantec team has reviewed the portion of Annapolis lands within the Study Area to better forecast the density of the Study Area. No commercial space is within portion of the Annapolis plan within the Study Area. The table below summarizes the unit breakdown of the concept plan lands within the Study Area:

Table 2-4 Annapolis Group Anticipated Development Yield

Use	Area	Total Units	Density
Apartment buildings	46.8 acre	1,808	3,254
Townhouses	108.0 acre	108	281
Single-detached houses	112.4 acre	794	2,064
	TOTAL	2,710	5,599

2.3 Development Scenarios

The RFP for this assignment specified that the consultant would assess the Highway 102 West Corridor Study Area in terms of three scenarios. Using the initial findings of the background review and updates to previous studies, Stantec evaluated and identified the three development possibilities for the Study Area. The scenarios consider the following criteria:

- Environmental considerations which resulted in the calculation of the available “developable land area” (Refer to the Land Suitability Analysis **Appendix 3A**),
- Capacity to create mixed use development comprising of 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.

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 is used as background information to the various analyses of infrastructure servicing, water quality and transportation impacts. These Development Scenarios should not be considered to be land use plans 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.

- **Low-Density Scenario** – The Low-Density Scenario assumes exclusively single-detached housing. Based on Pattern C (Suburban Low Density) in the 2005 HRM document *Settlement Pattern and Form with Service Cost Analysis* also known as the Pattern Book, we have assumed 8,100 square feet will be required for each unit allowing 2,553 dwelling units or 5.4 dwellings per acre on the Stevens and Annapolis Group sites. At 2.6 persons per unit the completed development would house 6,638 residents or 14.0 ppa.
- **Mid-Density Scenario** – Consistent with RFP specifications, the Mid-Density Scenario was derived from the Regional Plan Review *What We Heard Report*. As noted, research by Stantec determined that the 3,231 units referred to in the RFP applies only to lands owned by B. D. Stevens. Stantec determined the density of 3,231 dwelling units on 256.7 environmentally suitable acres available on the Stevens land equates to 12.6 dwellings per acre and applied the same density to 218.2 acres of developable area owned by the Annapolis Group. The profile of dwelling unit types in both cases was based on the distribution provided by the Annapolis Group plan. The resulting mix of dwelling units would be 5,977 units combined and would presumably accommodate up to 12,351 residents or 26.0 ppa.
- **High-Density/Developer-Requested Scenario** – The Upland Planning and Design Studio plan for the B. D. Stevens Group property provides for 8,737 apartment units, while Stantec estimates the Annapolis Group plan will generate 2,710 mixed residential units. Between them, the two properties would have 11,447 dwelling units that would presumably accommodate up to 21,326 people (44.9 ppa).

2.3.1 Low-density Scenario

The Low-Density Scenario assumes all development in the Study Area will be single-detached houses. Based on Pattern C (Suburban Low Density) described in the 2005 Pattern Book, we have assumed a requirement of 8,100 square feet of land per unit, which would allow 2,553 houses on 474.9 acres suitable for development according to the environmental review completed for this study (5.4 dwellings per acre). Based on the household size of 2.6 persons for ground-based units used for this study, 2,553 units comprised of 1,380 on the Stevens lands and 1,173 on lands owned by the Annapolis Group would accommodate 6,638 residents at 14.0 ppa. A summary of the development statistics is shown in **Table 2-5**.



Table 2-5 Development Statistics, 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
B. D. Stevens Group	340	256.7	Singles	1,380	5.4	100.0%	3,588	14.0	11.2	45,000
Annapolis Group	289	218.2	Singles	1,173	5.4	100.0%	3,050	14.0	11.2	35,000
STUDY AREA	629	474.9	All development	2,553	5.4		6,638	14.0	11.2	75,000

2.3.2 Mid-Density Scenario

The Mid-Density Scenario is based on the *Themes & Directions What We Heard Report* prepared for the current Regional Plan Review, which identified 3,231 dwelling units at 9.0 units per acre as the potential maximum for the lands owned by B. D. Stevens Group, which account for 54.1% of the developable land available within the Study Area. Dividing by developable acreage, which Stantec has applied for development scenarios for all Study Areas, the unit density for 256.7 developable acres owned by Stevens is 16.0 units per acre as opposed to 9.0 assumed by the Themes and Directions Report. The ratio of 16.0 units per developable acre was applied to the lands owned by the Annapolis Group within the Study Area.

Stantec assumed the residential mix on both properties would be the same as for the plan submitted by the Annapolis Group (i.e., 29.3% singles, 4.0% townhomes, and 66.7% apartments in multiple-unit buildings). Assuming 2.6 persons per ground-based unit and 1.8 persons per apartment unit, occupancy of the completed units would be expected to be 12,351 or 26.0 ppa. A summary of the development statistics is shown in **Table 2-6**.



Table 2-6 Development Statistics, Mid-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
B. D. Stevens Group	340	256.7	Singles	947		29.3%	2,461			
			Townhouses	129		4.0%	335			
			Multi-unit	2,156		66.7%	3,880			
			All types	3,231	12.6	100.0%	6,676	26.0	11.2	75,000
Annapolis Group	289	218.2	Singles	805		29.3%	2,092			
			Townhouses	109		4.0%	285			
			Multi-unit	1,832		66.7%	3,298			
			All types	2,746	12.6	100.0%	5,675	26.0	11.2	65,000
STUDY AREA	629	474.9	All development	5,977	12.6		12,351	26.0	11.2	140,000

2.3.3 High Density / Developer-Requested Scenario

The Developer-Requested Density Scenario combines the B. D. Stevens Group and Annapolis Group proposals outlined in the preceding section. Given the focus on multi-unit development in The Lakes concept proposed by the B. D. Stevens Group, we have designated the scenario as the High-Density option.

The Stevens Group has proposed 8,737 units on their landholding and the Annapolis Group has proposed another 2,710 units within their portion of the Study Area. Together, the two proposed residential developments would create 11,447 dwelling units in a mixture of housing types. The estimated population of the combined developments would be 21,326.

B. D Stevens Group plans to provide 22,199 m² (238,948 sq. ft.) of retail space. The Annapolis Group has not proposed any commercial retail space within the Study Area. The total commercial space within the Study Area would therefore be 238,948 square feet of gross leasable area (GLA) or 11.2 square feet per resident. We have rounded the area up to 240,000 square feet. By locating the majority of the commercial space close to Lacewood Drive and Bayers Lake Business Park, the designers of The Lakes appear to be drawing on and augmenting the community and regional shopping traffic that already defines the area, as well as addressing the needs of future residents in the neighbourhoods they propose to build. A summary of the development statistics is shown in **Table 2-7**.



Table 2-7 Development Statistics, High Density/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
B. D. Stevens Group	340	256.7	Multi-unit	8,737	34.0	100.0%	15,727	61.3	15.2	240,000
Annapolis Group	289	218.2	Singles	794		29.3%	2,064		0.0	0
			Townhouses	108		4.0%	281			
			Multi-unit	1,808		66.7%	3,254			
			All types	2,710	12.4	100.0%	5,600	25.7		
STUDY AREA	629	474.9	All development	11,447	24.1		21,326	44.9	11.2	240,000



3 Summary of Key Findings from the Background Studies

3.1 Highway 102 West Corridor Land Suitability Analysis

The Land Suitability Analysis (LSA) for the Highway 102 West Corridor Study Area (HSA) involved both desktop and field evaluations, supplemented by regional and local studies provided by other organizations. The desktop review included data from various 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 at gathering further environmental data and assessing 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 LSA report can be found in **Appendix 3A**.

Wetland habitat was a significant focus, with 44 wetlands identified. Of these, 35 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). Full analysis of wetlands desktop and field data can be found in Section 3.2 in **Appendix 3A**.

Stantec recommends the following steps when development decisions related to wetlands need to occur. The first step in the sequence (and the priority) is avoidance. This option involves avoiding alteration to wetlands, forcing the consideration of alternative options for the project that may result in fewer impacts to wetlands. If there is no alternative option, minimization is recommended, meaning that any unavoidable impacts to the wetland be managed in such a way that adverse impacts are reduced. This can be accomplished through specific techniques or materials, and/or by site choice. Compensation is required for any permanent loss of wetland area or function. Compensation can be in the form of restoration, enhancement, creation, and/or expansion of a wetland ecosystem. The amount of compensation necessary is determined by NSECC and ranges from 1 to 4 ha for every 1 ha of wetland altered, depending on the compensation approach and the relative ecological/social value.

The analysis of watercourses and water quality identified six mapped watercourses and four mapped waterbodies. The Study Area is located within the Kearney Run Watershed and contains the entirety of Washmill Lake and a portion of the following lakes: Quarry Lake, Susies Lake (commonly referred to as



Birch Cove Lakes), and Charlies Lake. The watercourses and waterbodies within the Study Area flow into Washmill Lake before leaving the Study Area and flowing into Kearney Lake, which eventually discharges into the marine environment of the Bedford Basin via Paper Mill Lake.

Water quality sampling indicated generally low levels of suspended sediments and concentrations of phosphorous indicative of oligotrophic 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 located within 30 metres of a watercourse were considered to have low suitability for development. Areas between 30 and 100 metres from a watercourse were considered to have moderate suitability for development, while areas greater than 100 metres from a watercourse were considered to have higher suitability for development.

Additional consideration was taken when scoring wetlands to manually adjust the weighting of policy-protected constraints including established environmental buffers such as a 30-metre wetland setback for wetlands intersected by watercourses. Prior to the development of lands within the 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 3A**.

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 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 3A. Stantec recommends alterations to landscape connectivity corridors in Fig 3.11c of the HSA LSA report (Section 3.5 **Appendix 3A**). This will ensure aquatic and terrestrial environments are integrated into the Halifax Green Network Plan. These alterations will allow for potential wildlife connections between Kearny Lake, Washmill Lake, and Quarry Lake. The report also addresses landscape connectivity, proposing wildlife corridors to link habitat patches and facilitate species movement (Section 3.5 **Appendix 3A**).

The LSA report concludes with two summaries of the culmination of biological and geological/topographical land suitability analyses. Areas with higher ecological function, such as wetlands, mature forests, and potential habitats for species at risk, are generally deemed relatively less suitable for development and more suitable for conservation. Conversely, areas with lower ecological function are considered relatively 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 foregoing analysis of potential land suitability based on forest habitat and species at risk should only be viewed as a preliminary tool to assist in planning for future development in the Study Area.



Responsible land development depends on many factors including those described above, and no one factor, or group of factors should be considered determinative. Rankings are meant to be indicative, and to lay the groundwork for future, site specific investigations to be conducted if planning proceeds.

Our work acknowledges that significant portions of the Study Area have been quarried, and the landowners contemplate transforming part of the affected areas into a human-made lake for stormwater management. While quarried portions of the Study Area that have been filled with water may create the potential conditions for attracting species at risk (SAR), the amount of quarrying activity may mean that SAR will not be found upon further detailed investigations. Ending the quarrying operation may benefit the surrounding communities and allow new habitat to establish. Consequently, more detailed site-specific studies should be conducted during the community planning process to determine areas that could continue to be altered and those that need to be left as habitat.



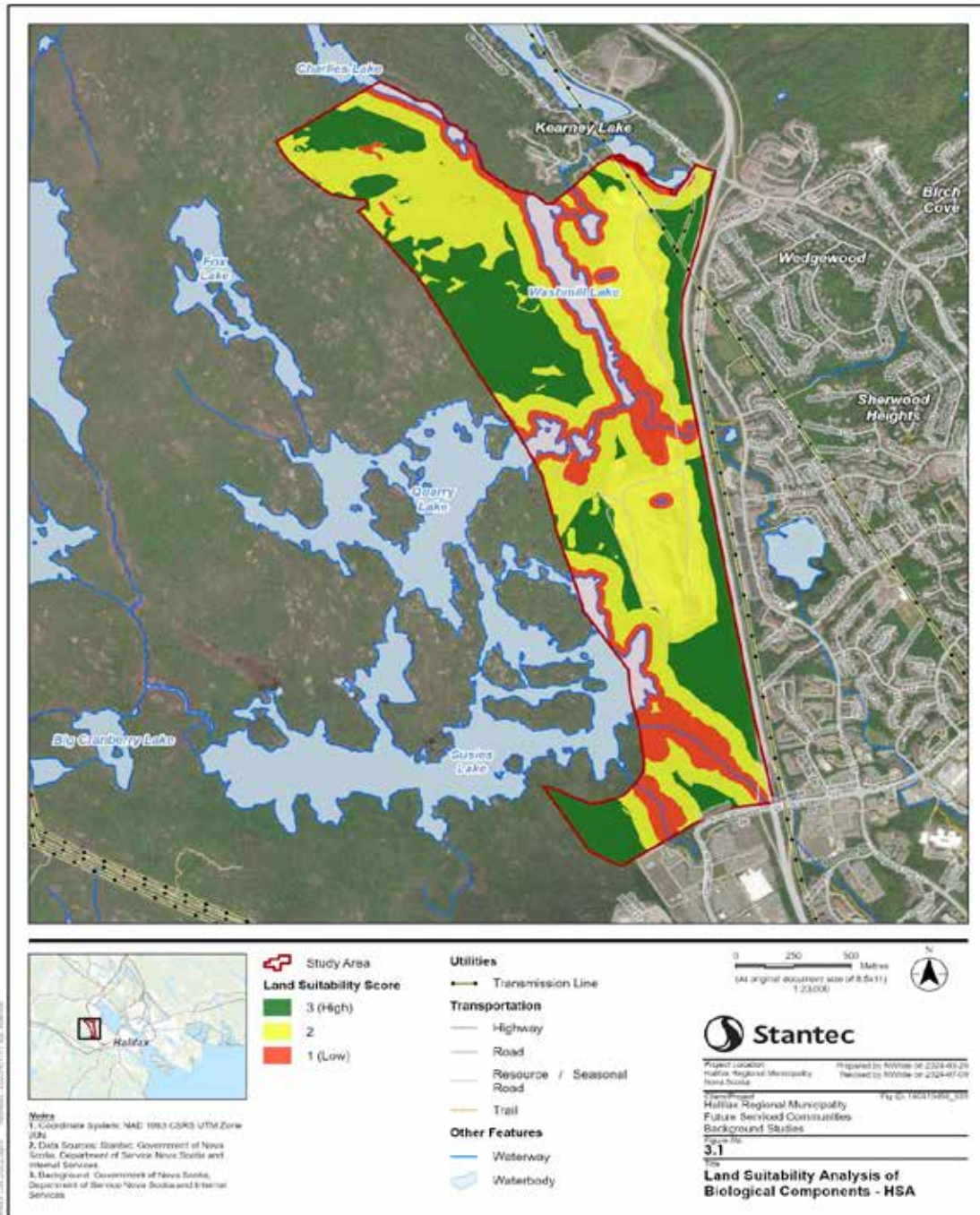


Figure 3-1 Land Suitability Analysis of Biological Components – Highway 102 West Corridor



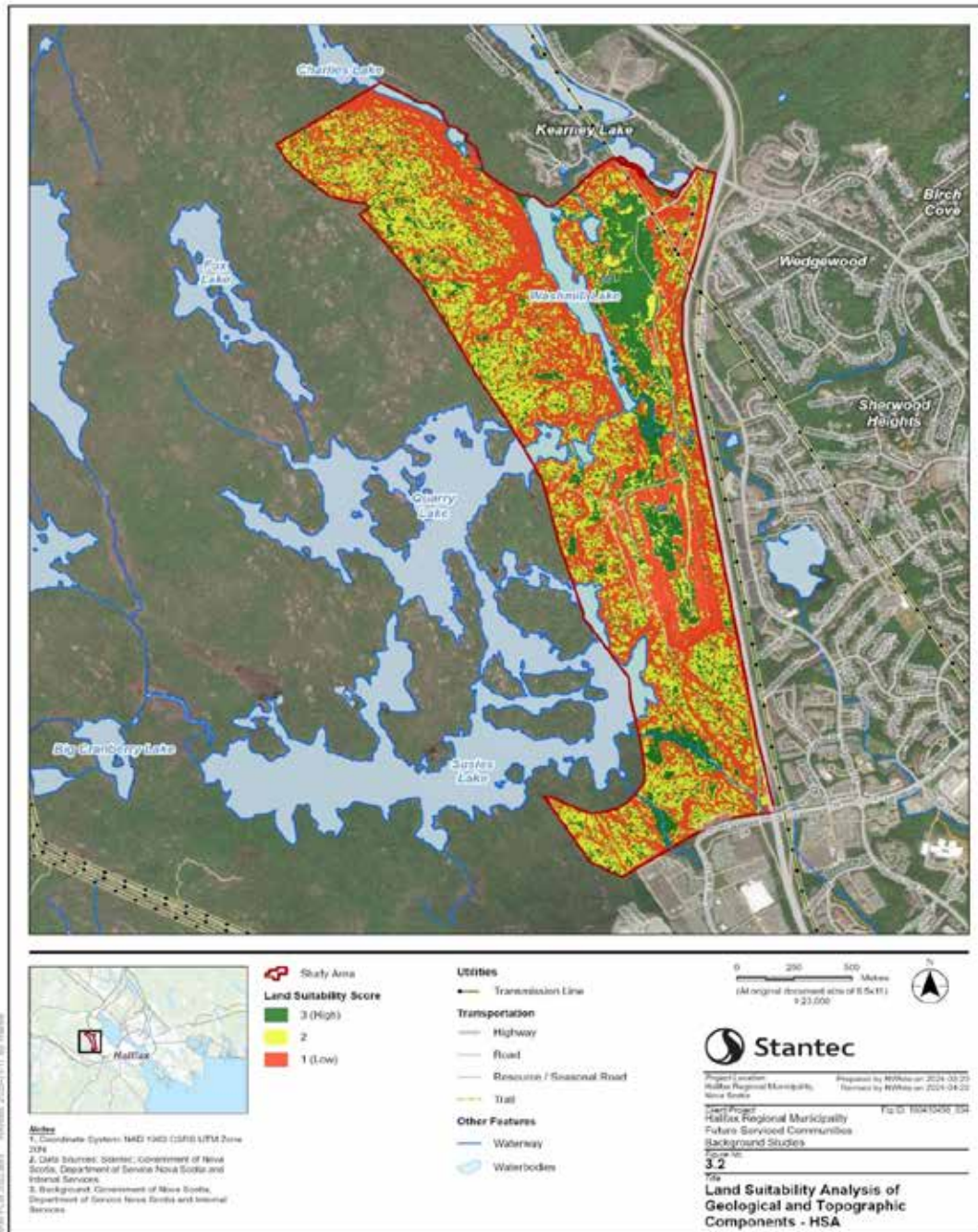


Figure 3-2 Land Suitability Analysis of Geological and Topographic Components – Highway 102 West Corridor



3.2 Highway 102 West Corridor Watershed and Stormwater Study

3.2.1 Water Quality Findings

The Highway 102 West Corridor 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, 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 to the HSA 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 Water Quality Study, contaminant loading models for three land development scenarios (low-density, mid-density, and high-density/developer requested density) were evaluated to understand the potential water quality effects resulting from each scenario. The B. D. Stevens concept plan included developing a pit lake within the existing quarry footprint; however, the assessment was conducted without reclassifying the quarry pit as a waterbody, since the future use of the quarry lands remains under consideration and retaining the “gravel pit” classification provides a more conservative approach.

In addition to the three development scenarios a fourth 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 scenario was evaluated to assess impacts of development on the watershed when forested area is conserved within the watershed. The outcome of the study is to provide recommendations for the planning, design, and implementation of new developments that will help to maintain existing water quality.

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

- **Phosphorus Loading:** Stantec estimates that the development scenarios will result in an increase in annual phosphorus loading to the various waterbodies within the Study Area by 11% to 15%, with the high-density scenario contributing the most significant increase.
- **Fecal Coliform:** Predicted increases in annual fecal coliform loading range from 13% to 16%, primarily due to increased high density residential development, with the high-density scenario contributing the most significant increase.



Sediment Loading: Predicted increases in annual sediment loading for all four scenarios were approximately 10%, this is due to similar developed areas; however, the areal land use scenario contributed the least at 1,492 tonnes/year. A lake system TP loading model was developed for Washmill Lake using the method developed by Brylinsky (2004). Based on the model results, 4% of TP input remains in the lake, with 96% discharged for the existing condition, while 5% of TP inputs remain in Washmill Lake for the low-, medium-, high-density and areal land-use scenarios. As a result of lake system nutrient loading modeling, the existing in-lake P concentrations were predicted to have an average value of 0.015 mg/L within Washmill Lake, which increased to 0.019 to 0.020 mg/L depending on the scenario applied.

Full analysis and study details of the Watershed Study are included in **Appendix 3B**.

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

- 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 pet droppings, risk of 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 of the planning for 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

The entire proposed development is within the Kearney Run secondary watershed. Within the Study Area, drainage is divided amongst Quarry Lake, Susies Lake, and Washmill Lake. Quarry Lake and Susies Lake discharge into Washmill Lake, which ultimately discharges northward into Kearney Lake. Kearney Lake is outside the proposed Study Area.

Planning documents must identify Flood Risk Areas consistent with the Canada-Nova Scotia Flood Damage Reduction Program mapping and any locally known floodplains. 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 Nova Scotia Statement of Provincial Interest Regarding Flood Risk Areas (“the Statement”) provides an outline for development restrictions and limitations within the floodway and the floodway fringe. 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.

The Halifax Regional Municipal Planning Strategy (RMPS) identifies development restrictions within the Highway 102 Study Area due to environmental sensitivity and the absence of municipal services and provides specific requirements for a master stormwater management plan in support of development. The Halifax Mainland Land Use By-law contains provisions for watercourse setbacks pursuant to the RMPS, as well as development restrictions. By-Law standards are minimum levels and additional buffer widths may be considered during later stages of the approvals process to address further protections for the ecological buffer zones.

PCSWMM software was used to create an existing drainage condition model to estimate existing peak flow discharges from the site areas into the receiving lakes. The Washmill Lake watershed encompasses a substantial area upstream of the subject site. This area includes rural lands and a network of lakes and wetlands. This complex system within the watershed has significant implications for stormwater management and planning and is not well understood at this stage. There is currently no available flow monitoring or stage discharge curves for either Quarry Lake, Susies Lake, or Washmill Lake, and as such the hydraulic modeling completed for this Study Area was based on preliminary lake water levels acting as fixed boundary conditions. Flow and water level monitoring at the lakes, as well as along the watercourses that interconnect the lakes within the Study Area will be required to validate the stormwater model and to size proposed culvert crossings.

As illustrated in **Figure 3.3**, the Study Area includes two existing culvert crossings (Culvert 27 and Culvert 29) and three culvert crossings entering the Study Area from external lands (Culvert 25, Culvert 28 and Culvert 30), as identified from the HRM Open Data source.

Upon reviewing the flood extents provided by HRM, it was observed that all existing culverts are undersized. It is therefore recommended that these culverts be upsized to provide adequate conveyance capacity and improve existing drainage conditions. However, as these culverts are all external to the site, these would need to be addressed by their respective owners. It is important to note that culvert upgrades would result in peak flow increases and increased flooding risks downstream and as such, it is recommended that further hydraulic analyses be completed at the detailed design stage of these culvert upgrades to assess flooding impacts downstream, if indeed these upgrades are considered prudent. Please refer to **Appendix 3B** for details.

Based on the floodlines obtained from HRM, part of the proposed development lies within the floodplain. Additionally, a small portion of the development lies within the floodplain of the unnamed watercourse 1.



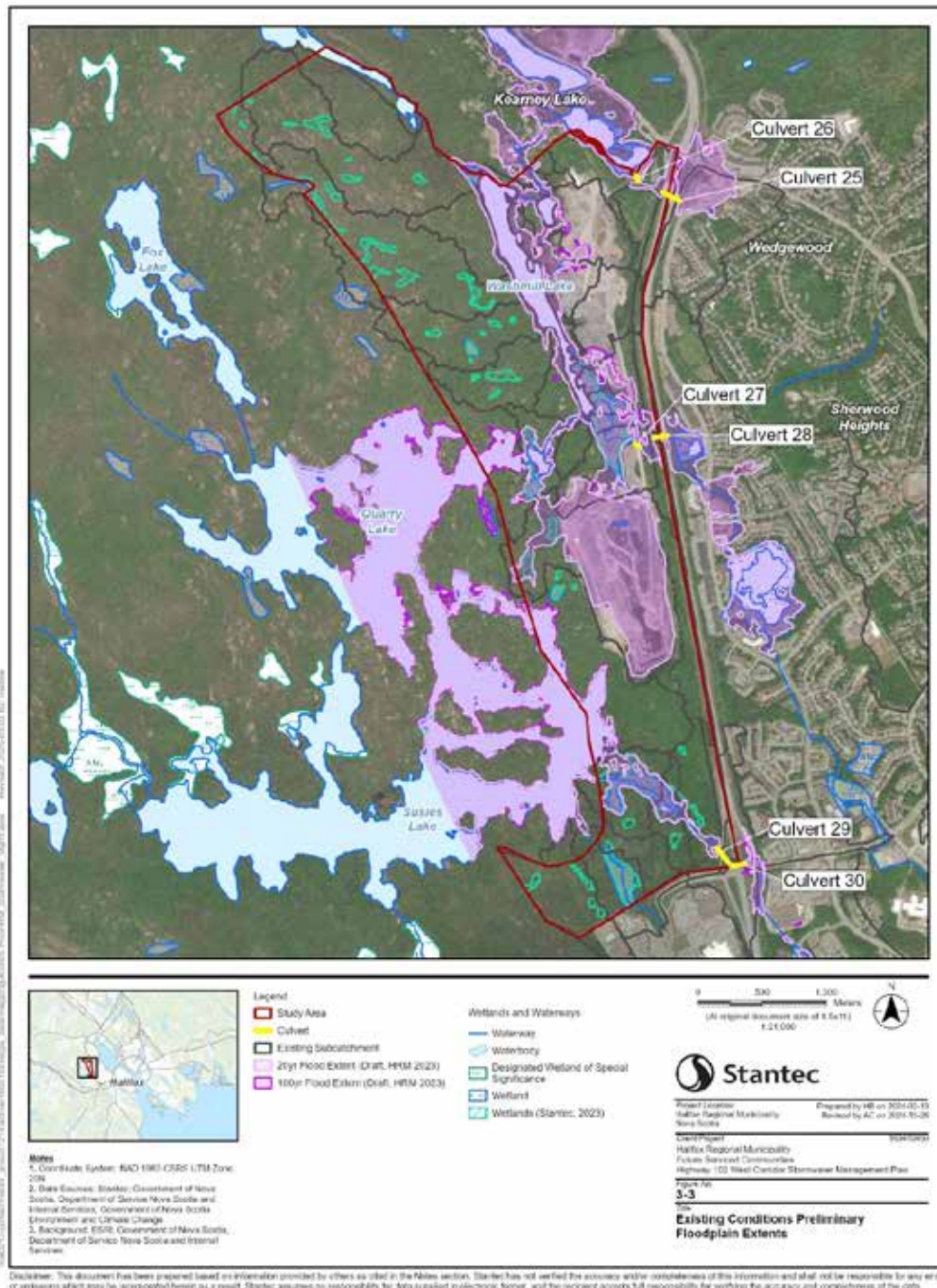


Figure 3-3 Existing Conditions Preliminary Floodplain Extents



For the proposed development areas within the floodplain, it is recommended that future development be restricted within the 100-year floodplain in consistency with municipal by-laws and the Nova Scotia Statement of Provincial Interest regarding Flood Risk Areas. In cases where road crossings cannot be avoided within the floodplain, it is recommended that the proposed roads be raised above the 100-year floodline.

The existing quarry was included in HRM's regional flood risk mapping project as a depression and it is shown to be part of Washmill Lake's floodplain in its entirety. Based on this observation, development should be restricted within the area as per provincial regulations. It is understood at this time based on conversations with the landowners, that the existing quarry pit will be allowed to fill naturally with runoff, groundwater flow, and direct rainfall contribution, with the goal that the existing depression will become a lake. Based on the existing topography, this lake to be created will need to discharge to Washmill Lake as well. The proposed lake is, however, conceptual and its outlet to Washmill Lake has not been included in the scope of this project.

The intention of allowing the existing quarry pit to fill and become a lake, as it is currently understood, is conceptual in nature and its implications on the water quality and the hydrologic/hydraulic regime of the downstream system have not been studied. The quarry pit lake has not been included in the post development condition stormwater model for the Study Area given that this artificial lake is proposed to have no hydraulic connectivity to the proposed SWM ponds and/or storm infrastructure and to provide a separate outlet to Washmill Lake.

Based on available LiDAR, the existing quarry pit is about 30 to 40 metres deep and as such, it is expected that such a deep and extensive waterbody would have significant impacts on the flow regime of the existing lake network downstream.

It is therefore recommended to complete a calibrated hydrologic/hydraulic assessment of the existing lake/watercourse network within the Study Area based on a flow and water level monitoring program for Susies Lake, Quarry Lake, Washmill Lake, and the watercourse connecting Quarry Lake and Bad Luck Falls with Washmill Lake. The existing condition hydrologic/hydraulic analysis would be used as a base scenario to assess the impacts of the quarry pit lake on the downstream system.

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 development concepts by the landowners. Note 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. The SWM strategies for the high-density scenario will also be applicable and effective for the low and medium-density scenarios.

Post development sub-catchments were developed based on existing topography, proposed grading, and the high-density concept plan layout. A hydrologic/hydraulic modeling exercise was completed in



PCSWMM for different return periods based on estimated boundary conditions from the preliminary HRM flood lines in order to size required storm drainage infrastructure and to outline resulting stormwater management strategies. Please refer to **Appendix 3B** for details on the conceptual stormwater management plan.

The proposed development area would be serviced through storm sewers that would be sized to convey the 5-year runoff under free flow conditions to the proposed end of pipe SWM dry ponds for quantity control prior to discharging into the receiving waterbodies. During major storm events, higher than the 5-year storm, peak overflows would be routed overland to the proposed SWM dry ponds.

To restrict post-development peak flows to pre-development levels up to the 100-year storm event, five 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 current SWM pond locations are conceptual (i.e., not an approved plan) and subject to change based on results of more detailed analysis as the development plan progresses. The SWM ponds should be located outside of the floodplain based on existing topography and proposed grading to restrict post development peak flows to existing conditions levels (**Figure 3-4**).

Although the SWM ponds are currently outside the HRM-provided 100-year floodplain, the floodlines provided are based on a high-level model and it is subject to change based on more detailed analysis that could result in the SWM ponds being within the 100-year floodplain. In general, it is recommended that the proposed development plans for the Study Area be revised to avoid residential, commercial, and institutional land uses within the 100-year floodplain and to ensure that appropriately sized blocks are allocated for the SWM Ponds outside the 100-year floodplain. In the further stages of site planning and development, the development plan should be revised to relocate residential development and ponds that are currently close to or within the potential flood line. By pulling back the development and potentially adding density to the remaining development, the population/development yield of the site could remain similar, and it could reduce the risks associated with flooding.



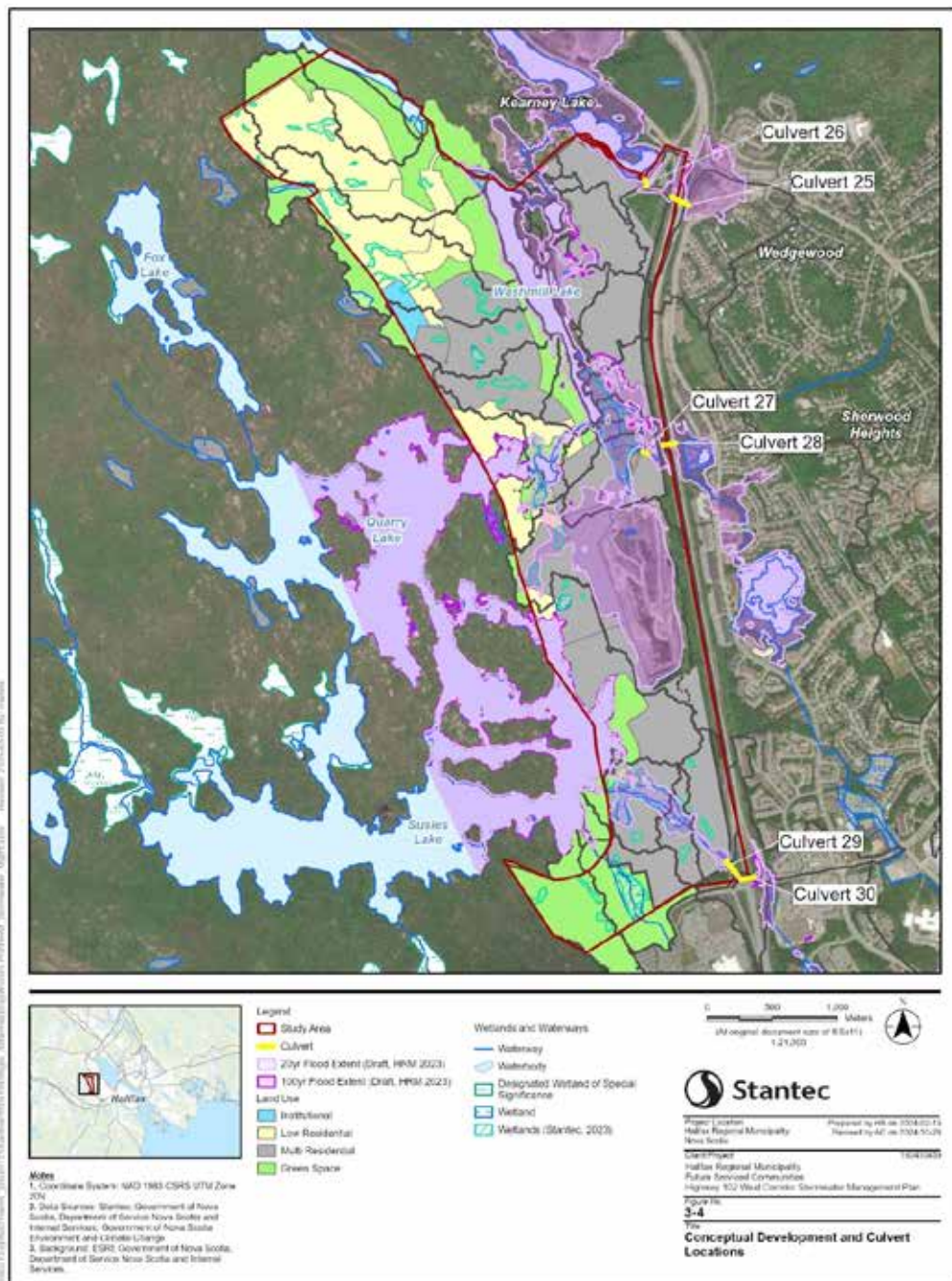


Figure 3-4 Conceptual Development and Culvert Locations



Given that Halifax Water currently does not have a mandate for water quality and cannot devote 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)

- LID measures that impact the overall drainage plan should be located within the right of way owned by the Municipality, to avoid modification by property owners impacting the performance of the overall storm drainage plan.
- Bioretention Cells and Rain Gardens to imitate natural water cycles and are effective in removing various contaminants from runoff, reducing volume and intensity.
- Permeable Pavements to allow for stormwater to seep through into a stone reservoir for temporary storage or infiltration.
- Vegetated Filter Strips and Swales to process and reduce runoff from nearby impervious surfaces.

Tree Plantings and Native Plantings to help absorb stormwater, decrease runoff and enhance water quality.

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

- The stormwater management plan for the Highway 102 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 five 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 requires a thorough revision 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.
- One proposed watercourse crossing has been identified, over the watercourse associated with Bad Luck Falls. However, a preliminary sizing exercise could not be completed due to limited available peak flow for the watercourse and lake response data. Additionally, the upstream dam structure on the outlet of Quarry Lake, and its response under major storms is not well understood. Future sizing should meet the $H_w/D \leq 1$ criterion for the 100-year design storm event based on a calibrated model and observed runoff response at the lakes.



- Current development plans assume an artificial lake will be provided at the site of the existing quarry depression with independent hydraulic connectivity to Washmill Lake. If the decommissioned quarry site is to become a lake, an outlet structure and channel to Washmill Lake needs to be designed and incorporated into the proposed development.
- Portions of the current development plans infringe on the preliminary 100-year floodplain extents.
- Two sections of the planned development area overlap portions of the existing watercourses. Additionally, the extents of SWM Pond 2, in its current location, may overlap portions of an existing watercourse as well.

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

- Flow monitoring in the watercourses and lakes, followed by model calibration be completed to assess existing dam operation (i.e., stage-discharge curve), determine lake water levels, confirm regulatory floodplain limits, determine culvert sizing and proposed pond sizes and locations.
- No active development 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. Once the above is completed it is also recommended to confirm pond sizes and locations as well as size the watercourse crossings.
- Investigation into existing dams (i.e., water control structures) at Quarry Lake, Susies Lake, and Washmill Lake to determine the rain-runoff response at the lakes is recommended to refine the boundary conditions in the model.
- An environmental impact assessment is recommended for the proposed lake at the existing quarry site to understand both the interim and final hydrologic, hydrogeologic, hydraulic, and water quality implications on the overall drainage network, as well as their respective interim durations.
- A detailed geotechnical investigation is recommended to be completed at the detailed design stage. Geotechnical recommendations should be provided for the proposed Stormwater Management (SWM) ponds, grade-raise restrictions, and the feasibility of Low Impact Developments (LIDs) in the area.
- The development concept plan be revisited to ensure SWM Ponds are located outside the 100-year floodplain and/or delineated wetlands, to maximize the use of natural areas considering the recommendations of the Land Suitability Assessment, 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 located in or close to areas under risks of flooding.



- The development concept plan be revisited to incorporate options to maintain connectivity of the existing watercourses and the proposed quarry site lake to their respective downstream waterbodies, as well as grading considerations and setbacks to place development outside the preliminary flood limits.
- The development concept plan be revisited to maintain connectivity between terrestrial systems.
- Future development phasing 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.
- Under the Halifax Mainland LUB, all residential development must be located at least 20 metres from the ordinary high-water mark. The Bylaw requirement was adopted pursuant to the 2014 RMPS. The draft revision of the RMPS prepared through its current review recommends expanding the buffer distance to 30 metres. Proposed RMPS Policy EC-19, furthermore, states “When considering requests to develop future serviced communities ..., the Municipality shall require watershed or sub-watershed studies concerning natural watercourses where new or additional development could adversely affect watercourses within the watershed.” The recommendation, which is not yet approved, aligns with the statement in the Land Suitability Report prepared for the Highway 102 Corridor that areas within 30 metres of a watercourse have low suitability for development, so setback areas from watercourses and waterbodies should be studied on a site-specific basis during subsequent area planning to determine suitability.
- Retaining native and existing ground cover be prioritized where possible to preserve ecosystem service function, reduce volume of runoff discharged into watercourses/waterbodies, 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 Highway 102 West Corridor Development Servicing Scenario

The Highway 102 West Corridor Development Servicing Scenario is detailed in **Appendix 3C**. The report addresses the following with respect to the Highway 102 West Corridor development:



- 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 Water Distribution

A water system model was developed using InfoWater Pro to estimate the development distribution system requirements to achieve the level of service set out in Halifax Water's Design Specification. The model development assumes that the connection to each existing pressure zone is a constant Hydraulic Grade Line (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 3-1** indicate the following for both the high-density and low-density population scenarios:

Table 3-1 Water Model Results

Flow Scenario	Pressure Range (psi)	Max Velocity (m/s)	Available Fire Flow (Lpm)
MDD High Density	51 – 82*	< 1.5	N/A
PHD High Density	50 – 79*	< 1.5	N/A
MHD High Density	51 – 84*	< 1.5	N/A
MDD + FF High Density	> 22	< 2.4	4,100 – 24,600**
MDD Low Density	51 – 84*	< 1.5	N/A
PHD Low Density	51 – 82*	< 1.5	N/A
MHD Low Density	51 – 85*	< 1.5	N/A
MDD + FF Low Density	> 22	< 2.4	4,500 – 26,300**

* With the exception of the low-lying elevations along the proposed street servicing the northwest and the connection to the new Geizer 158 transmission main. However, there are no planned serviced lots in these areas.

** Based on the assumption 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.



Pressure reducing valves installed on the water service lines (in accordance with Halifax Water's Supplementary Standard Specifications) should be considered in those locations identified with pressure above the range identified in the Design Specification.

Figure 3-5 illustrates the potential future water and pressure distribution in the high density/developer-requested scenario. The presented subdivision plan is preliminary and subject to change; therefore, the MHD, MDD, PHD and required FF demands presented in this report may change resulting in changes to proposed water distribution preliminary design. The level of service and distribution system requirements be reassessed during subsequent design stages.

In the absence of a full system model, the effect of the proposed development on the level of service of the remaining system could not be assessed. Also, the effect of potential restrictions within the existing system on the proposed development could not be assessed. In Halifax Water's 2019 IMP, it was 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. The proposed development should be incorporated in the all-pipe model to perform a more refined fire flow level of service assessment for the development.

It was noted that water modeling was carried out using an isolated steady-state model for each of the four proposed development sites. Stantec's water servicing report recommended that the modeling for the proposed developments should be based on using a full system model so that the effect of the proposed developments on the level of service on the remaining water system can be assessed. Similarly, the report noted that modeling of the development sites only would not identify potential restrictions in the system that may impact the development sites. It was noted that this approach was outside of the scope of the services for the study as the system fall under the Halifax Water Regional Authority. Considering the scale of the proposed developments and potential impacts on existing water systems and off-site infrastructure upgrades, the recommended full system modeling should be carried out as part of the upcoming update of the Integrated Resource Plan (IRP).



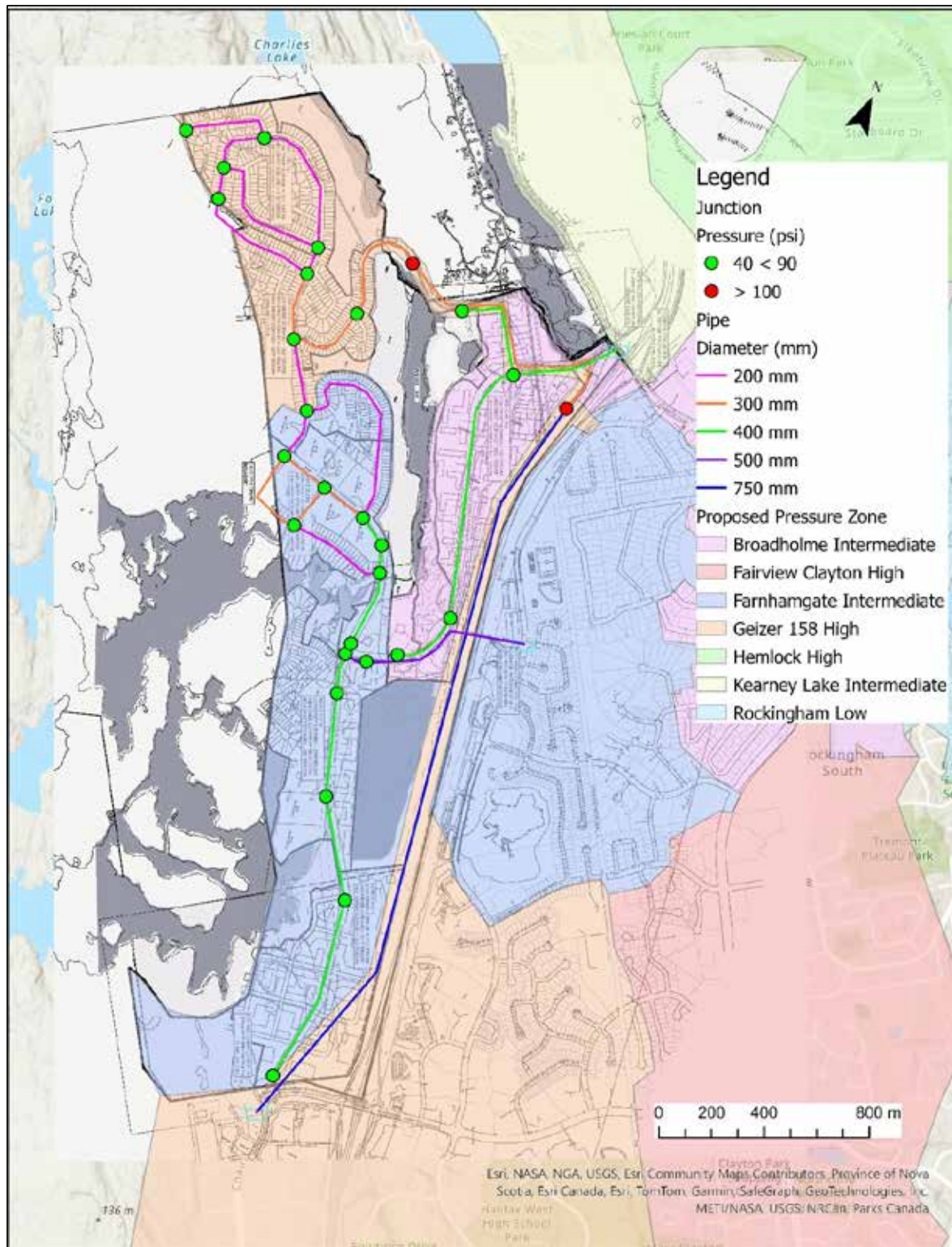


Figure 3-5 Pressure Distribution Under PHD (High-Density Scenario)



In terms of network resiliency, Section 6.2.1.7 of the Water Infrastructure Servicing Plan (Halifax Water) notes that twinning of the Geizer 158 transmission main has been previously considered to include looping of the Lacewood Drive main at the southern extent of the Highway 102 West Corridor expansion area. The intent of the twinning was to provide a second feed to the Lakeside High service area and resiliency to Geizer supported pressure zones. The Servicing Plan had considered an alignment planned along the west side of Highway 102 through future development lands to create a system loop as described in the figure below, and to be accommodated within servicing for the Highway 102 West Corridor expansion area, shown in **Figure 3-6**.

The 2009 CBCL Greenfield Study, which was completed for HRM, noted the requirement for a 5.3ML water storage reservoir within the Highway 102 development area. High ground in the area is just to the west of the study area at the north end of the Hwy 102 lands. This area was identified as the proposed location of the reservoir in the 2009 Greenfield Study (refer to Figure below). It is to be noted the CBCL study considered Highway 102 West Corridor area significantly larger than that contemplated in current study 503 ha vs 254Ha although the population projections for the ultimate development in CBCL report were similar to those considered in the high-density scenario of the current study, 23,000 vs 21,326. The sizing was based on the assumed development densities at that time. The reservoir sizing requirements will need to be recalculated based on current growth and build-out projections and on the ultimate service boundaries for the local area and reflected in Regional Infrastructure Master Plan Update.





Figure 3-6 Proposed Geizer Twinning

3.3.2 Sanitary Sewers

As noted in Section 6 of the Wastewater Infrastructure Plan, growth in this region triggers a constraint within the linear system between Highway 102 and the Bedford Highway downstream of the Kearney Lake Road PS. The existing sewers are predicted to surcharge resulting in flooding under the 5-year design storm.



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, as well as needing to maintain these as the identified growth occurs. The implications of the FSC growth areas on the Wastewater Infrastructure Plan (WIP) recommendations are thus of interest as these growth areas are in addition to those considered in the 2020 WIP. For the Western Region, Strategy 2a: Maximize Existing Capacity and Herring Cove Wastewater Treatment Facility (WWTF) (minimize expansion at Halifax WWTF) is identified as the recommended servicing strategy.

The 2020 WIP identified that sanitary sewer upsizing would be required in the Kearney Lake Road area downstream of the Kearney Lake Pumping Station (KLPS). The required upsizing is identified as needing sewers between 525 and 675mm in diameter.

The 2020 WIP does not mention if there is residual capacity at the KLPS for either existing, or for the growth scenarios considered. A 6MLD expansion at the Halifax WWTF is identified.

The KLPS residual capacity was discussed during the HRM Future Service Communities – Halifax Water/ Stantec Coordination Meeting held on September 12, 2023. During this meeting it was noted that there is existing residual capacity at the KLPS, and that this available capacity may indeed increase in the future once a planned flow diversion upstream removes flow from those captured by the KLPS. It is assumed this residual capacity would be adequate to accommodate the Highway 102 West Corridor growth area projected flows; however, flow rates/capacities were not provided to confirm. An updated capacity study is recommended to establish if the KLPS can accommodate additional flow from the Highway 102 West Corridor growth area. This capacity study should align with the needs for the Sandy Lake growth interest as well as any flow diversion strategies that may have been previously developed.

It is to be noted that the previous studies made no allowance for the Hwy 102 West Corridor lands in the design of the West Bedford pump stations or the forcemains.

Further study is required to evaluate the alternative options for wastewater servicing for the Study Area and to confirm feasibility of the KLPS to accommodate additional flow, and review other alternatives to wastewater servicing, including construction of new PS and connection to Wedgewood Ravine. The study should also review the capacity of Kearney Lake Trunk Sewer, and WWTP capacity. This study should be coordinated with the analysis of the Sandy Lake development proposals as well as any flow diversion strategies that may have been previously developed.

The scope of the water and wastewater servicing analysis included in the Future Serviced Communities Study does not include wastewater treatment facilities or water treatment plants. Halifax Water has a well-established strategy for water and wastewater infrastructure planning as it relates to asset renewal, compliance, and growth. The Integrated Resource Plan (IRP) shapes Halifax Water's capital program by identifying resource and finance needs. There are three major plans contained within the IRP, those being the Asset Management Plan, Compliance Plan, and Infrastructure Master Plan (IMP). The IRP aims to provide regional water and wastewater infrastructure needed to support planned growth.

The IMP is a comprehensive infrastructure master plan for both water and wastewater that supports growth. As part of the IRP approach, the plan is updated at regular intervals to ensure the consolidated



long-term program remains current. Halifax Regional Municipality supplies Halifax Water with growth projections to be considered within the IRP, in this case, the Future Serviced Communities Studies: Sandy Lake, Highway 102 West Corridor, Morris Lake Expansion, and Westphal will be incorporated into the upcoming review of the latest iteration of the IRP. Growth projections are used as input to analysis, such as water and wastewater models, which aid in determining preferred servicing strategies.

3.4 Highway 102 West Corridor Transportation Study

3.4.1 Analysis of Development Impacts

The HRM Integrated Mobility Plan reiterates regional mode share targets originally established in the 2014 Regional Plan. To be achieved by 2031, the planning targets were only projected to be achievable through incorporation of IMP recommendations. The IMP anticipates arrangements and behaviour in the various sub-areas of the region to contribute differently to overall regional goals. Within the Inner Suburban area, where the Highway 102 West Corridor Study Area is found, the 2031 targets seek at least 20% transit mode share and at least 6% for trips made solely by walking.

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 Highway 102 West Corridor 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, which 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 has been 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 Highway 102 West Corridor development. This model includes a reduced level of committed infrastructure compared to the 2045 baseline model. Notwithstanding the reduced levels of traffic demand growth, the 2031 forecast year is still deemed as being highly sensitive in trip reassignment when adding the proposed Highway 102 West Corridor development.

Development in the Highway 102 West Corridor will share many components of local infrastructure with existing and potential development in the surrounding area. In particular, development in the Study Area will impact the Kearney Lake Road interchange, which will be directly affected by whatever development takes place in Bedford West 10, Bedford West 11 and, further along, at Sandy Lake. The alternative access to the Study Area, via Lacewood Drive and its interchange with Highway 102 will be subject to increasing volumes as the development of the Bayers Lake Business Park continues and as development of Regency Park Drive proceeds.

While Sub-area 11 is delineated in Schedule BW-6 of the Bedford West Secondary Planning Strategy, the Strategy includes no description of guidance specifically enabling development within the sub-area. It is only referenced along with the other eleven sub-areas in Policy BW-20, which, among other provisions, states "...approvals within Sub-Areas 1 to 12 will also be contingent upon availability of capacity within municipal service systems." Additional development potential of Sub-area 11 lands is unclear. While the bulk of developable land is owned by two development companies, the complexity of ownership and layout of the more fragmented Kearney Lake Park subdivision present impediments to development of the larger holdings.

Any development on Sub-area 11 lands will rely on Kearney Lake Road and its interchanges with Highway 102 to access the regional road network. As such, the coordination of infrastructure with potential development may consider a roadway link that might increase person movement capacity for residents and visitors of the sub-area and adjacent sections of the proposed Highway 102 West Corridor development. Initial exploration of a link that would join Colins Road and Saskatoon Drive to provide a route parallel to Kearney Lake Road directly serving the sub-area encounters a number of complicating factors and is not supported by anticipated traffic demand increases.

The Nova Scotia Department of Natural Resources owns a 4,011-acre property that abuts the sub-area. The property is a major portion of the proposed Blue Mountain Birch Cove Lakes Wilderness Area and includes substantial waterfrontage on the southwest side of Kearney Lake. Immediately north of the Provincial land is an estate lot subdivision on Colins Road. To the east, lots are largely developed in the Kearney Lake Park Subdivision. Saskatoon Drive ends at the Maskwa Aquatic Club that operates on



Kearney Lake. It is reasonable to expect opposition to joining roads across a defined Wilderness Area as well as resistance from residents on the two roads, who would likely be concerned with the encouragement of through traffic.

Based on the model, the following roadway corridors would experience high levels of congestion within the 2031 baseline with or without the proposed Highway 102 West Corridor development. The proposed Highway 102 West Corridor development is expected to add to dominant traffic patterns on the surrounding highway network. As the project introduces new residential, commercial, and educational facilities, the resulting increase in travel demand will have direct implications for highway capacity, congestion and overall traffic flow particularly on the following roadways:

- Highway 102 – Between the Highway 101 Interchange and Dunbrack Street
- Kearney Lake Road – Near Highway 102 Interchange
- Lacewood Drive – Between Dunbrack Street and Bayview Road
- Washmill Lake Drive/Main Avenue – Between Bently Drive and Hillcrest Street
- Bedford Highway – Between Dartmouth Road and Highway 111

Additionally, preliminary modelling performed as part of the larger Highway 102 West Corridor transportation analysis indicates minimal demand from residents of new development from sub-area 11 for travel northwest along the Kearney Lake Road/Larry Uteck Boulevard corridor. Model outputs anticipate only 60 to 80 additional vehicles during peak hours. Extended consideration of what utility such a roadway might have in accessing a potential Highway 113 is also tempered by model results, which indicate small demand increases of 40 to 80 vehicles per hour along Highway 103 west of Highway 102.

The Highway 102 West Corridor 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 transportation alternatives 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 Bayers Lake Business Park presents an opportunity to integrate additional destinations through transportation facility design and enhancement.

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.

Travel modelling indicates that the Volume-to-Capacity ratio on segments of Highway 102 into Halifax will exceed 100 percent by 2031, characterized by severe congestion before the Highway 102 West Corridor development is introduced. Mitigation measures for Highway 102 should ideally be implemented before or in parallel with the development of the Study Area to mitigate further negative effects of congestion. In addition to Highway 102 capacity additions to be examined through joint planning work underway between the Joint Regional Transportation Agency and the Department of Public Works, and efficiency adjustments slated for the Kearney Lake Road interchange (Exit 2), further junction upgrades are required to accommodate southbound movements generated by the new development at the Lacewood Drive interchange with Highway 102.

Modelled capacity deficiency along Lacewood Drive east of the Lacewood Terminal is likely to be fully mitigated by the Green Line Bus Rapid Transit (BRT) as planned. Capacity strains on other roadways near the development site appear to be of limited severity, such that additional bus service and strategic designation of transit priority lanes can compensate for person throughput deficiencies. Effective on-site transit route planning will require that developers determine and specify the right-of-way dimensions of proposed roadways. Internal roads should be conceived and aligned to ensure that all new residents live within a 400-metre walk of a transit stop. Our connectivity analysis outputs indicate that without bus service closely servicing the development, all new residents will struggle to access public transportation within 30 minutes on foot.

New on-road bicycle-only facilities described in the B. D. Stevens development concept plan must be supported through roadway intersections with a protected design. Any potential reconfiguration of the boulevard section should consider buffers for the bicycle lanes comprised of either physical installations or an on-street parking lane. Further, concept plans do not describe bicycle 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 pedestrian and path routing.

A 2009 Cost of Servicing Plan for the Highway 102 West Corridor identified an infrastructure requirement for a roadway link crossing Highway 102 between the Kearney Lake Road and Lacewood Drive interchanges. Modelled trip distribution for the new development does not indicate an intermediate destination immediately east of Highway 102 between interchanges. However, new demand converges toward the intersection of Lacewood Drive and Dunbrack Street (**Figure 26, Figure 27**). While the operational capacity of Lacewood Drive is more than adequate to absorb the additional demand, the aggregate demand of the demand scenario indicates capacity issues along Kearney Lake Road through the Highway 102 interchange extending to where it functionally becomes Dunbrack Street (**Figure 32**). At the southern end of the development, the primary on-site collector road appears to be over capacity during the PM peak period, which would impact the operation of the Lacewood Drive/Chain Lake Drive intersection.

These considerations suggest that an intermediate roadway link would provide value for the overall transportation network in the development area as it presents alternatives to easterly travel that would



alleviate impacts on bottlenecks related to development site geography and reliance on two access points proximate to busy expressway interchanges. Final decisions require sensitivity analysis to better estimate travel utility followed by in-depth evaluation of localized community impacts, environmental impacts, cost of construction, ease of land assembly, and other factors. Any general traffic connection spanning Highway 102 represents an opportunity to include active transportation facilities to reduce travel time and distance for non-motorized modes presented by the current inability to cross the limited-access highway.

At a minimum, creating external active travel connections from the Study Area to Birch Cove and the Bayers Lake Business Park would be highly beneficial. These connections could link the internal active travel infrastructure within the proposed development to nearby destinations to support the usefulness of active transportation mode choices. Beyond access modelling challenges, the distance between crossings of Highway 102 creates a large practical barrier to the usefulness of active transportation. Future consideration may be given to the feasibility of a multi use pathway connection either above or below Highway 102 linking the new development to Parkland Drive and Glenbourne to promote a greater external active transportation mode share.

3.4.2 Recommendations

The following is a list of recommendations from the Transportation analysis, and major infrastructure upgrades are shown in **Figure 3-5**:

- Noting that current policy direction encourages investment in alternative modes rather than additional vehicle capacity and based on the magnitude of predicted transportation network capacity stress, automobile system enhancement needs in the area of the Highway 102 West Corridor are mainly limited to provincial jurisdiction (Highway 102 and its interchanges) or previously scoped corridor improvement initiatives. Cost estimates attempt to associate an order of magnitude cost with recommended physical implementations as a function of corridor segment length, transit operating cost, or figures previously cited by other planning efforts.
- The sole recommended throughput enhancement with a potential physical roadway modification component would be the introduction of a transit priority lane on Kearney Lake Road starting at Parkland Drive, the planned terminus of the proposed Purple BRT Line. From Parkland Drive, the implementation would extend through the Highway 102 interchange and past the northern development access point to Larry Uteck Boulevard in manner similar to a Purple Line Extension option described in the Rapid Transit Strategy.
- The Joint Regional Transportation Agency model predicts particularly visible congestion by 2031 along Highway 102 parallel and to the north of the Study Area independent of any large scale development in the proposed Future Serviced Communities. On October 24, 2024, the Nova Scotia Department of Public Works announced a suite of planned modifications to the Highway 102 corridor to ease traffic congestion and enhance safety. With proposed development added, modelling indicates large increases in traffic volumes across multiple movements at the Exit 2 and Exit 2A interchanges. While provincial plans include interchange upgrades at Kearney Lake Road to improve efficiency and safety, the Lacewood Drive interchange is not part of the



announcement scope. Modelling suggests a lane reconfiguration will be needed along the southbound on-ramp, which is currently characterized by a 7-metre-wide travel lane and sizable shoulder, to increase its capacity upgrade.

- The Bedford Highway is an important link in the transportation network extending from the eastern edge of Clayton Park to the planned Mill Cove and Larry Uteck Ferry terminals and beyond to Bedford and Highway 101. Baseline model results indicate a need for additional mobility capacity by 2031 for nearly the entirety of the corridor. The 2019 Bedford Highway Functional Plan examined this entire extent. Evaluation within the plan and consideration of public feedback chose a preferred corridor configuration option that provide continuous active transportation facilities, targeted transit priority improvements, and intersection reconfigurations to mitigate anticipated travel time increases.
- An increase in regular bus frequency and implementation of transit priority measures in strategic locations represents a viable alternative to accommodating the anticipated increase in both transit and vehicular demand along certain area corridors. Transit service serving the proposed Highway 102 West Corridor development should typically connect to the Lacewood Terminal along Lacewood Drive. While the anticipated implementation of Bus Rapid Transit would automatically provide a higher capacity option with transit priority, the corridor between the terminal and the development site should also be considered for increased levels of service to handle anticipated travel demand.
- As previously discussed, projections tied to anticipated development create the greatest need for additional mobility capacity along the Kearney Lake Road corridor. Absorbing the combination of increased transit demand and vehicular volume over capacity would require a large investment in transit service expansion over what is currently provided by the existing rural and express routes that travel through the corridor. Service along the corridor would require 5-6 additional buses per hour during the AM peak period, 9-11 additional buses per hour during the PM peak period, and 4-5 additional buses per hour during non-peak hours. Conversely, modelling does not indicate a great demand for people moving capacity in the Lacewood Drive corridor as it approaches and becomes Chain Lake Road. A minor increase of two buses per hour during the AM peak period and a single additional bus per off-peak hour would satisfy increased transportation demand as currently predicted in the current transit system configuration. In the future, service levels of a bus service travelling along the primary roadway between development access points would provide a sizable amount of this service expansion.
- Multiple modelled analyses of the 2031 background scenario identified needs to improve congestion and absorb extra transit demand along the Washmill Lake Drive / Main Avenue corridor. Portions of the corridor currently host Routes 2, 28 (serves the proposed development site's southern gateway), and 138. Combining the baseline with increased travel demand imposed on the network by the proposed development indicates a level of need that can be accommodated through increases in transit service levels. Service along the corridor would require two additional buses per hour during the AM peak period, seven to nine additional buses



per hour during the PM peak period, and two or three additional buses per hour during non-peak hours.

- Consistent with the Active Transportation Priorities Plan, the study team identified a need for active transportation enhancements in the Kearney Lake Road corridor, especially bridging the divide between sides of Highway 102 through the Exit 2 interchange. There are existing bike lanes on Kearney Lake Road from Highway 102 to Larry Uteck Blvd. The plan does not define the type of bikeway desired to complement existing sidewalks. As facilities along these corridors would be geared toward transportation functions more so than recreation, the ideal bicycle facility 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 existing bus bulbs, future BRT configuration, and other right-of-way reassignment factors may dictate a different facility selection.
- Additionally, traffic impact studies for ancillary developments near the Study Area call for pedestrian accommodation to supplement on-road bicycle facilities along the portion of Kearney Lake Road north of Hamshaw Drive. Reconfiguration of the corridor to potentially include transit priority lanes creates options with respect to pedestrian facility selection and possible needs for reconfiguration of bicycle facilities, which should continue to emphasize a transportation function.
- Per initial consultation and evaluation associated with the Bayers Lake Business Park Functional Active Transportation Plan, the eastern sidewalk along Chain Lake Drive becoming the southern sidewalk along Lacewood Drive should be modified to multi-use path standards to provide an important link for new development residents to use cycling to reach a broader array of commercial offerings and public transportation services at the Lacewood Terminal.
- 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 dependent 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.



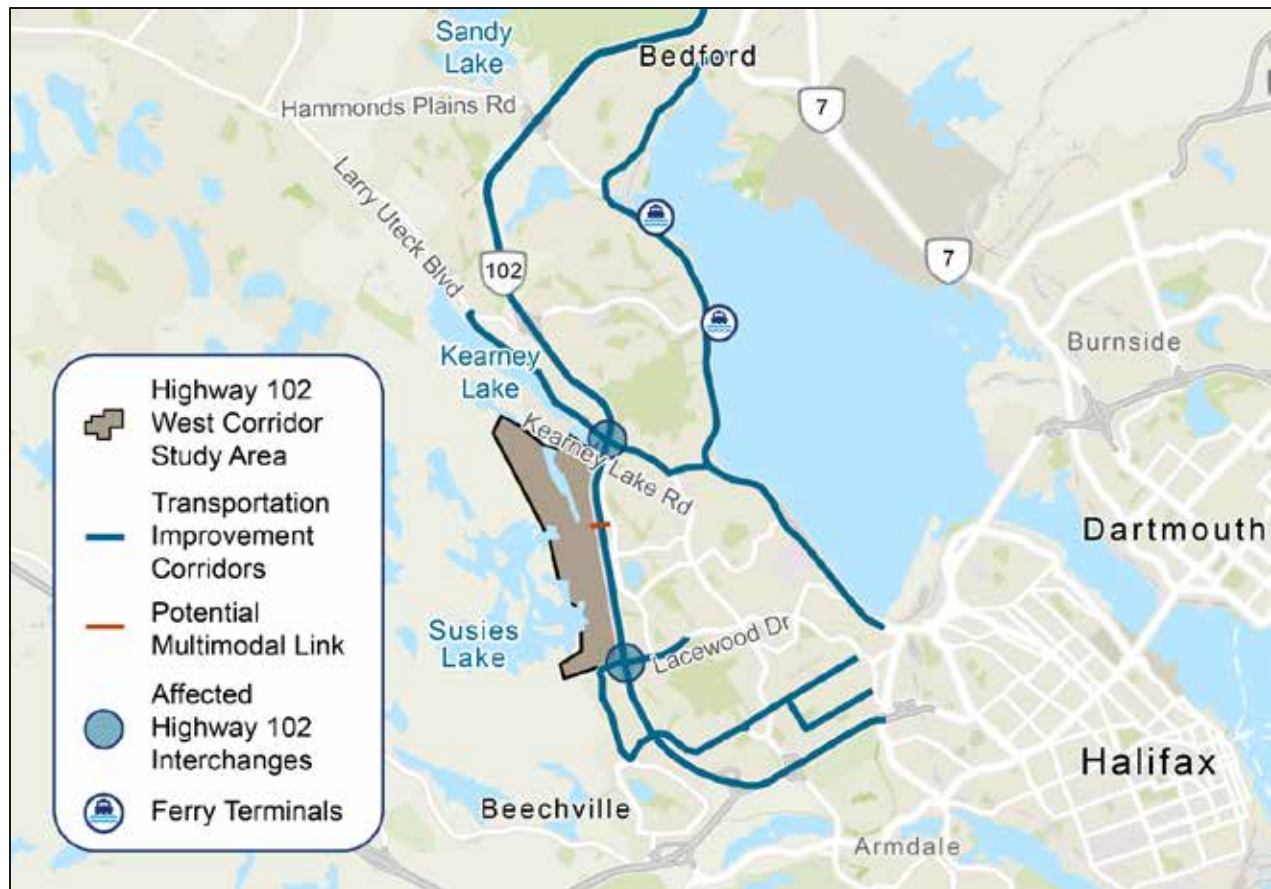


Figure 3-7 Recommended Transportation Improvements

3.5 Infrastructure Costing

The order of magnitude costs of providing the conceptual servicing are shown in the following **Table 3-2**. Note that cost estimates in this report are high-level order of magnitude costs. They 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 (ROM) 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 costs between pipe sizes to accommodate differing population levels are a relatively small



portion of the cost. There may be some minor differences 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.

The cost estimate does not include regional level public transportation upgrades such as the cost of the Purple line BRT or improved ferry services, which are not yet funded.

Table 3-2 Estimated Order of Magnitude Costs for Infrastructure

Servicing Component	Estimated Order of Magnitude Cost¹
Provincial Responsibility	
Highway 102 Corridor Traffic Mitigation Measures	Provincial responsibility – not costed
Highway 102 Exit 2 (Kearney Lake Road)	Provincial responsibility – not costed
Highway 102 Exit 2A (Lacewood Drive)	Provincial responsibility – 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)	
Bedford Highway Improvements (Union St. to Highway 111 per the Bedford Highway Functional Plan	\$35.1M from 2019 Class D estimates which with inflation would be \$53.56M in 2024
Kearney Lake Road Transit Priority Lane	\$10.74M
Lacewood Drive/Chain Lake Drive Bus Service Enhancements	\$515k annual operating cost
Kearney Lake Road Bus Service Enhancements	\$2.11M to \$2.63M annual operating cost

¹ Construction inflation estimates are based on Statistics Canada for the Halifax Census Metropolitan Area for Q4. [Building construction price indexes, by type of building and division](#)



Washmill Lake Drive/Main Avenue Bus Service Enhancements	\$1.1M to \$1.6M annual operating cost
Lacewood Drive/Chain Lake Drive multi-use path from Washmill Lake Drive to Lacewood Terminal	\$1.0M to \$1.18M
New bridge crossing Highway 102 near the mid-point of the Study Area (2 lane bridge including cycle tracks and sidewalks on both sides)	\$25-\$35M depending on several factors, including the bridge's length, design complexity, location, soil conditions, required foundation work, and necessary permits and approvals. Assuming 30-25m span and no ramps to freeway. (Pedestrian/Cycling only bridge - with a 30-35m span: \$13-\$17M depending on several factors, including the bridge's length, design complexity, location, soil conditions, required foundation work, and necessary permits and approvals)
Kearney Lake Road Pedestrian Sidewalk/Multi-Use Pathway and Bicycle Lanes	This requires additional scoping but using comparable unit rates for a new Multi-Use pathway, this will be in the order of \$0.995 million.
New Geizer 158 750mm dia. transmission main	\$21.8 million
5.0ML water storage reservoir and Pump House within Highway 102 development area	\$32.5 million
New 540 L/s Wastewater Pump Station for HWY 102 (includes existing flows 240L/s) to Replace PS#2	\$22.4 million
525mm Sanitary Sewer on Kearney Lake Road From HWY 102 to New PS	\$5.7 million



Forcemain New PS to Castle Hill Discharge Point	\$9.2 million
Sanitary Sewer Upsize of Existing Sanitary Sewer to Kearney Lake Road Trunk (375/450 diameter to 600 diameter, 600 diameter to 750 diameter, 750 diameter to 900 diameter, 900 diameter to 1050 diameter)	\$13 million
Developer Responsibility or Shared Responsibility	
500mm dia. main extension from Farnham Gate Intermediate Across HWY 102	\$8.6 million
Pressure reducing valves (3)	\$3.0 million
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

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

The Highway 102 Corridor lands are linear with B. D. Stevens Group owning lands abutting the highway corridor and the Annapolis Group owning extensive lands to their west of which only the lands immediately abutting the B. D. Stevens Group holding are within the Study Area. The B. D. Stevens Group lands have been subject to extensive disruption from construction and operation of the highway and long-standing quarrying operations that have recently ceased. The Annapolis Group lands have been used for forestry in the more distant past and incorporate lakes that have been artificially enlarged by



dams to support past forestry operations. Consequently, the lands having been heavily disturbed from their natural state would be good candidates for rehabilitation to a new future serviced community.

The developer-requested scenario represents a high intensity of development. While a high density of development is reasonable given the level of investment required to bring the required infrastructure to the site, and the proximity of the Study Area to other existing amenities and services, HRM will need to confirm the appropriateness of the density, and the resulting housing mix through further steps in community planning. As there are transportation and servicing inter-relationships between the Highway 102 West Corridor and the Sandy Lake Study Areas, the cumulative effects of the two, particularly on the water and wastewater infrastructure will need to be considered.

The blended density of the two development proposals at 44.9 units per acre (approx. 110 units/ha) is on the high end of what can be supported by a regular bus service. However, the terminus of the Purple Line BRT would be just outside the north end of the development. Although this is not a high density for a single site, it is not typically found spread across such a large land area in Halifax outside of the city core. Development at a higher density that is supportive of transit is appropriate, but the ultimate density may be constrained by the available water and sewer capacity, so it may need to be lowered. The proposals, as presented, concentrate a considerable proportion of the density on the B. D. Stevens lands. It would be advisable to use the community planning process to try and better distribute the density across both landowners' holdings, concentrating higher density along the main transit route through the area. Feathering density down to lower levels approaching the park boundary is appropriate, discussed further below. An overall blended density of approximately 100 units per hectare, provided there is sufficient servicing capacity, may be more realistic, and it would still support regular bus services.

This is linked to phasing considerations, since this much density requires a complete local road connection from south to north to make transit service viable. In all likelihood, the landowners would prefer to phase development from south to north, development adjacent to the south end is relatively advanced. The south end abuts the Bayers Lake Business Park, which is intensively developed. On the opposite side of the road (Lacewood Drive), for example, is Costco. Farther south along Chain Lake Drive is likely the largest concentration of retail development in Halifax. To the east along Lacewood Drive is more commercial development extending to Dunbrack Street, the Canada Games Centre and a substantial collection of recreation facilities (i.e., Indoor Soccer Centre with four fields, Mainland North Commons with outdoor soccer and ballfields) as well as Halifax West High School. There is also a transit terminal on Lacewood Drive next to the Canada Games Centre.

Entry to the north end of the area is likely to be difficult to execute early. The intersection of Crusher Road and Kearney Lake Road is within 500 feet of the offramps from Highway 102. The presence of the development will also be modest because there is limited area between the roadway and a pond to the west.

The multi-year phasing for the Lakes development will be influenced by a variety of internal and external factors. Based on discussions with the landowners, they would like development to start from the southern end, with readying Parcel 1 and Possibly 2 (see Figure 2-5) accessed from the proposed Chain Lake Drive/Lacewood roundabout. The further sequence would involve development starting from the



Kearney Lake roundabout (proposed as part of Bedford West Area 11 Development) and proceeding South through Parcel 4 and 3 to ultimately link to Parcel 1 (shown in Figure 2-5). This will necessitate a temporary sanitary servicing scheme until the ultimate configuration is built, and the availability of capacity needs to be confirmed by Halifax Water. This arrangement would introduce an additional pump station to connect to the sanitary system on the east side of Highway 102 at approximately Langbrae Drive either on an interim or long-term basis that would need to be managed by Halifax Water. If the landowners are prepared to reimburse Halifax Water for those costs, then this is an orderly form of development taking advantage of the synergies of new development with the services and amenities available on Lacewood Drive. Otherwise, development phasing should go from north to south from Kearney Lake Road based.

Subject to negotiations with the landowners, it would be helpful for Halifax Water if the full central road was built early in the project, which would contain the transmission watermain to twin the Geizer 158 transmission main. This would also enable a logical bus transit loop through the area.

Several studies have considered the interface between a potential park in the Blue Mountain-Birch Cove Lakes area and land development. In 1996, Porter Dillon (now Dillon Consulting) prepared the Birch Cove Lakes Area Environmental Study. At the time, the report noted under the heading “Suitability Assessment” that “80% of the [BCBML area] can accommodate low to medium density residential, high-density residential, large scale commercial and industrial, developed recreation facilities, and passive recreation. Background in the Task 3 report suggests that the land was reasonably positioned for residential development at the time because the area now generally referred to as Clayton Park West was “roughly 70 percent developed,” while the Birch Cove Lakes area was close to the urban core and had access to water and sewer services (Task 3, p. 16). The report adds, however, that the Birch Cove Lakes land would be expensive to develop because of “rugged topography and minimal overburden.” This was balanced by the prime location next to Mainland North, which had and continues to have a good residential reputation, and the amenity offered by “lakes and striking views.”

The area was assessed again by EDM in the 2006 Blue Mountain/Birch Cove Lakes Assessment Study. Under the heading “Park Configuration,” their report states that contacts interviewed for the assignment expressed strong interest in seeing the wilderness area become a park. The report noted that the value of the area is in its proximity to developed areas whose residents can “experience the wild landscape on a daily basis” (p. 43). At the same time, EDM acknowledged the area “does not rank as outstanding ecologically at the regional or provincial level” noting “[t]here are no known significant or rare landscape elements” or any “individual elements, which if not included, would greatly diminish the ecological value of the park.” The report does note that the area is resilient or durable, stating the extensive rock surfaces and limited ground cover can stand up to human use “while retaining their essential wilderness attributes.”

The report endorses residential development on the edges of the park. It argues that residents on the park fringe and, particularly, at access points to the park would provide surveillance in keeping with CPTED (Crime Prevention Through Environmental Design) principles. EDM recommended that the core area of the park should begin on the western shores of Susies and Quarry Lakes, and encompass lakes to the west (notably Fox, Ash, Crane, and the two Cranberry Lakes). An “Active Use Area” was defined



around the edges of the core that took in the balance of Susies and Quarry Lakes, including their eastern shorelines, as well as Washmill and Charlies Lakes to the north.

EDM viewed community development next to the edge favourably. The report describes the relationship between park and community as “complex and inter-related.” Promotion of the “wilderness experience” required that development not be “impinging on the park” but EDM expected the residents to be park users with a “sense of ownership” of the park and engagement in its management (p. 51).

The “curvilinear boundary” proposed by EDM in the study report was expected to encourage interspersed community development that would promote community engagement and oversight. The report is clear that the boundary portrayed in the report was not intended to be the final boundary, stating the “location [of the eventual boundary] should be determined while simultaneously considering the ideal community build-out such that both the park and community perform well.” EDM was also supportive of commercial development on the edges of the park and suggested that public street frontage should face the park rather than “the backyards of homes.” To some extent, Upland has acknowledged the idea with the roadway route selected to serve The Lakes concept created for B. D. Stevens (see pp. 43 and 55). Upland has limited the height of development to four to six stories and demonstrated that structures in the Lakes development will not be visible from within the park (The Lakes Master Plan Development Concepts, pp. 28-29). There is no similar assessment of proposed development on Annapolis Group lands, but the Annapolis plan is clearly lower density than the proposal for the Stevens land and should provide a transition to the park area if that is desirable. EDM's views concerning CPTED could, however, justify taller structures that would serve as a landmark for park users and provide oversight for its lands.

Certainly, Upland anticipates the Lakes community will make use of the wilderness area and has made access to the park an important component of their development plan:

The lands allocated for the Regional Park will become the new front door to the park for both residents and people from across the region. In unison with the private open space network and the park land offer by the property owner, the new Regional Park will have a continuous and interlinked access corridor for walks, hiking and canoe / kayak staging. (Upland, p. 28)

The most recent report on the area is the Blue Mountain-Birch Cove Lakes Comprehensive Study completed by Stantec on June 21, 2023, points out that the lands in the Highway 102 Corridor are not unique in their relationship to the park:

While lands identified on the edges of the Study Area appear to be largely vacant, in many situations these lands are the subject of existing planning subdivision approvals. Such subdivisions establish edges and prospective park boundaries, where considerations should be given toward interfaces such as park entrances, in anticipation of future urban development. HRM is currently addressing several recent and active planning applications within the Study Area including two applications involving properties that may abut public lands. Site-specific requests are also being considered by HRM through the ongoing Regional Plan update. (Stantec, p. 10)



In addition to consideration of the Highway 102 Corridor through the Future Serviced Communities project, site-specific requests include Bayers Lake Business Park, Fraser Lake on St. Margaret's Bay Road, and Voyageur Lakes in Hammonds Plains. Existing "legacy subdivisions" on the edges of the proposed park are Voyageur Lakes, Sheldrake Lake in St. Margaret's Bay Road south of Fraser's Lake, and Leeward Phase 4 south of Highland Park in Hammonds Plains. As with developments in the Highway 102 corridor, consideration will have to be given in each of these areas to the compatibility of land use with the expected park experience and with the need to facilitate access to ensure the area reserved is effectively used as an urban park that will give both adjacent residents and members of the wider community the opportunity to experience the natural environment.

Ecology and Water Quality

From an environmental perspective, avoiding the 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.

Based on the limited information available on how it could be designed, it is not advisable to rely on the existing quarry as part of the stormwater management system of the site. This would have the potential to substantially alter water quantity and quality in the surrounding watercourses, and the condition of any sediment within the quarries that are filled with water is unknown. If this were to be proposed in the development, substantially more environmental information and hydraulic modelling would be required to validate the concept. Alternatively, provided an environmental management plan is developed, the quarries could be drained, replaced with appropriate fill, and used for development areas.



The presence of individual SAR was not used exclusively to evaluate the presence and distribution of SAR within the HSA since it was not feasible to conduct comprehensive investigations to detect all individuals of all SAR species that may be present in the HSA. Instead, SAR that are or could potentially be present were identified from both the results of the field surveys and from AC CDC records of SAR reported within 5 km of the HSA. The habitat preferences of these species were compared to the results of the upland, wetland, and aquatic surveys conducted in the HSA along with available habitat mapping and aerial imagery. Where matches were found between SAR habitat preferences and the habitats that had been mapped in the Study Area, those species were considered potentially present. The habitat mapping was then used to map the potential distribution of various SAR in the Study Area.

Several patterns are visible in the SAR distribution mapping. No areas in the HSA can be excluded as being potential SAR habitat. This is attributable to the potential presence of yellow-banded bumble bee and gypsy cuckoo bumble bee, which can occur in a wide variety of upland and wetland habitats. The yellow-banded bumble bee can potentially be found in all terrestrial habitat types in the HSA. The gypsy cuckoo bumble bee is a brood parasite of the yellow-banded bumble bee, so although its niche is very narrow (the nests of its host species), it can be found in a wide variety of habitats due to the wide niche breadth of its host.

Many of the areas where SAR are potentially concentrated are linked by watercourses. This is probably attributable to several factors. The watercourses provide habitat for their own suite of SAR. Wetlands often develop along these watercourses or are the headwaters for watercourses and support a different group of SAR. The riparian habitats along the watercourses are protected by buffer zones within which no forest harvesting may occur. Therefore, the remnants of mature forest can become concentrated along the shores of these watercourses. These mature forest remnants provide habitat for other SAR. These linear concentrations of SAR are of particular benefit since they can provide both habitat for SAR and corridors to connect plant and animal populations in urban areas.

Eight of the 21 SAR that have been identified as potentially present in the HSA are known to make use of anthropogenic habitat for at least part of their life history. These include bank swallow, barn swallow, common nighthawk, little brown myotis, common snapping turtle, yellow-banded bumble bee, gypsy cuckoo bumble bee, and monarch. Although these species can exploit anthropogenic habitats, they often require nearby undisturbed habitats to satisfy other aspects of their natural history. For instance, bank swallows, barn swallows and common nighthawks often nest on human structures or in areas heavily disturbed by humans; however, these species require nearby foraging habitats such as wetlands or watercourses that produce abundant flying insects to provide food for themselves and their nestlings. In heavily developed areas, these food sources may not be present or may be degraded to the point where they do not produce enough food.

The Study Area is adjacent to the Blue Mountain-Birch Cove Lakes Wilderness Area and proposed national urban park. These areas together constitute an extensive area of relatively undisturbed habitat that is largely surrounded by urban and suburban development. Providing landscape connectivity between this area, other protected areas within the developed portion of HRM, and undeveloped areas of HRM is important for the maintenance of biodiversity in this area. Figure 3.11a of the LSA report presents general mapping of the HSA and the area surrounding it including the portion of the Blue Mountain-Birch



Cove Lakes Wilderness Area located near the HSA to facilitate interpretation of the landscape connectivity text. Figure 3.11b of the HSA LSA report shows both the Blue Mountain-Birch Cove Lakes Wilderness Area and various corridors that have been proposed by the Halifax Green Network Plan (HGPN 2018) and the Nova Scotia Crown Share Land Legacy Trust (NSCSLLT 2021) to provide required landscape connectivity. This figure presents these corridors in relation to the HSA to determine if the HSA can contribute to landscape and watercourse connectivity. Figure 3.11c of the HSA LSA presents a proposed, updated corridor system for the HSA that aims to provide both connectivity as well as protection for sensitive ecological features found in the HSA. The following text summarizes some of the previous corridor planning efforts in the region of the HSA as context for the newly proposed corridor within the HSA.

While it may be necessary to cross the ecological corridors with roads and utilities to pursue development in areas deemed suitable, this type of interference should be avoided. It is recommended that roads and utilities enter the areas suitable for development using existing roads and utility corridors wherever possible to minimize disturbance to the proposed ecological corridors. If crossing streams cannot be avoided, bridges should be used as opposed to culverts. Bridges allow for the maintenance of plant communities at the crossing site, which provides some habitat continuity and reduces sensory disturbance that might deter wildlife from crossing at these locations. Bridges also permit wildlife to cross under the road reducing the potential for collisions between vehicles and wildlife. To enhance public safety and maintain ecological connectivity, the number of locations where roads or utilities intersect wildlife corridors should be kept as low as possible to reduce traffic and wildlife interactions.

Transportation

The Study Area is not complex to integrate into the various modes of the regional transportation system. There are existing capacity issues on the major highway and road systems such as Highway 102 and the Bedford Highway that exist regardless of the development. Our study identifies potential mitigation strategies that have been discussed by the JRTA, HRM, and the Province. To achieve the planned density, an additional crossing of Highway 102 is recommended.

The Annapolis proposal currently does not propose any commercial uses. This is problematic since a development of this magnitude should have some on-site commercial and institutional uses to provide amenities and support to the population to reduce the number of trips required. The HRM Regional Plan policies speak to this requirement, and this will need to be addressed in any future iteration of the developer's concept plan.

This study area abuts Sub-Area 11 of the Bedford West Secondary Planning Strategy, which does not yet include detailed policies to enable development. Opportunities to coordinate infrastructure and potential development with this area must be considered.

Siting of a potential link under or across Highway 102 in the middle of the Study Area requires further evaluation and faces many constraints related to the built environment and reserved natural areas on the east side of the expressway as well as the location of a rock quarry pit slated to become a lake within development concept plans. Noting that alignment with Farnham Gate Road would create the most



natural travel link to Dunbrack Street, but acknowledging practical constraints, the 2009 Servicing Plan recommends that the link connect to the northernmost intersection of Parkland Drive and Heathside Crescent, currently a driveway for the Glenbourne Gardens apartments.

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.

Further study is required to evaluate the alternative options for wastewater servicing for the Study Area and to confirm feasibility of the KLPS to accommodate additional flow, and review other alternatives to wastewater servicing, including construction of new PS and connection to Wedgewood Ravine. The study should also review the capacity of Kearney Lake Trunk Sewer, and WWTP capacity. This study should be coordinated with the analysis of the Sandy Lake development proposals as well as any flow diversion strategies that may have been previously developed.

Financial

Opening the area for development, in Stantec's high-level order of magnitude estimate, requires an investment of approximately \$221.9M 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 (if you include a new crossing of Highway 102 at the mid-point of the Study Area).

On a "per door" (total cost divided by the number of estimated housing units), which represents approximately \$87,000 per door for the low-density scenario, approximately \$37,100 a door for the mid-density scenario, and approximately \$19,400 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 new crossing of Highway 102 would not be warranted, but many of the infrastructure upgrades are still required regardless of the scenario.

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 will be for HRM to review the completed studies and determine if secondary planning should be initiated, also known as comprehensive neighbourhood planning, which 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.

