SOUTHEAST BRANDON

NEIGHBOURHOOD PLAN

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NEIGHBOURHOOD PLAN

December 2022

prepared by

SCATLIFF + MILLER + MURRAY

visionary urban design + landscapes

on behalf of

VBJ Developments

It begins with a plan.

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PART 01
INTRODUCTION

PURPOSE OF THE NEIGHBOURHOOD PLAN

This Neighbourhood Plan has been prepared on behalf of VBJ Developments, in accordance with Section 6.1.4(b) of the Southeast Brandon Secondary Plan.

The purpose of this Neighbourhood Plan is to document the planning process undertaken, convey the design and land use structure of the subject site, and demonstrate how the planned development aligns with the City of Brandon's overall planning and development framework.

AREA CONTEXT

As shown in Figure 1, the subject site is located in Southeast Brandon, on the east side of 1st Street, near Maryland Avenue. As shown in Figure 2, the area west of the site is primarily residential, close to Crocus Plains Regional Secondary School and Maryland Park School. Industrial uses are located north of the undeveloped areas along Richmond Avenue East, as well as east of the site along 17th Street. The area south of the site, extending down to Patricia Avenue, is a protected ecological area as a known habitat for the endangered Small White Lady's Slipper, and will be managed by the Nature Conservancy of Canada (NCC) .

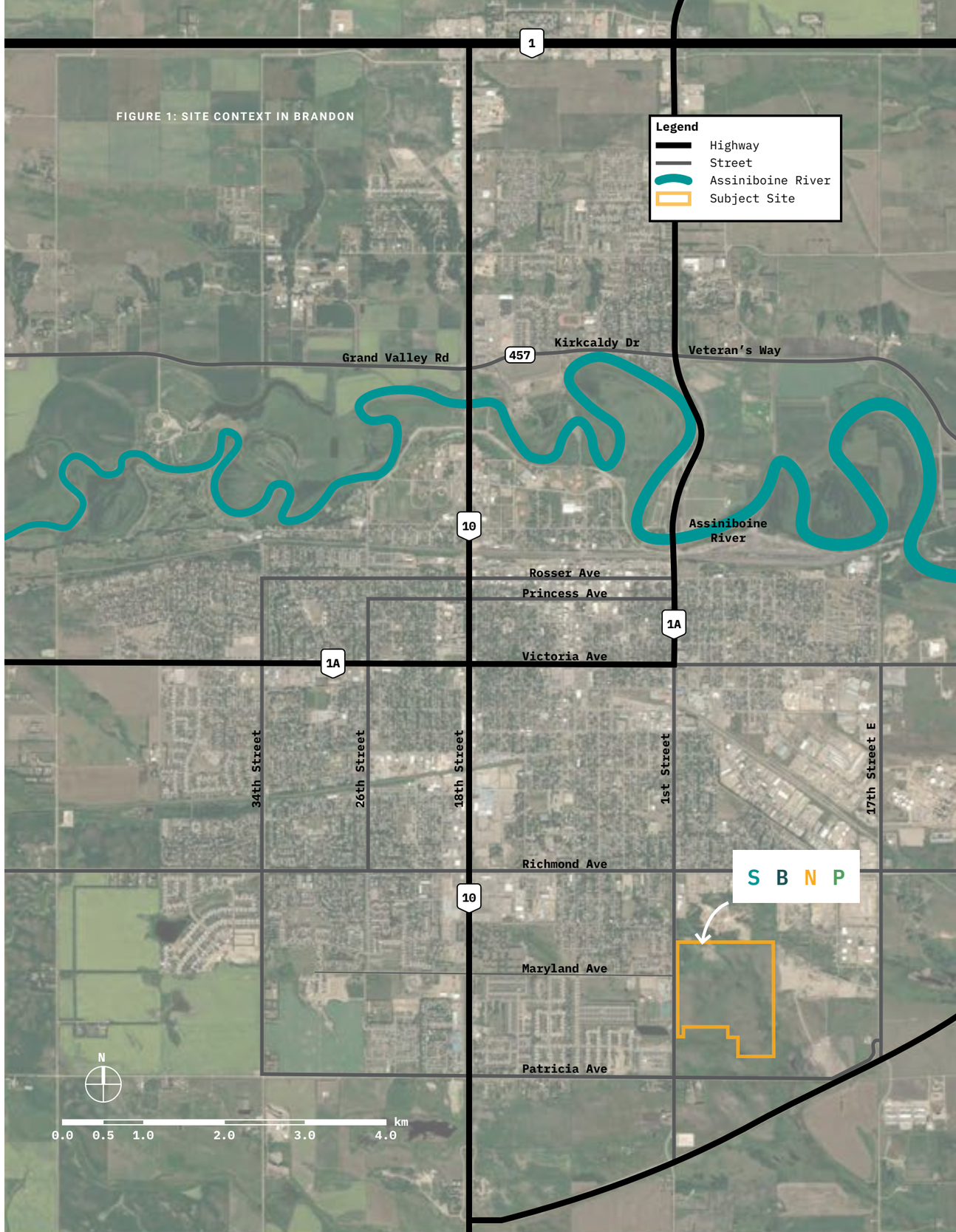
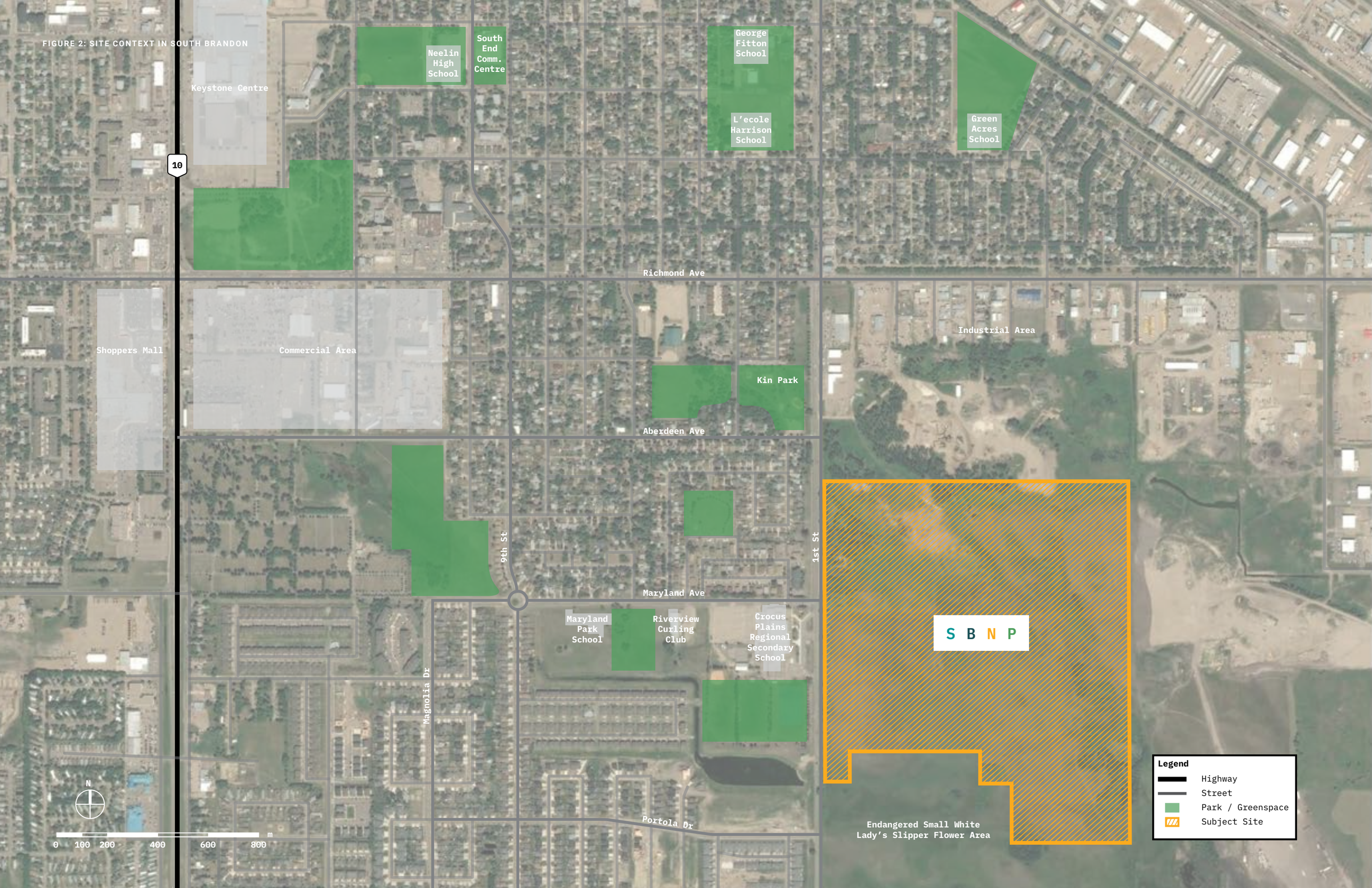


FIGURE 2: SITE CONTEXT IN SOUTH BRANDON



SITE DESCRIPTION

The 61.8 hectare (152.7 acre) site is immediately to the east of 1st Street, near Maryland Avenue. As shown in Figure 3, the subject site is largely undeveloped and currently includes an existing residential acreage and treed areas. The subject site is generally flat, with a low-lying wet area northeast of the intersection of 1st Street and Maryland Avenue.

Much of the land on the east side of 1st Street, including portions of the subject site, was previously subdivided into a grid pattern that was never developed. VBJ Developments owns the majority of the land, while the City of Brandon owns the existing undeveloped road rights-of-way. A third party owns one existing undeveloped lot in the northwest quadrant of the site. Through the subdivision process, the existing undeveloped rights-of-way will be closed, enabling the site to be developed as set out in this Neighbourhood Plan.

QUICK STATS

61.8
HECTARES

152.7
ACRES

FIGURE 3: EXISTING CONDITIONS

PART 02
PLANNING FRAMEWORK

PLANNING FRAMEWORK

The City of Brandon regulates land use and development through a variety of statutory plans, bylaws, and guidelines. This section summarizes how the following documents have shaped the land use structure and design for the subject site:

- Brandon and Area Planning District Development Plan (2013)
- Southeast Brandon Secondary Plan (2021)
- Zoning Bylaw No. 7124 (2016)
- Greenspace Master Plan

BRANDON + AREA PLANNING DISTRICT DEVELOPMENT PLAN

The Brandon and Area Planning District Development Plan is the primary planning document currently used by the City of Brandon to direct and manage its long-range growth and development. The Development Plan, which is undergoing an update since the dissolution of the Brandon and Area Planning District, sets out objectives and policies to direct growth and establish an overall land use structure, rooted in the community's vision and aspirations. The City relies on the Development Plan to inform and guide decision-making on all matters of land development in the city.

The Development Plan designates the site as 'Residential'. The intent of this designation, as stated in Section 2.0 of the Plan, is to:

- Accommodate a variety of housing types;
- Ensure residential areas are close to services, infrastructure, and transportation routes; and
- Ensure residential areas are separated from potentially incompatible land uses.

The following are key policy directives that provide the strategic foundation of this Neighbourhood Plan:

- A variety of housing densities within the City (Section 2.2.2)
- Inclusion of parks and community facilities (Section 2.2.11)
- Sensitivity around natural features (Section 11.2.2)
- Inclusion of buffers along major streets (Sections 6.2.5 + 16.2.4)

Finally, the Development Plan classifies 1st Street to the west of the site and Patricia to the south as arterials. It classifies the existing leg of Maryland Avenue as a collector and proposes Elderwood Drive / Franklin Street as a future collector.

SOUTHEAST BRANDON SECONDARY PLAN

The Southeast Brandon Secondary Plan, which flows out of the Development Plan, establishes the policy framework to guide future planning and development in Southeast Brandon. As such, it provides policy direction on land use, long-range growth, and public and private investment in support of the City's development objectives for the Southeast Secondary Plan area.

As outlined in the Secondary Plan's Composite Map (Figure 4), development of the subject site should:

- Primarily be developed as Residential Low Density with nodes of Residential Moderate Density and Mixed Use;
- Include a green buffer along the east side of 1st Street and a central greenspace;
- Include a southward extension of Elderwood Drive / Franklin Street; and
- Include an eastward extension of Maryland Avenue with land dedications for the roundabout intersection at 1st Street.

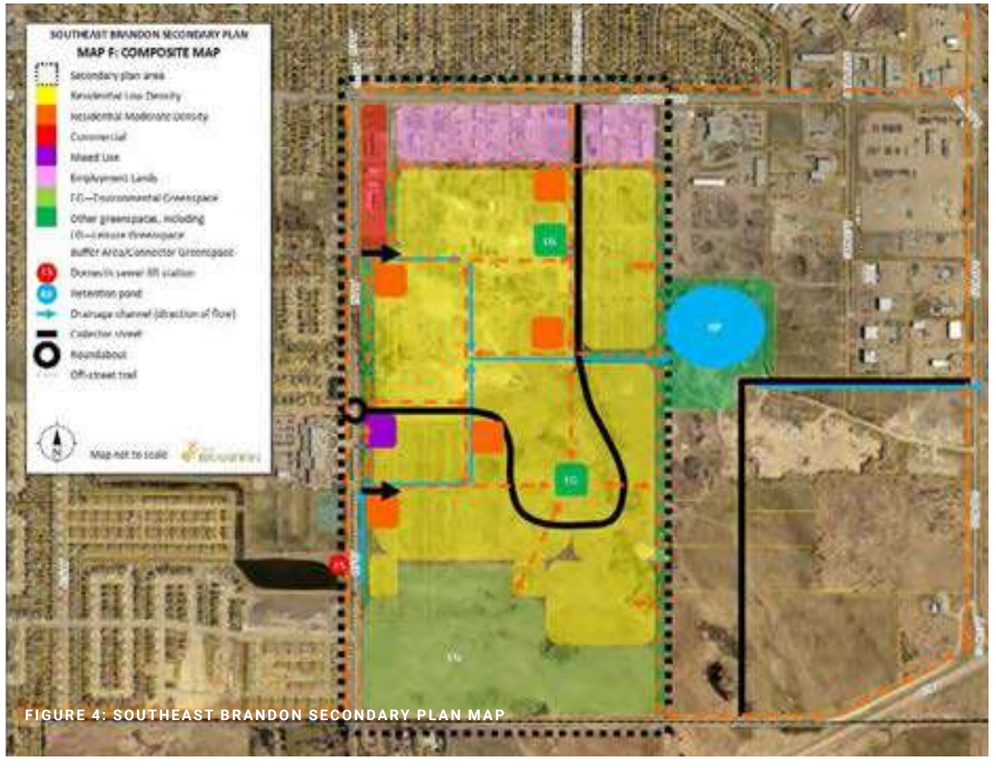


FIGURE 4: SOUTHEAST BRANDON SECONDARY PLAN MAP

The Southeast Brandon Secondary Plan provides specific direction and policies for the site regarding land use, density, greenspace, and transportation.

RESIDENTIAL DEVELOPMENT

According to Section 2.1 of the Secondary Plan:

- Development should include a variety of housing forms and types (Section 2.1.2)
- Land within the Residential Low Density designation may be zoned Residential Single Detached Zone (RSD), Residential Mobile/Modular Home Zone (RMH), and/or Residential Low Density Zone (RLD) (Section 2.1.3)
- Residential Moderate Density (RMD) areas should be located on arterial or collector streets with adequate servicing and connections to public transit and greenspace (Section 2.1.4);
- Development should include a mixture of zones that accommodate a mixture of housing types. For RLD areas, this includes housing forms as single detached, semi-detached, and duplex dwellings, and street-oriented townhouses (Section 2.1.6)
- Higher density housing types should locate adjacent to features such as greenspaces, major intersections, collector streets, and transit routes (Section 2.1.7)

COMMERCIAL AND MIXED-USE DEVELOPMENT

According to Section 2.2 of the Secondary Plan:

- Commercial and Mixed-Use developments are intended to serve both the immediate neighbourhood and the broader Secondary Plan area
- Mixed-Use areas can include either a vertical or horizontal mix of commercial and residential uses (Section 2.2.3)
- Commercial and Mixed-Use areas should consider pedestrian connectivity, appropriate buffers adjacent to Residential Low Density areas, and public transit servicing (Sections 2.2.8 – 2.2.10)

GREENSPACES

According to Section 2.4 of the Secondary Plan:

- Developers should dedicate 10% of lands for linear and/or leisure greenspaces (Section 2.4.1.2)
- Greenspaces should be within a five minute walk or 400 metres to most residents (Section 2.4.1.3)
- Lands required for infrastructure services and lands not suitable for development will not be dedicated as public reserve (Section 2.4.1.4)
- Existing vegetation and natural features should be preserved where possible (Section 2.4.1.5)
- Leisure greenspaces that serve the local neighbourhood will be highly accessible for pedestrians and cyclists, be a minimum of 1 hectare in size, and include space for potential community gardens (Section 2.4.2)
- Connector greenspaces are required along arterial streets such as 1st Street (Section 2.4.4.1) which should be a 9 metres wide (Section 2.4.4.3), to provide separation between the arterial street and the adjoining residential area, as well as safe connections for pedestrians and cyclists.

TRANSPORTATION

The transportation system within the Site should provide a range of viable transportation options that are well integrated into the broader transportation network.

According to Section 3.2 of the Secondary Plan, the active transportation network should:

- Include multi-use trails to connect to the larger trail and greenspace network, as well as within buffer areas (Section 3.2.1 – 3.2.2)
- Include mature trees where possible (Section 3.2.3)
- Consider user safety at intersections (Section 3.2.5)
- Provide convenient pedestrian connections to transit stops (Section 3.2.7)
- Be accessible for people of all abilities (Section 3.2.8)

According to Section 3.3 of the Secondary Plan, the public transit network should:

- Include routes along arterial and collector streets (Section 3.3.1)
- Include stops that are within a five-minute walk or 400 metres of all uses (Section 3.3.2)
- Include transit stops that are directly connected with pedestrian connections (Section 3.3.3)

According to Section 3.4 of the Secondary Plan, the street network should:

- Balance convenient circulation with safety, attractiveness of the area, and vistas (Sections 3.4.1 & 3.4.4)
- Include safety features such as well marked street crossings and traffic calming where appropriate (Sections 3.4.2 – 3.4.3)

ZONING BYLAW NO. 7124, 2016

The site is currently zoned Development Reserve (DR), which allows the preservation of existing agricultural sites in an unfragmented state for future development that would be consistent with the Development Plan and any applicable Secondary Plan. The site will need to be rezoned, in alignment with the policies of the Secondary Plan, to facilitate the planned development outlined in Part 3 of this Neighbourhood Plan.

The Zoning Bylaw also includes the Urban + Landscape Design Standards Manual, a set of standards for new development to adhere to in order to enhance its character.

GREENSPACE MASTER PLAN

The City of Brandon's Greenspace Master Plan classifies greenspaces into Connector, Leisure, and Environmental categories. Recognizing the subject site's adjacency to a significant ecological area to the south, the subject site is planned to include the first two categories, as shown in Part 3 of this Neighbourhood Plan.

CONNECTOR GREENSPACES

These linear greenspaces are intended to create an integrated and connected system of open space by linking parks and other destinations.

LEISURE GREENSPACES

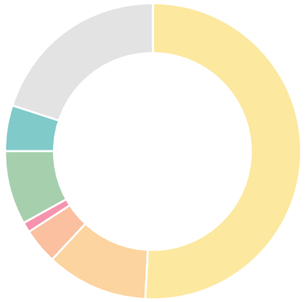
Leisure Greenspaces are the most common type of greenspaces and should be centrally located within each neighbourhood. They are intended to be the primary public space in a neighbourhood and provide the most direct access to greenspace. As passive recreation spaces, they offer casual and non-programmed park use/activities and the potential for ecological education close to one's own backyard. Leisure Greenspaces are within a short walking distance from all residential areas. Leisure Greenspaces are designed for neighbourhood gathering and events.

PART 03
NEIGHBOURHOOD DESIGN

DEVELOPMENT OVERVIEW

As shown in Figure 5, the site's proposed uses include residential, commercial, greenspaces, and stormwater retention uses. The site will be organized around a central greenspace with a stormwater retention pond, and a street network arranged in a modified grid pattern, with the extensions of Maryland Avenue and Elderwood Drive / Franklin Street acting as collector streets. Sidewalks, on-street active transportation infrastructure, and multi-use trails will connect to the City's larger active transportation network including a new pathway on the east side of 1st Street and green corridors near the south edge of the site and immediately east of the site.

QUICK STATS



- 51% RESIDENTIAL LOW DENSITY
- 11% RESIDENTIAL LOW DENSITY (TOWNHOMES)
- 4% RESIDENTIAL MODERATE DENSITY
- 1% COMMERCIAL
- 8% GREENSPACES
- 5% STORMWATER RETENTION
- 20% ROAD RIGHTS-OF-WAY

DESIGN CONSIDERATIONS

The design and structure of the neighbourhood has been informed by the site's surrounding development context and is consistent with Southeast Brandon Secondary Plan's policies. Key planning and design considerations that have shaped the proposed plan include:

- Generally adhering to the land use mix and locations set out in the Secondary Plan
- Incorporating a variety of housing types
- Incorporating a 9-metre-wide Connector Greenspace along 1st Street
- Integrating a central Leisure Greenspace as a key community amenity
- Extending Maryland Avenue and Elderwood Drive / Franklin Street into the site, acting as collector roads for this site and future development
- Providing a range of viable transportation options including access to active transportation and public transit
- Setting aside lands for a utility corridor to accommodate potential construction of City piped services in the future

Each of these topic areas are discussed in more detail on the following pages.

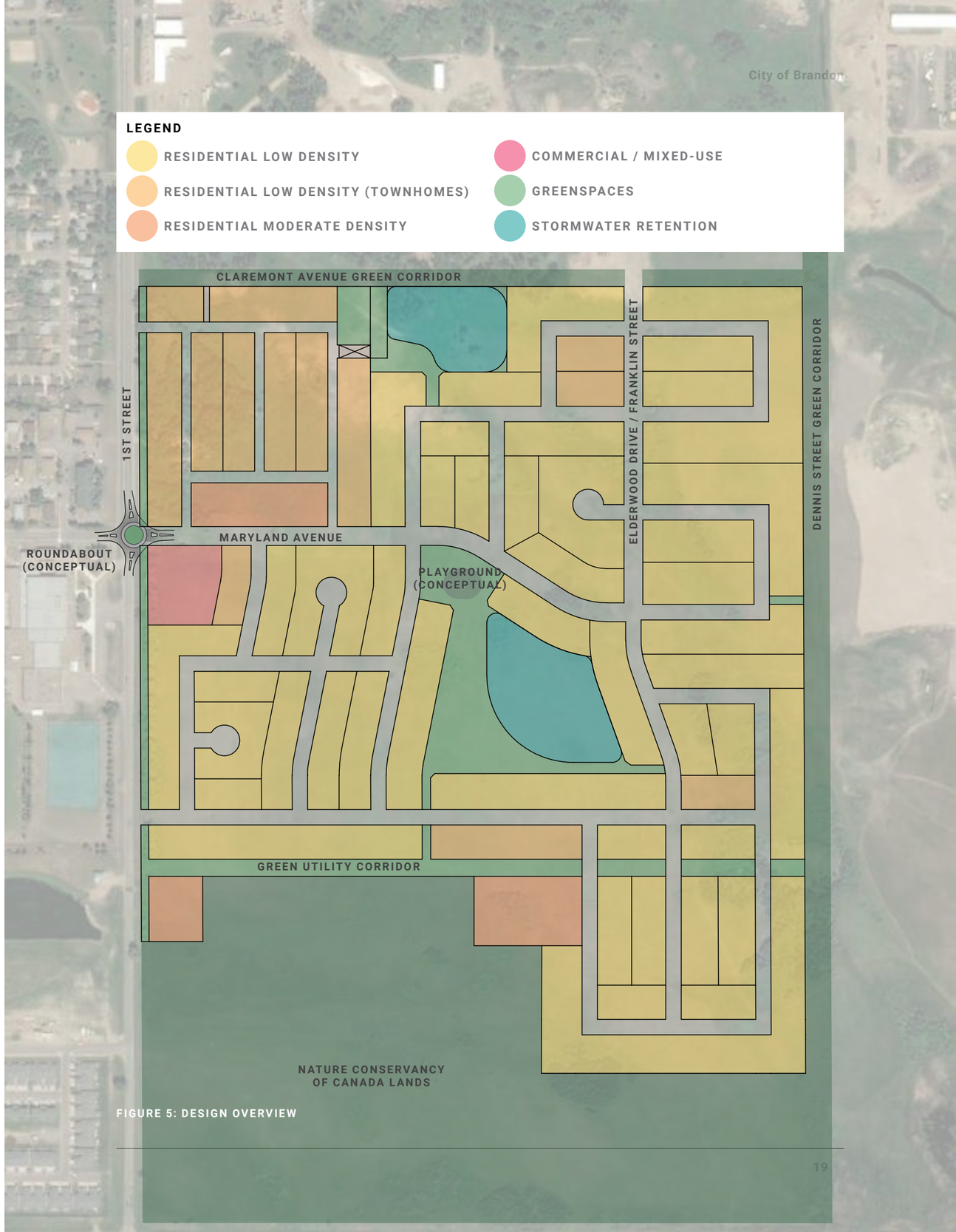


FIGURE 5: DESIGN OVERVIEW

COMMERCIAL / MIXED-USE NODE

As shown in Figure 5, the site will include a commercial / mixed-use node at the intersection of 1st Street and Maryland Avenue. The intended use of this node is flexible, with the ability to accommodate small-scale commercial use(s) that serve the local area, as well as moderate density residential uses.

HOUSING + POPULATION

As shown in Figure 5, the site will primarily be developed for low density residential use, with 3 moderate density residential sites. It is anticipated to have 750 - 950 housing units, for a gross density of 12.1 – 15.4 units per hectare (4.9 - 6.2 units per acre). This is in line with the Secondary Plan's policies to include a variety of housing types such as detached, semi-detached, duplex, street-oriented townhouse, and apartment dwellings. The 750 - 950 housing units translates to a total estimated population of 2,025 – 2,565, assuming a household size of 2.7, as set out in the Development Charges Background Study.

QUICK STATS

750 - 950
HOUSING UNITS

2,025 – 2,565
ESTIMATED POPULATION

12.1 – 15.4
GROSS UNITS PER HECTARE

PHASING PLAN

As shown in Figure 6, the site will generally be built out in three phases, beginning in the northwest corner. Phase 1 will include approximately 150 - 200 dwellings, a greenspace, and stormwater pond. Phase 2 will include approximately 150 - 200 dwellings, a commercial area, additional greenspace, and the second stormwater pond. Phase 3 encompasses the remaining land, including 450 - 550 dwellings and greenspaces.

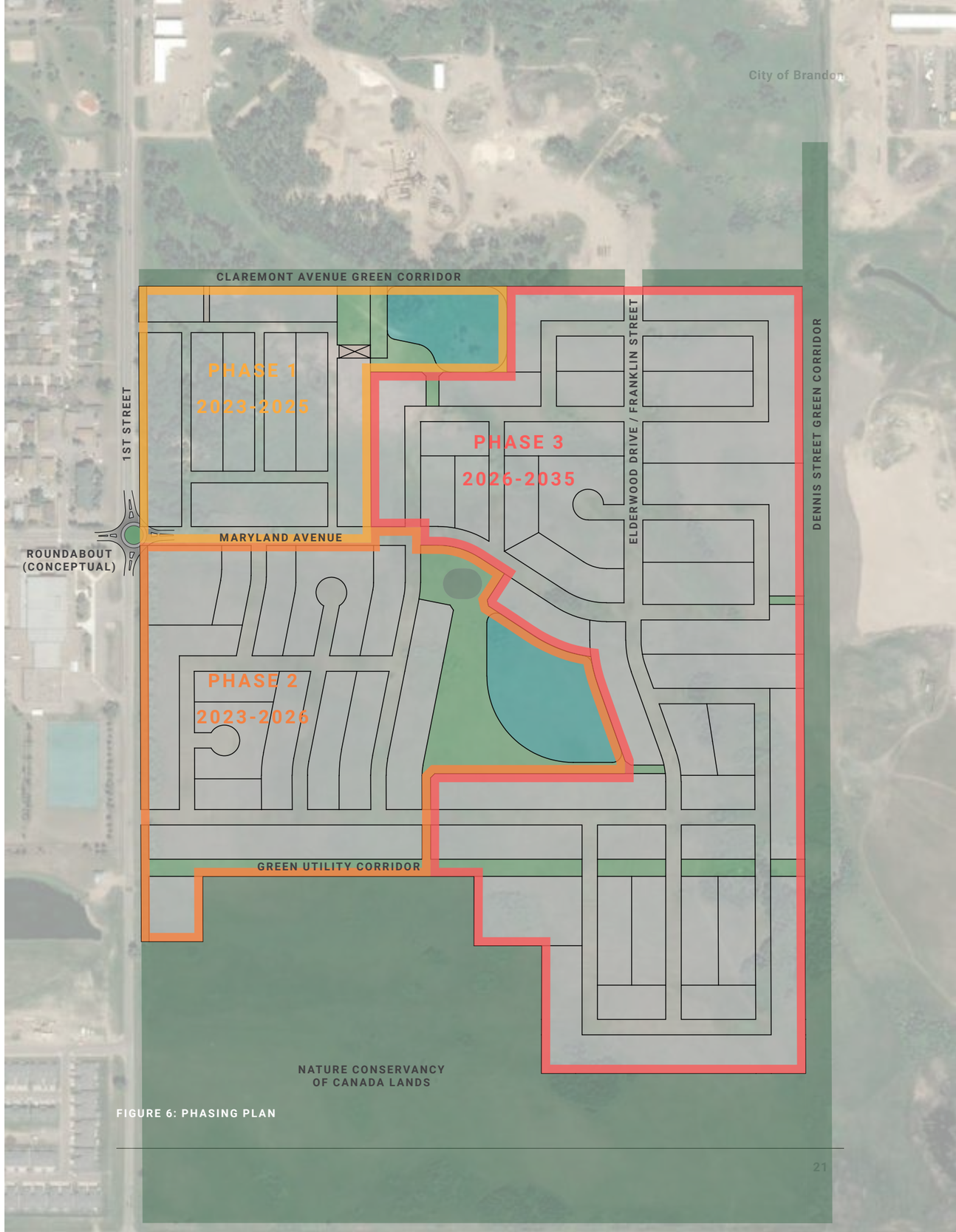


FIGURE 6: PHASING PLAN

GREENSPACES

As shown in Figure 7, greenspaces account for 5.1 hectares, 12.5 acres, or 8.2% of the site area, featuring a central greenspace, as well as various smaller parks, corridors, and connectors.

LEISURE PARKS

- **A** The central leisure park will be the largest park in the neighbourhood at 2.2 hectares or 5.5 acres. Located near the central stormwater pond, it will provide leisure areas, a playground area, and active transportation connections.
- **B** The 0.7 hectare (1.8 acre) leisure park near the northern boundary will provide leisure areas and an active transportation connection to the Claremont Avenue Green Corridor.

PERIMETER GREEN CORRIDORS & CONNECTOR GREENSPACES

The site includes two green corridors its western and southern limits. Additionally, connector greenspaces within the subject site provide connections to parks and green corridors within the site and also to the surrounding area. Lastly, there are two green corridors anticipated to be established just outside the subject site within existing City rights-of-way immediately east (Douglas Street) and north (Claremont Avenue). Although these two corridors are not included in the greenspace contributions projected above, they will serve as important active transportation connections in the area.

- **C** The 9-metre wide (0.6 hectares or 1.5 acres) 1st Street Green Corridor establishes a physical separation between houses and the arterial road, achieving many objectives for the frontage outlined in the Southeast Brandon Secondary Plan. The corridor accommodates a multi-use trail along 1st Street, preserves the shelterbelt's existing mature trees where possible, and extends the City's active transportation network.
- **D** The 20.1-metre wide Green Utility Corridor (1.4 hectares or 3.6 acres) along the southern limit of the site will establish a physical separation between the site and the NCC lands to the south, while also providing a right-of-way to accommodate sanitary and stormwater infrastructure. In the southeast corner of the site, the corridor cuts through the site rather than jogging around it in order to maximize efficiency of the sanitary and stormwater infrastructure.
- **E** A southern connector will link the southern street with the Green Utility Corridor and serve as the southern terminus of the internal north-south active transportation corridor.
- **F** The Maryland Avenue connector will provide a connection to the Douglas Street Green Corridor.

ACCESS TO GREENSPACE

As shown in Figure 8, the vast majority of residents will be within 400 metres, or about a 5 minute walk, from Greenspace A. Further, all residents will be within 400 metres of a green corridor, which provide easy access to the network of greenspaces. Greenspaces in the surrounding area include Kin Park, amenities at Crocus Plains Regional Secondary School, and the NCC lands (public access to be determined). Finally, residents may opt to take a short bicycle ride to other greenspaces in the city, many of which can be accessed using the integrated trail / sidewalk network.

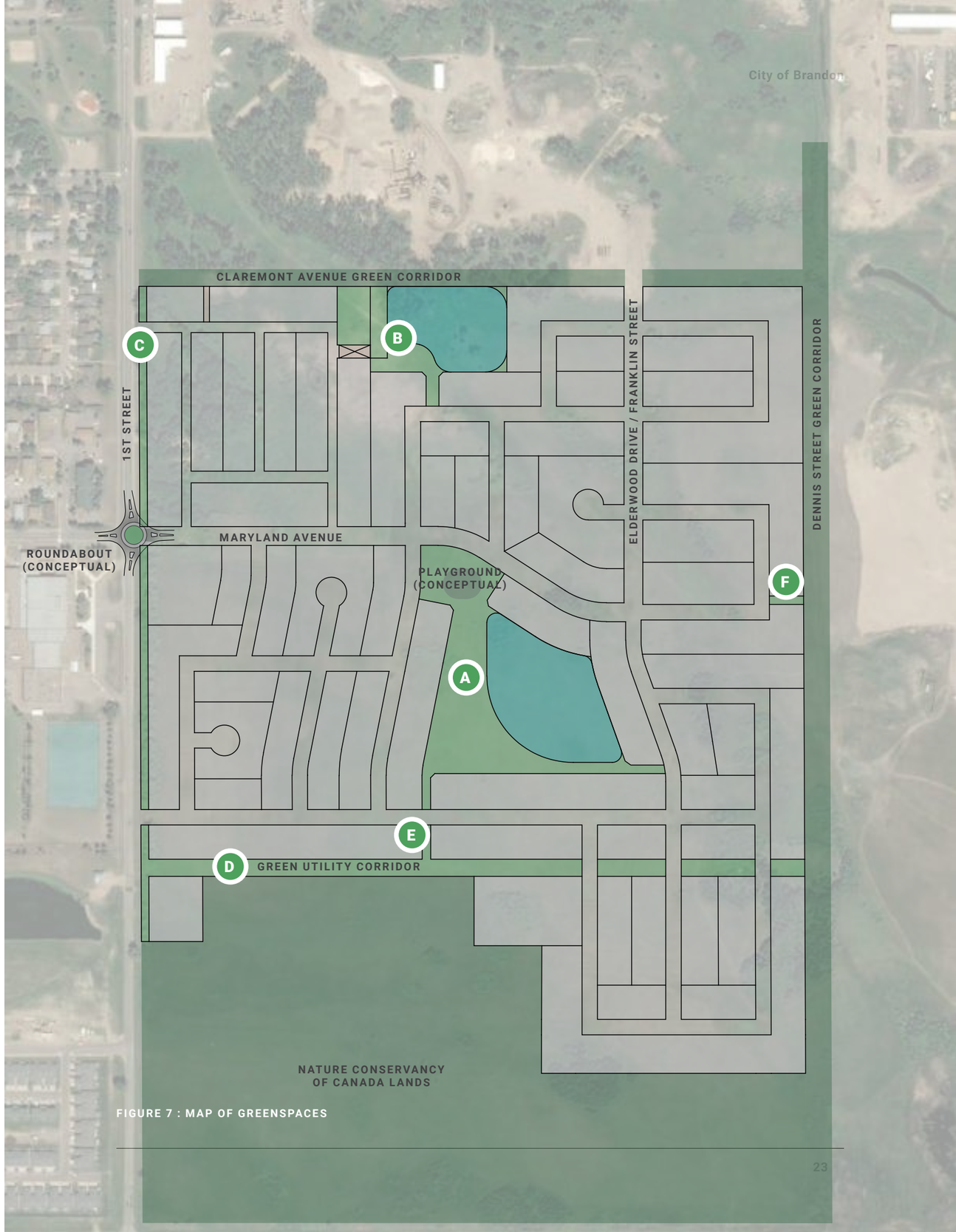


FIGURE 7 : MAP OF GREENSPACES

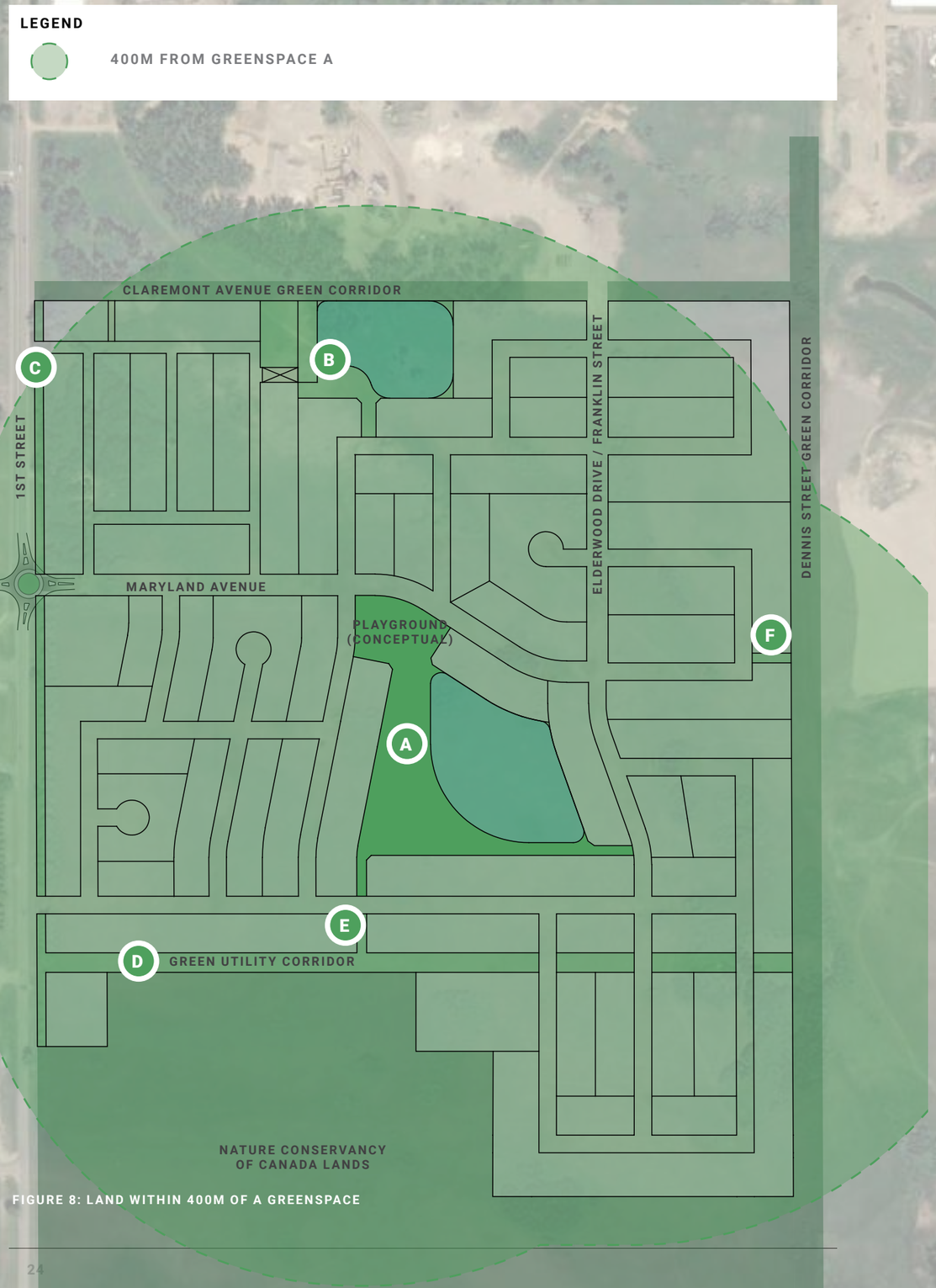


FIGURE 8: LAND WITHIN 400M OF A GREENSPACE

TRANSPORTATION

VEHICLES

The site's streets are organized in a grid modified pattern. Streets within the northwest condominium area will be under private ownership and have been designed with 11 to 13.7 metre-wide rights of way. Maryland Avenue between 1st Street and Elderwood Drive / Franklin Street, as well as Elderwood Drive / Franklin Street north of Maryland Avenue, are considered collectors and will be 22 metres wide. All other streets are considered public local streets and have been designed with 18.0-metre rights-of-way and will be constructed in accordance with City standards.

ACTIVE TRANSPORTATION

As shown in Figure 9, the site's proposed active transportation network includes multi-use trails within green corridors, cycling lanes along collector streets, and sidewalks along all internal streets. This internal infrastructure will connect residents with Brandon's wider active transportation network. Since local streets are expected to have low traffic volumes, they are expected to be safe for cycling without dedicated active transportation facilities. The sidewalks and trails will also connect residents to existing public transit stops nearby.

PUBLIC TRANSIT

Currently, the closest public transit to the site is Brandon Transit Bus Route 23, which runs along Maryland Avenue and 1st Street, with stops at Crocus Plains Regional Secondary School on Maryland Avenue and near the intersection of 1st Street and Aberdeen Avenue. As shown in Figure 10, a portion of the site will be within 400 metres, or an approximately 5-minute walk, of an existing bus stop. If the City were to add / adjust bus routing to travel through the site, additional lands could be situated within 400 metres of a bus stop.

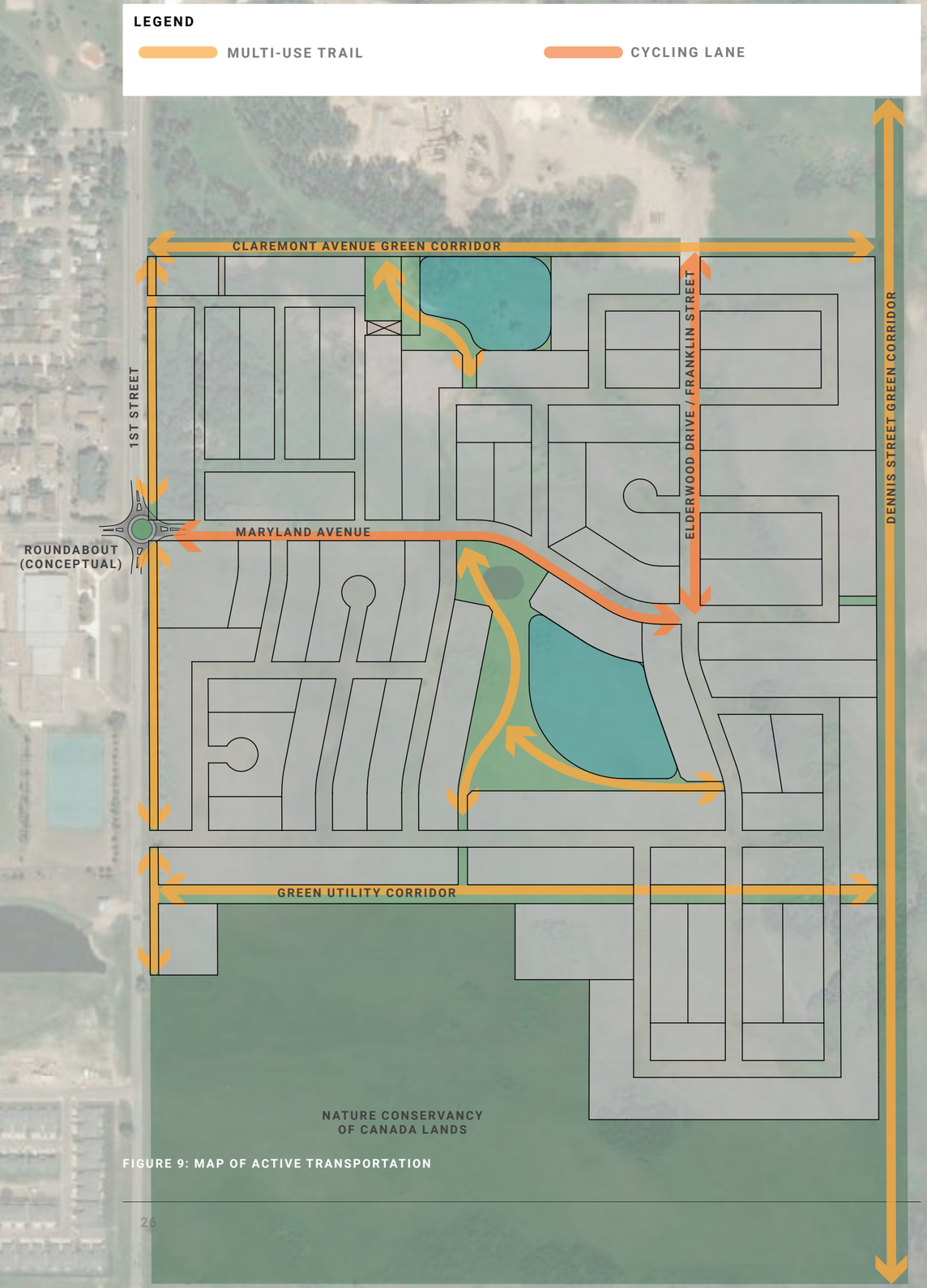


FIGURE 9: MAP OF ACTIVE TRANSPORTATION

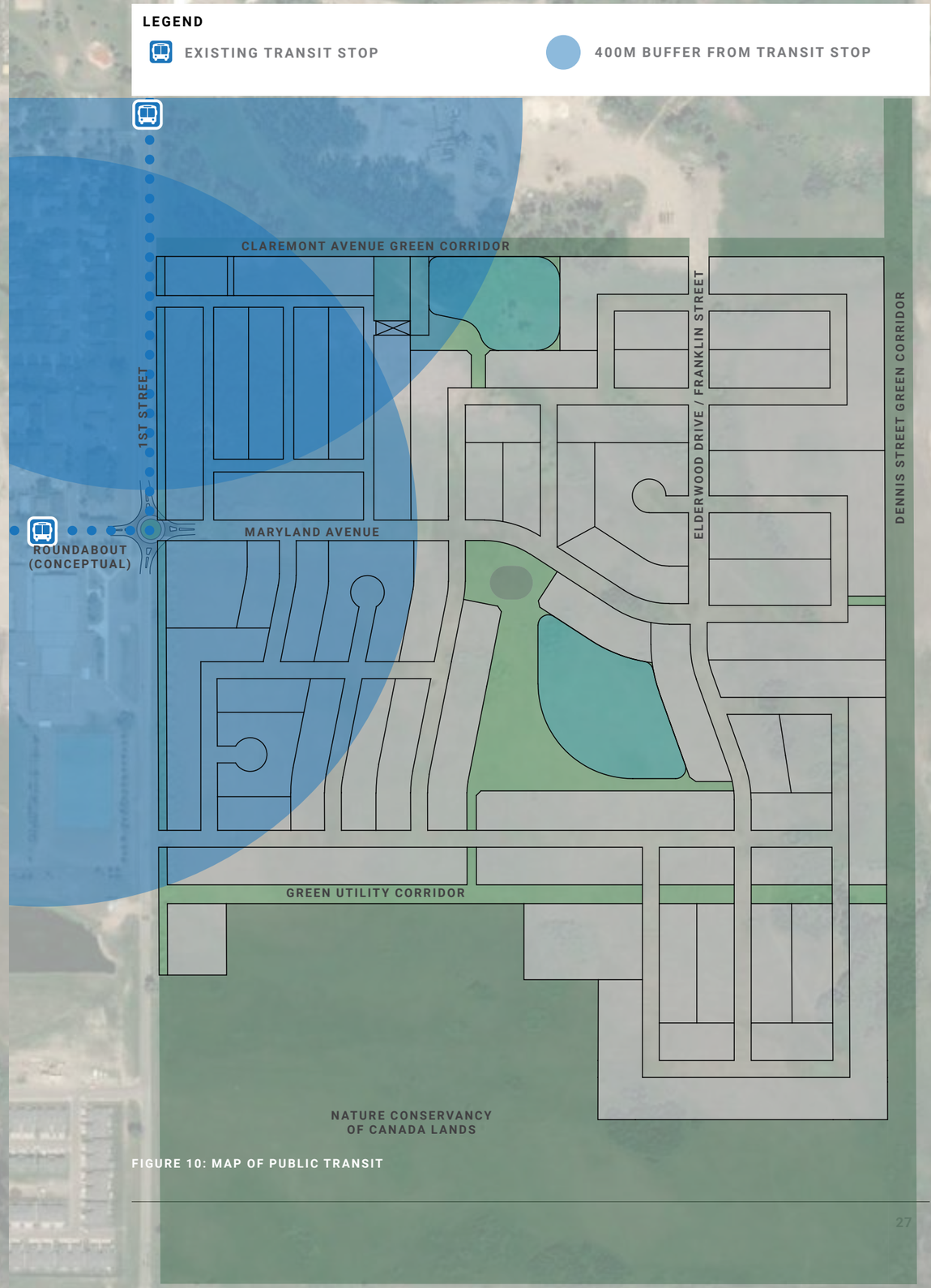


FIGURE 10: MAP OF PUBLIC TRANSIT

SERVICING + INFRASTRUCTURE

The site's servicing - water, wastewater, and stormwater - will connect to the City of Brandon's larger municipal infrastructure systems. As such, a key component of this Neighbourhood Plan is to estimate anticipated flows and demands on the larger systems to ensure there is capacity. The general locations of water, wastewater, and stormwater pipes are shown on Figure 11, and a full engineering report/study has been prepared in conjunction with this Neighbourhood Plan.

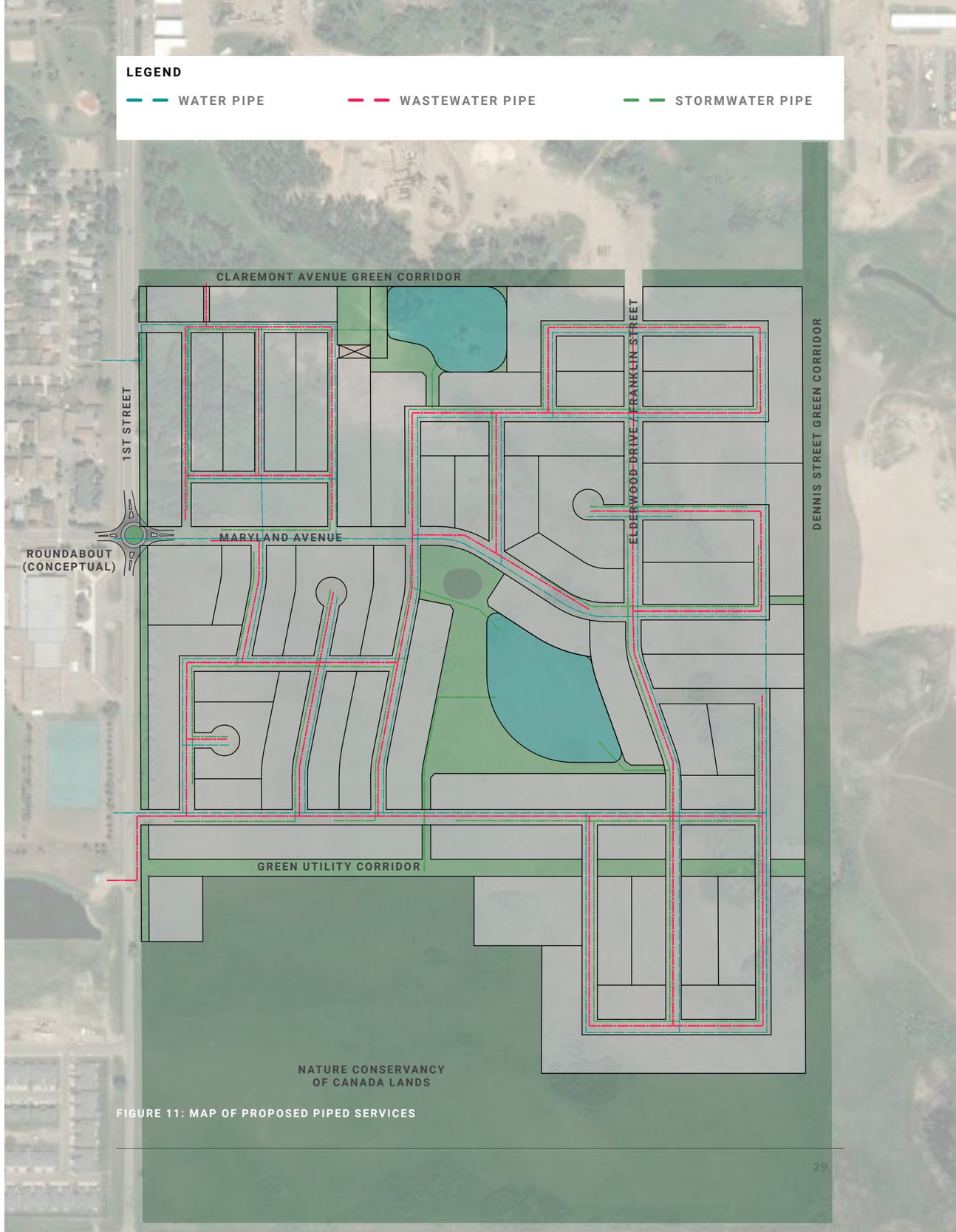


FIGURE 11: MAP OF PROPOSED PIPED SERVICES

VBJ DEVELOPMENTS LTD.

First St. and Maryland Subdivision Servicing Report

Revision:
Rev 0

Date:
December 23, 2022

KGS Group Project:
21-2210-003

Client Project:

VBJ DEVELOPMENTS LTD.

First St. and Maryland Subdivision Servicing Report

Revision:
Rev 0

KGS Group Project:
21-2210-003

Date:
December 23, 2022

Client Project:

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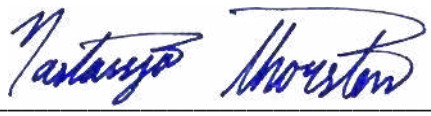

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STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for VBJ Developments Ltd. (VBJ Developments) in accordance with the agreement between KGS Group and VBJ Developments (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations, and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

This report is based on information made available to KGS Group by VBJ Developments. Unless stated otherwise, KGS Group has not verified the accuracy, completeness, or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this report apply only as they existed at the time of KGS Group's work.

Third Party Use of Report

Any use a third party makes of this report or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

1.0 OVERVIEW

KGS Group prepared this servicing report on behalf of VBJ Developments, as a requirement of their development review and subsequent approval. This includes the design criteria and parameters utilized for the site grading, watermain, wastewater sewer, and land drainage sewer systems.

The proposed development is a 152.5 acre (61.7 Ha) site and is located immediately to the east of 1st Street, bounded by Claremont Ave to the north, Douglas St to the east, and the Nature Conservancy of Canada Lands to the south. The land immediately adjacent to the site on the north, east, and south sides are undeveloped and consist of grasslands and farmlands. The natural area south of the site near Patricia Avenue is home to the endangered Small White Lady's Slipper flowers.

Phase One is a condo development, 8.0 hectares in size and the site is located immediately to the east of 1st Street, bound by Claremont Ave to the north, Fredrick St to the east, and Maryland Ave to the south.

The development, outlined in Figure 1, will be primarily moderate density residential with a combination of duplex dwellings, street-oriented townhouses, and five (5) twelve-plex dwellings along Maryland Ave. A total of 194 housing units are planned for the site, resulting in a total population of 464, assuming an average household size of 2.7 for duplex/quadplexes and 1.7 for apartment-style units in the 12-plexes, per the Development Charges background study for this type of development.

Phases 2 and 3 of the development will consist of a mix of low and moderate density residential units, including single family homes. A total of 775 housing units are planned for the site, resulting in a total population of 2,093 also assuming an average household size of 2.7.

VBJ Developments owns the majority of the land for the subdivision site, with the City of Brandon owning the existing undeveloped road right of ways (except for within the Phase 1 site), and a private individual owns one existing undeveloped lot in the northeast corner of the Phase 1 site.

The development will also create ponds, parks, and greenspaces, including a 9-metre-wide buffer which will preserve vegetation and include an active transportation connection along 1st Street. Maryland Ave will be extended east of 1st Street, along with a future roundabout at the intersection (by others), acting as a collector road for this site and potential future development. The design will also integrate walking and cycling infrastructure, access to public transit, greenspaces, and efficient servicing and infrastructure.

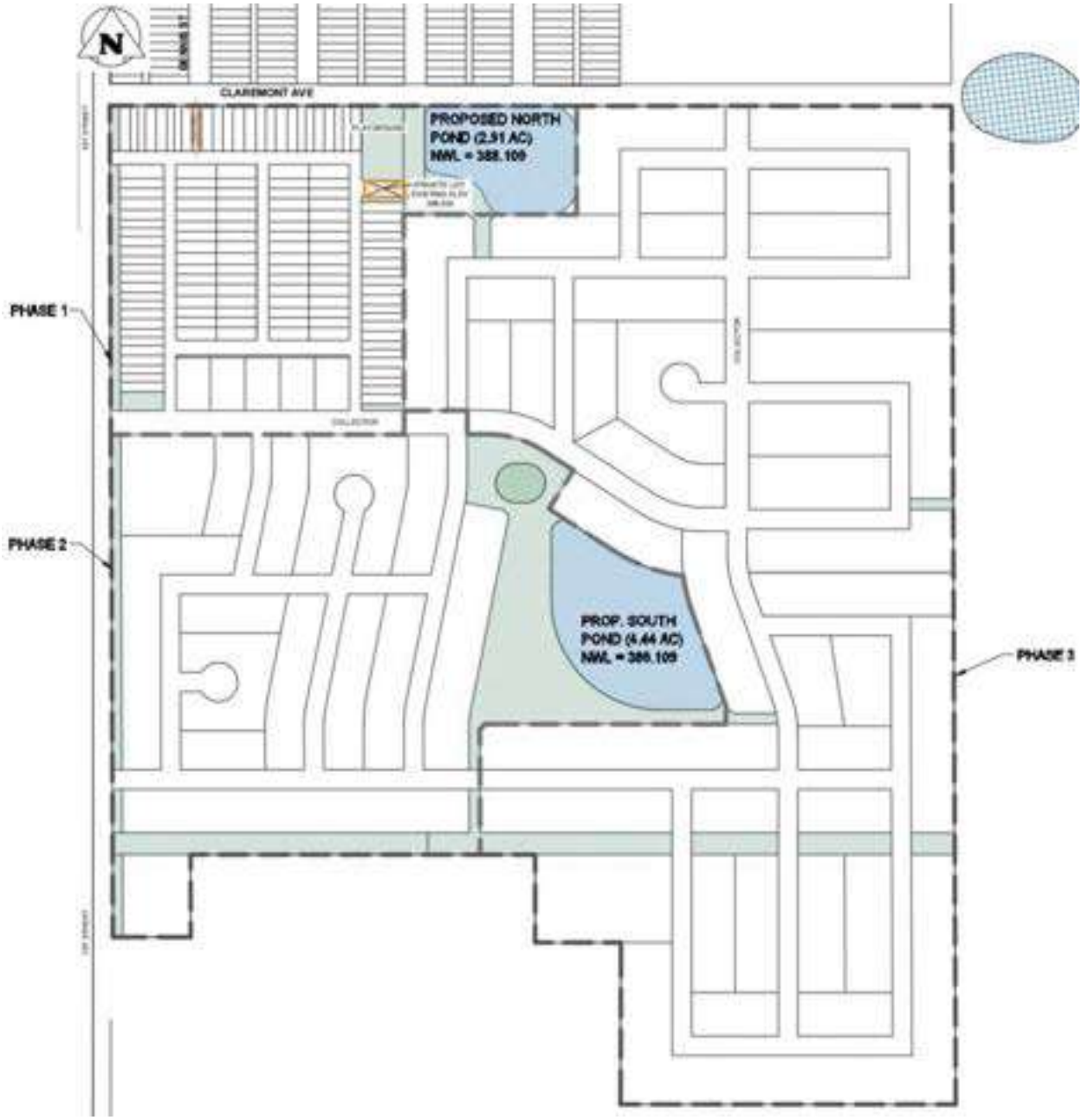

Figure 1: Development Overview

2.0 SITE GRADING

Site grading will typically be governed by minimum cover required for the wastewater sewer network. A preliminary grading plan can be found in Figure 4, highlighting key elevations at intersections.

The lots along the east edge of the development are higher than the existing ground. Along the southeast corner walkout basements will likely be used to accommodate the change in grade going out towards the Nature Conservancy of Canada Lands. In the northeast corner, the boundary may be built up to design grade to allow for future development of the area.

2.1 Roads

Maryland Ave will extend into this development as the primary collector road, all collector roads will have a 22.0 meter right of way, including 1.5 m sidewalks, 1.25 m bike lanes, and 3.5 m vehicle travel lanes in both directions.

The private roads within the condo development will have 11.0, 12.5 and 13.7 meter right of ways, all including a 1.5 m sidewalk on one side and two 3.5 m vehicle travel lanes, parking lanes will be included along higher density housing rows.

The local streets within the development will have 18.0 meter right of ways, including 1.5 m sidewalks and 3.5 m vehicle travel lanes in both directions, dedicated 1.25 m bike lanes will be included along some roadways.

Cross sections will include crowned roadways with curb and gutter drainage inlets to catch basins that connect to the land drainage network. Typical cross fall will be 2%, with 180 mm reveal barrier curbs along properties and lip curbs along driveways. Hydrants will be located along the same side of the road as sidewalks and will be behind the sidewalks, at least 1.5 m off back of curb.

3.0 WATER

3.1 Design Assumptions

KGS Group designed VBJ subdivision's water distribution system using EPANET version 2.2, which is a free software created by the United States Environmental Protection Agency. We used the following assumptions and criteria in our design:

- A Hazen-Williams coefficient of friction ("C" value) of 120 for water mains with diameters of 200 mm or smaller, and 130 for diameters larger than 200 mm, as per City of Winnipeg specifications.
- An average daily residential water demand of 250 L/capita/day, as per City of Brandon draft servicing specifications.
- A dwelling density of 22.4 dwellings per hectare where number of dwellings was unknown (phases 2 and 3).
- A population density of 2.7 people per dwelling, consistent with City of Brandon draft servicing specifications for detached dwellings, and compatible with the Southeast Brandon Secondary Plan Map A: "Land Use and Greenspace."
- A maximum day water demand equal to 1.7 x the average daily rate, as per City of Brandon draft servicing specifications.
- A peak hour water demand equal to 3.4 x the average daily rate, as per City of Brandon draft servicing specifications.
- Two connections to the existing City of Brandon watermain.
- Watermain elevations as per the conceptual grading plan.
- The eastern section of the watermain (east of phase 1) will not be built before the southern section of the watermain (south of phase 1).

3.2 Operational Criteria

Based on the above assumptions, the proposed water distribution system meets the following operational criteria:

- A fire flow between 55 L/s and 85 L/s during maximum day demand, as shown on Figure 5. Note that this is the maximum achievable fire flow based on the hydrant test results from December 9, 2021. Although this is consistent with pressures observed on Maryland Ave and Portola Drive from March 24, 2020, it is not appropriate for all types of buildings. The developer is responsible for adhering to *Water Supply for Public Fire Protection: A Guide to Recommended Practice in Canada* by the Fire Underwriters Survey to determine appropriate building standards based on the provided fire flow adjacent to each lot (e.g., minimum exposure distance, maximum total effective area, fire resistance of construction materials, etc.). The development may require auxiliary storage or a booster station for fire protection depending on the required fire flow of the buildings proposed.
- Minimum fire pressure of 25 psi during maximum day demand as per City of Winnipeg specifications (including 5 psi allowance for hydrant losses).

- Minimum water main pressure of 30 psi during peak hour demand as per City of Winnipeg specifications.

3.3 Calculations

The average water demand for each dwelling in the subdivision is approximately 0.008 L/s, calculated as shown below:

- Residential Demand per Dwelling = (250 L/capita/day) • (2.7 capita/dwelling) ÷ (86,400 sec/day)
  = 0.0078125 L/s/dwelling

KGS estimated the number of dwellings based on the site plan provided by SMM on Dec. 16, 2022. The total estimate for all three phases was 969 dwellings. Dwelling demand was assigned to the closest node on the watermain network.

3.4 Conclusion and Recommendations

Table 1, below, shows a summary of the mainline watermain pipe required to meet the operational criteria described in section 3.2 of this report with respect to the assumptions listed in section 3.1 of this report. As stated in section 3.2, the development may require auxiliary storage or a booster station for fire protection depending on the required fire flow of the buildings proposed. Please note that this table does not include service pipe (pipe which extends from the mainline watermain to a dwelling). Available fire flow for the development is shown by area in Figure 5.

Table 1: Water Main Length and Diameter

Pipe Size (mm)	Total Pipe Length (m)
200	1,945
250	5,645

4.0 WASTEWATER

4.1 Design Overview & Methodology

KGS Group designed a wastewater sewer (WWS) system for Phases 1, 2, and 3 of the proposed 152.5-acre subdivision in accordance with City of Brandon servicing standards. The design was developed using an Excel spreadsheet which incorporates Manning's equation to estimate the capacity of the proposed pipes. Phase 1 of the development will use gravity sewer pipes to route flows northward to tie into the City's wastewater system at Dennis St. Phases 2 and 3 will use gravity sewer pipes which route flows westward to tie into the existing First Street lift station. Spreadsheets detailing the design of the WWS for the phases are provided in Appendix A.

4.2 Criteria & Assumptions

The wastewater system was designed to satisfy the following key criteria included in the City of Brandon's servicing standards:

1.) The design flow is the peak wet weather flow.
2.) Minimum velocity of 0.61 m/s is required within pipes to provide adequate flushing velocity and prevent excessive build up of sediment.
3.) Minimum spacing between manholes shall not exceed 120 m and preferably should be 100 m or less.
4.) The minimum sewer main size is 200 mm.
5.) A minimum slope of 0.40% is required for a 200 mm pipe and 0.28% for a 250 mm pipe.

Assumptions applied during the wastewater system design include:

1.) Size of Phase 1 of proposed subdivision = 21.5 acres
2.) Size of Phases 2 and 3 of proposed subdivision = 131 acres
3.) Population per unit = 2.7 for townhouses and low-density residential areas
4.) Population per unit = 1.7 for moderate-density residential areas which are to be comprised of apartments
5.) Commercial wastewater generation rate = 16,800 L/ha/day
6.) Wastewater generation rate = 270 L/capita/day
7.) Average Dry Weather Flow = ADWF = Daily Average Wastewater Flow rate
8.) Peak Dry Weather Flow = PDWF = ADWF x Harmon's Peaking Factor
    - Harmon's Peaking Factor = $1 + (14 / (4 + (P / 1000)^{0.5}))$
    - Note: Harmon's Peaking Factor is only applied to the residential ADWF, and the commercial flow is added as a separate term:
      PDWF = $ADWF_{Residential}$ x Harmon's Peaking Factor + $ADWF_{Commercial}$
9.) Design Flow = Peak Wet Weather Flow = PWWF = Peak Dry Weather Flow + Extraneous Flow
    - Extraneous flows consist of inflow from manholes and groundwater infiltration.
10.) Extraneous Flow Rates
    - Groundwater infiltration rate = 2200 L/hectare/day

- Manhole infiltration = 12 L/min/manhole

11.) A minimum slope of 0.23% is required for a 300 mm pipe.
12.) Minimum depth to cover for pipes = 3 m
13.) Pipes were assumed to have a Manning's N-value of 0.014.

Design spreadsheets for the proposed WWS are provided in Appendix A and show the proposed pipes will have sufficient capacity to convey flows generated in the development and meet all the City of Brandon criteria.

4.3 Population & Wastewater Flow Estimate

KGS group estimated the population and wastewater generation for Phase 1 of the subdivision as well as Phases 2 and 3 using information provided by VBJ and within the Southeast Brandon Secondary Plan. These population and wastewater flow estimates are presented in Table 2.

Table 2: Wastewater Flow Estimates

Parameter	Phase 1	Phases 2 and 3
Population	464	2053
$ADWF_{Residential}$ [L/day]	125,226	554,413
$ADWF_{Commercial}$ [L/day]	N/A (No commercial areas present within this phase)	10,198
PDWF [L/day]	499,751	2,000,115
Extraneous Flow [L/day]	261,062	1,306,421
PWWF [L/day]*	760,813	3,306,536

*Note: The PWWF estimates provided in the table above are conservative since standard rates were used to estimate the number of manholes per unit area which contribute to extraneous flows. However, flows incorporated in the wastewater design spreadsheets provided in Appendix A account for the actual number of manholes comprising the proposed network.

4.4 Pipe Network Design

The proposed wastewater pipe network for Phase 1 consists of a set of 200 mm gravity sewer pipes which route flows northward and then tie into the City's wastewater system at Dennis Street, as shown in Figure 6. Note, there are no commercial areas within Phase 1, therefore sanitary flows generated by this phase of the development will be strictly from residential development. The wastewater system design for this phase of the subdivision is provided in Appendix A. The provided design spreadsheet demonstrates the proposed pipe

sizes and configuration will have adequate capacity to convey flows generated from this phase and satisfy the minimum 0.61 m/s velocity requirement.

The proposed wastewater pipe network for Phases 2 and 3 consists of a set of gravity sewer pipes ranging from 200 mm to 375 mm which route flows westward and then tie into the existing Southeast lift station on First Street, as shown in Figure 6. These pipes were sized so the design flow conveyed could be up to a maximum of 75% of that pipe's capacity. Note, there is a commercial area designated within Phases 2 and 3, therefore the total sewage flow generated by these phases is a combination of residential and non-residential flows. The wastewater system design for these phases of the subdivision is provided in Appendix A. The provided design spreadsheet demonstrates the proposed sizes have adequate capacity to convey flows generated in these phases and satisfy the minimum 0.61 m/s velocity requirement.

5.0 LAND DRAINAGE

5.1 Design Overview & Methodology

KGS Group designed a land drainage sewer (LDS) system for Phases 1, 2, and 3 of the proposed 152.5-acre subdivision in accordance with City of Brandon servicing standards using InfoWorks ICM (version 2021.7) hydraulic modelling software. Calculations using a combination of a design storm hyetograph and the Rational Method were conducted by KGS Group to determine key values to inform the design of the two proposed ponds within this system. The required storage volume of the ponds was determined using the Rational Method for the allowable outflow rate and a design storm hyetograph to estimate the storage volume required at each timestep throughout the storm event. The proposed LDS system is split into a north and south component along Maryland Ave; everything north of Maryland Ave will drain to the North Pond and everything south of Maryland Ave will drain to the South Pond. The North Pond is planned to drain through an open channel further northeast toward a proposed City of Brandon Pond that is currently being designed by others. The south pond is planned to drain to a City of Brandon trunk main to be constructed in the future which will run along the southwest end of the subdivision.

5.2 Criteria & Assumptions

The stormwater retention pond was designed to satisfy the following key criteria which are outlined in the City of Brandon Naturalized Stormwater Pond Guidelines:

1.) The outlet capacity for the 100-year return period rainfall event must be limited to the 5-year return period rainfall event's corresponding pre-development discharge rate.
2.) At least 0.3 m of freeboard between the pond level and the top of the pond must be present for the 100-year return period rainfall event.
3.) The rise of the pond water level for a 100-year return period rainfall event cannot exceed 1.5 m above the normal water level (NWL).
4.) The time to drawdown the pond level back to NWL (or near to, subject to City of Brandon approval) must be within 48 hours for the 5-year return period rainfall event and within 120 hours for the 100-year return period rainfall event.
5.) Minimum pond depth is 2 m.
6.) The minimum LDS main size is 375 mm, and the minimum catchbasin (CB) lead size is 300 mm.
    ➔ Note: KGS Group did not model CB leads at this stage of the design process. However, that work would be done during detailed design.

Key Assumptions:

1.) KGS Group sized LDS pipes to prevent flooding and allow 0.3 m of freeboard for all manholes for a 5-year return period rainfall event.
2.) IDF parameters provided by the City of Brandon were used to calculate the peak rainfall intensity, i, values required to compute pre-development runoff rates using the Rational Method.

3.) A runoff coefficient, C, of 0.100 was used for Rational Method calculations to determine the pre-development runoff rates.
4.) The 5-, 25- and 100-year design storms were used to assess and iterate the design.
5.) The post-development site was assumed to be 50% impervious and 50% pervious area, corresponding to a typical developed residential land use.
6.) Time of concentration = 10 minutes
7.) Pipes were assumed to have a Manning's N-value of 0.014.
8.) The existing groundwater elevation is assumed to be generally high in the project area.
9.) The post-development runoff rates were determined from InfoWorks model simulations rather than using the Rational Method. Model subcatchments were assigned a percentage distribution of three representative runoff surface types:
    I. Roof (represents an impervious surface with no initial loss)
    II. Road (represents an impervious surface with an initial loss)
    III. Grass (represents a pervious surface)

➔ The breakdown for most subcatchments (except the two subcatchments containing the ponds and one subcatchment containing a commercial area) was 15% roof, 35% road, and 50% grass. This breakdown is typical for residential areas.

➔ Key properties assigned to these runoff surface types are provided in Table 3 below.

➔ Table 3: Properties of InfoWorks Runoff Surfaces Applied to LDS Model Subcatchments

Runoff surface ID	Description	Runoff routing value	Runoff volume type	Surface type	Ground slope (m/m)	Initial loss value (m)	Routing Model
300	Roof Runoff	0.015	Fixed	Impervious	0.01	0.000	SWMM
301	Road Runoff	0.015	Fixed	Impervious	0.01	0.002	SWMM
302	Grass	0.250	Horton	Pervious	0.01	0.005	SWMM

5.3 Internal Storage Retention Pond Design

For the north subdivision LDS sub-catchment area, KGS Group proposes a 1.18 Ha (2.91 acre) internal storage retention pond to be incorporated to provide additional storage of approximately 11,000 m^3 during rainfall events. This pond will be situated to the east of Phase 1 and will have its base set at 386.00 m, assumed ground level at 391.00 m, with 5:1 side slopes. Note, a normal water level of 388.109 m was assumed for this pond, which meets the minimum 2 m depth requirement noted in the guidelines. KGS Group recommends a pond outlet pipe size of 450 mm to facilitate timely drawdown and ensure the post-development runoff rate for the 100-year event meets design guidelines. KGS Group computed pre-development runoff rates using the Rational Method and IDF parameters provided by the City of Brandon. The post-development runoff rates were obtained from InfoWorks model results. These rates are presented in Table 4. Note, the pond

outlet pipe will convey flow to a downstream channel assumed to have a trapezoidal cross section with a 1 m base and 4:1 side slopes. This channel will convey flow toward a City of Brandon pond to be constructed in the future that is currently being designed by others.

Table 4: North Pond Runoff Rates & Simulation Results

Parameter	Value
5-year Pre-development Runoff Rate (m^3/s)	0.72
5-year Post-development Runoff Rate (m^3/s)	0.31
100-year Pre-development Runoff Rate (m^3/s)	1.42
100-year Post-development Runoff Rate (m^3/s)	0.60
100-year Maximum Rise above NWL (m)	1.47
100-year High Water Level (m)	389.58
100-year Freeboard (m)	1.42

Table 4 shows the north pond meets the outlet criteria since the 100-year event post-development runoff rate of 0.60 m^3/s is less than the 5-year event pre-development runoff rate of 0.72 m^3/s. InfoWorks model results indicate the pond exhibits necessary drawdown for the 5-year and 100-year rainfall events during the time periods specified in the criteria. Additionally, model results confirm the pond rise does not exceed 1.5 m above the NWL, and there is more than 0.3 m of freeboard available for the 100-year event.

For the south subdivision LDS component, KGS Group proposes a 1.80 Ha (4.44 acre) internal storage retention pond to be incorporated to provide additional storage of approximately 19,000 m^3 during rainfall events. This pond will be situated within the Phases 2 and 3 region and will have its base set at 386.00 m, assumed ground level at 391.00 m, and feature 5:1 side slopes. Note, a normal water level of 388.109 m was assumed for this pond, which would meet the minimum 2 m depth requirement noted in the guidelines. KGS Group recommends a pond outlet pipe size of 750 mm to facilitate timely drawdown and ensure the post-development runoff rate for the 100-year event meets design guidelines. KGS Group computed pre-development runoff rates using the Rational Method and IDF parameters provided by the City of Brandon. The post-development runoff rates were obtained from InfoWorks model results. These rates are presented in Table 5. Note, the pond outlet pipe will then convey flow toward a City of Brandon trunk main to be constructed in the future which will run along the southwest end of the subdivision.

Table 5: South Pond Runoff Rates & Simulation Results

Parameter	Value
5-year Pre-development Runoff Rate (m^3/s)	1.11
5-year Post-development Runoff Rate (m^3/s)	0.36
100-year Pre-development Runoff Rate (m^3/s)	2.18
100-year Post-development Runoff Rate (m^3/s)	0.66
100-year Maximum Rise above NWL (m)	1.52*
100-year High Water Level (m)	389.63
100-year Freeboard (m)	1.37

*Note: Model results show the south pond exceed the maximum allowable 1.5 m rise above NWL for the 100-year event by 0.02 m. However, KGS Group considers these 2 cm to be within the acceptable model margin of error. Therefore, the criterion is considered met.

Table 5 shows the south pond meets the outlet criteria since the 100-year event post-development runoff rate of 0.66 m^3/s is less than the 5-year event pre-development runoff rate of 1.11 m^3/s. InfoWorks model results indicate the pond exhibits necessary drawdown for the 5-year and 100-year rainfall events during the time periods specified in the criteria. Additionally, model results confirm there is more than 0.3 m of freeboard available for the 100-year event.

5.4 Pipe Network Design

The LDS pipes were designed and sized using a hydraulic model developed in InfoWorks. Subcatchments were delineated to define and generate runoff, and design storms were applied to simulate system performance. The proposed sizes of pipes comprising the LDS were determined through multiple model iterations and range from 450 mm to 1200 mm, as indicated in Figure 7. These pipes were sized to ensure 0.3 m of freeboard to the ground surface would be provided during a 5-year return period design storm.

APPENDIX A

Wastewater Calculations

PHASE 1 - Sanitary Sewer Design Spreadsheet

	CALCULATE DESIGN FLOW - Based on municipality guidelines																PROPOSED SEWER PIPE - Based on municipality guidelines							
			*Assumed a breakdown of units to contribute flows to each pipe segment		*Used rate of 2.7 persons/unit for low density units and 1.7 persons/unit for moderate density units			*Used rate of 270 L/capita/day and multiplied by Harmon's Peaking Factor	*Assumed a breakdown of percentage of total Phase 1 area which contributes flows to each pipe segment			*Used rate of 2200 L/ha/day	*Used rate of 12 L/min/manhole				*Minimum pipe size required is 200 mm				*Assumed n-value of 0.014	*Minimum 0.61 m/s required
	From MH	To MH	No. of Low Density Residential Units	No. of Moderate Density Residential Units	Incremental Population	Cummulative Population	Harmon's Peaking Factor	Cumulative Peak Residential Sewage Flow (L/day)	Percentage of Total Area	Incremental Area (ha)	Cumulative Area (ha)	Ground Water Infiltration (L/day)	Manhole Inflow (L/day)	Cumulative Manhole Inflow (L/day)	Total Extraneous Flow (L/day)	Design Q peak (L/s)	Design Q peak (m3/s)	L (m)	S (m/m)	S (m/100m)	D (mm)	A (m2)	P (m)	Capacity Q (L/s)	Full Flow Velocity (m/s)
No upstream flows to pick up	1	2	6	0	16.2	16.2	4.39	19211	2.50	0.22	0.22	479	17280	17280	17759	0.43	0.00043	52.859	0.004	0.4	200	0.031	0.628	19.26	0.613
No upstream flows to pick up	5	2	2	30	56.4	56.4	4.30	65539	4.50	0.39	0.39	861	17280	17280	18141	0.97	0.00097	87.072	0.004	0.4	200	0.031	0.628	19.26	0.613
No upstream flows to pick up	8	9	6	0	16.2	16.2	4.39	19211	2.50	0.22	0.22	479	17280	17280	17759	0.43	0.00043	52.859	0.004	0.4	200	0.031	0.628	19.26	0.613
No upstream flows to pick up	5	9	2	30	56.4	56.4	4.30	65539	4.50	0.39	0.39	861	17280	17280	18141	0.97	0.00097	85.709	0.004	0.4	200	0.031	0.628	19.26	0.613
*Picks up flows from two pipes	2	3	12	0	32.4	105	4.24	120139	7.00	0.61	1.22	2680	17280	51840	54520	2.02	0.00202	65.824	0.004	0.4	200	0.031	0.628	19.26	0.613
	3	4	19	0	51.3	156.3	4.19	176619	14.00	1.22	2.44	5360	17280	69120	74480	2.91	0.00291	108.015	0.004	0.4	200	0.031	0.628	19.26	0.613
No upstream flows to pick up	5	6	12	0	32.4	32.4	4.35	38048	7.00	0.61	0.61	1340	17280	17280	18620	0.66	0.00066	66.254	0.004	0.4	200	0.031	0.628	19.26	0.613
	6	7	18	0	48.6	81	4.27	93330	14.00	1.22	1.83	4020	17280	34560	38580	1.53	0.00153	107.586	0.004	0.4	200	0.031	0.628	19.26	0.613
*Picks up flows from two pipes	9	10	12	0	32.4	105	4.24	120139	7.00	0.61	1.22	2680	17280	51840	54520	2.02	0.00202	66.162	0.004	0.4	200	0.031	0.628	19.26	0.613
	10	11	18	0	48.6	153.6	4.19	173671	14.00	1.22	2.44	5360	17280	69120	74480	2.87	0.00287	107.677	0.004	0.4	200	0.031	0.628	19.26	0.613
	11	7	15	0	40.5	194.1	4.15	217633	10.25	0.89	3.33	7322	17280	86400	93722	3.60	0.00360	85.709	0.004	0.4	200	0.031	0.628	19.26	0.613
*Picks up flows from two pipes	7	12	7	0	18.9	294	4.08	324045	8.25	0.72	5.87	12921	17280	138240	151161	5.50	0.00550	61.437	0.004	0.4	200	0.031	0.628	19.26	0.613
	4	12	5	0	13.5	169.8	4.17	191321	4.50	0.39	2.83	6221	17280	86400	92621	3.29	0.00329	24.272	0.004	0.4	200	0.031	0.628	19.26	0.613
*Picks up flows from two pipes	12	13	0	0	0	463.8	3.99	499751	N/A	0.00	8.70	19142	17280	241920	261062	8.81	0.00881	51.972	0.004	0.4	200	0.031	0.628	19.26	0.613
	13	14	0	0	0	463.8	3.99	499751	N/A	0.00	8.70	19142	17280	259200	278342	9.01	0.00901	4.917	0.004	0.4	200	0.031	0.628	19.26	0.613
	14	15	0	0	0	463.8	3.99	499751	N/A	0.00	8.70	19142	17280	276480	295622	9.21	0.00921	116.961	0.004	0.4	200	0.031	0.628	19.26	0.613

*For non-shaded cells, computed incremental area based on percentage of total area

***For the last three pipe segments, assumed the GW infiltration is zero because these pipes act like a main rather than a collector (not intended to pick up servicing connections which would result in GW infiltration)

PHASE 2 & 3 - Sanitary Sewer Design Spreadsheet

PHASE 2 & 3 SOUTHEAST

	CALCULATE DESIGN FLOW - Based on municipality guidelines																PROPOSED SEWER PIPE - Based on municipality guidelines							
				*Used rate of 2.7 persons/unit			*Used rate of 270 L/capita/day and multiplied by Harmon's Peaking Factor	*Used rate of 28,100 L/ha/day			*Used rate of 2200 L/ha/day		*Used rate of 12 L/min/manhole							*Minimum pipe size required is 200 mm		*Assumed n-value of 0.014	*Minimum 0.61 m/s required
	From MH	To MH	No. of Residential Units	Incremental Population	Cummulative Population	Harmon's Peaking Factor	Cumulative Peak Residential Sewage Flow (L/day)	Peak Commerical Sewage Flow (L/day)	Incremental Area (ha)	Cumulative Area (ha)	Ground Water Infiltration (L/day)	# of Manholes	Manhole Inflow (L/day)	Cumulative Manhole Inflow (L/day)	Total Extraneous Flow (L/day)	Design Q peak (L/s)	Design Q peak (m^3/s)	L (m)	S (m/m)	S (m/100m)	D (mm)	A (m^2)	P (m)	Capacity Q (L/s)	Velocity (m/s)
SECTION H	18	269	42.8	116	116	4.23	131804	0	2.68	2.68	5896	3	51840	51840	57736	2.19	0.00219	150.00	0.004	0.40	200	0.031	0.628	19.26	0.613
SECTION G	269	21	67.0	181	296	4.08	326520	0	3.72	6.40	14080	4	69120	120960	135040	5.34	0.00534	98.78	0.004	0.40	200	0.031	0.628	19.26	0.613
SECTION F	21	23	32.9	89	385	4.03	419183	0	1.96	8.36	18392	3	51840	172800	191192	7.06	0.00706	142.20	0.004	0.40	200	0.031	0.628	19.26	0.613
SECTION E	23	80	16.4	44	429	4.01	464610	0	1.50	9.86	21692	2	34560	207360	229052	8.03	0.00803	61.39	0.004	0.40	200	0.031	0.628	19.26	0.613
SECTIONS B, C, D	80	25	220.9	596	1026	3.79	1050432	0	12.30	22.16	48752	14	241920	449280	498032	17.92	0.01792	28.11	0.003	0.30	250	0.049	0.785	30.25	0.616
SECTION A	25	28	41.7	112	1138	3.76	1156469	0	2.65	24.81	54582	2	34560	483840	538422	19.62	0.01962	92.18	0.0023	0.23	300	0.071	0.942	43.06	0.609
		Sum:	**422**	**1138**				**Sum:**	**24.81**		**Sum:**	**28**													

REST OF PHASE 2 & 3

	CALCULATE DESIGN FLOW - Based on municipality guidelines																PROPOSED SEWER PIPE - Based on municipality guidelines							
				*Used rate of 2.7 persons/unit			*Used rate of 270 L/capita/day and multiplied by Harmon's Peaking Factor	*Used rate of 28,100 L/ha/day			*Used rate of 2200 L/ha/day		*Used rate of 12 L/min/manhole							*Minimum pipe size required is 200 mm		*Assumed n-value of 0.014	*Minimum 0.61 m/s required
	From MH	To MH	No. of Residential Units	Incremental Population	Cummulative Population	Harmon's Peaking Factor	Cumulative Peak Residential Sewage Flow (L/day)	Peak Commerical Sewage Flow (L/day)	Incremental Area (ha)	Cumulative Area (ha)	Ground Water Infiltration (L/day)	# of Manholes	Manhole Inflow (L/day)	Cumulative Manhole Inflow (L/day)	Total Extraneous Flow (L/day)	Design Q peak (L/s)	Design Q peak (m^3/s)	L (m)	S (m/m)	S (m/100m)	D (mm)	A (m^2)	P (m)	Capacity Q (L/s)	Velocity (m/s)
	19	17	28.7	77	77	4.27	89301	0	1.74	1.74	3828	3	51840	51840	55668	1.68	0.00168	150.00	0.004	0.40	200	0.031	0.628	19.26	0.613
	17	61	19.5	53	130	4.21	147827	0	1.03	2.77	6094	1	17280	69120	75214	2.58	0.00258	98.78	0.004	0.40	200	0.031	0.628	19.26	0.613
	61	60	25.1	68	198	4.15	221591	0	1.46	4.23	9306	1	17280	86400	95706	3.67	0.00367	142.20	0.004	0.40	200	0.031	0.628	19.26	0.613
	60	53	23.5	64	261	4.10	289471	0	1.46	5.69	12518	2	34560	120960	133478	4.90	0.00490	61.39	0.004	0.40	200	0.031	0.628	19.26	0.613
	53	51	19.9	54	315	4.07	346203	0	1.13	6.82	15004	1	17280	138240	153244	5.78	0.00578	28.11	0.004	0.40	200	0.031	0.628	19.26	0.613
	51	49	51.7	140	455	4.00	490585	0	3.47	10.29	22638	5	86400	224640	247278	8.54	0.00854	92.18	0.004	0.40	200	0.031	0.628	19.26	0.613
	49	28	36.5	99	553	3.95	590365	0	2.20	12.49	27478	3	51840	276480	303958	10.35	0.01035	96.28	0.003	0.30	250	0.049	0.785	30.25	0.616
ADDS SOUTHEAST	28	29	450.2	1216	1769	3.63	1732220	0	26.79	39.28	86416	28	483840	760320	846736	29.85	0.02985	58.29	0.0023	0.23	300	0.071	0.942	43.06	0.609
	29	31	47.9	129	1898	3.60	1846987	0	2.89	42.17	92774	4	69120	829440	922214	32.05	0.03205	246.20	0.0017	0.17	375	0.110	1.178	67.13	0.608
	31	32	72.1	195	2093	3.57	2017828	17141	4.95	47.12	103664	8	138240	967680	1071344	35.95	0.03595	94.02	0.0017	0.17	375	0.110	1.178	67.13	0.608
	32	34	0.0	0	2093	3.57	2017828	0	0.39	47.51	104522	3	51840	1019520	1124042	36.36	0.03636	131.43	0.0017	0.17	375	0.110	1.178	67.13	0.608
	34	Entrance to Lift Station	0	0	2093	3.57	2017828	0	0.00	47.51	104522	0	0	1019520	1124042	36.36	0.03636	0.00	0.0017	0.17	375	0.110	1.178	67.13	0.608
		Sum:	**775**	**2093**				**Sum:**	**47.51**		**Sum:**	**59**													

APPENDIX B

Drawing Figures

11x17

N

DENNIS ST

CLAREMONT AVE

CORNWALLIS BAY

1ST STREET

CORNELL BAY

MARYLAND AVE

PHASE 1

PHASE 2

PHASE 3

PROPOSED NORTH POND (2.91 AC) NWL = 388.109

PROP. SOUTH POND (4.44 AC) NWL = 388.109

PLAYGROUND

PRIVATE LOT EXISTING ELEV 388.000

COLLECTOR

COLLECTOR

1ST STREET

389.000 389.000 388.500 389.500 393.000 393.500 392.000 391.000 388.500 389.000 389.500 389.500 389.500 389.000 388.500 389.500 389.000 388.500

390.784 390.804 391.109 391.012 391.257 390.284 393.551 393.947 394.250 394.317 391.541 391.688 392.031 392.515 392.908 393.151 393.568 393.868 394.162 391.804 391.953 392.296 392.820 392.228 393.310 393.109 393.403 393.708 392.014 392.507 392.000 392.215 391.984 391.200 391.944 392.191 392.105 391.808 391.659 391.691 392.871 392.642 392.938 393.243 391.192 391.410 391.341 391.544 392.446 392.636 390.792 390.985 390.863 391.050 391.905 392.388 391.923 390.650 390.532 390.631 390.933 390.976 391.294 391.477 391.651 392.070 391.120 390.955 391.500 389.781 391.000 391.715 391.990 392.404 392.084 392.315 392.735 392.398 392.633 393.051

0 40.0 80.0 120.0 160.0m

SCALE: 1:2000m (24"x36")
1:4000m (11"x17")

NO.	YY/MM/DD	DESCRIPTION	BY
B	22/12/21	ISSUED FOR REVIEW	KMM
A	22/11/15	ISSUED FOR REVIEW	KMM

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VBJ DEVELOPMENTS LTD.

MARYLAND & 1ST STREET
DEVELOPMENT
SOUTH EAST BRANDON

DEVELOPMENT OVERVIEW
SITE GRADING
PLAN VIEW

NOVEMBER 2022 | FIGURE 4 | REV: A

FileName: U:\PMS\21-2210-00321-2210-003_DESIGN.dwg - Tab: F04 Plotted By: KMoist 22/12/23 [Fri 10:07am]
11"x17" PLOT SCALE: 1:2

11x17

DENNIS ST

CLAREMONT AVE

PHASE 1

PHASE 2

PHASE 3

CONNECTION TO EXISTING
250 WM ON 1ST ST

CONNECTION TO EXISTING
250 WM ON 1ST ST

0 40.0 80.0 120.0 160.0m

SCALE: 1:2000m (24"x36")
1:4000m (11"x17")

NO.	YY/MM/DD	DESCRIPTION	BY
B	22/12/21	ISSUED FOR REVIEW	KMM
A	22/11/15	ISSUED FOR REVIEW	KMM

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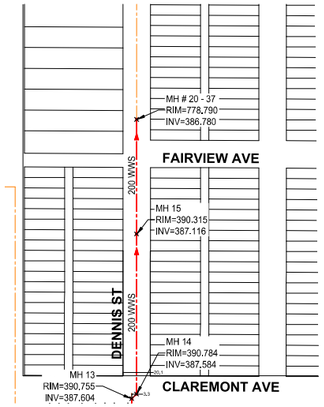
DEVELOPMENT
SOUTH EAST BRANDON

DEVELOPMENT OVERVIEW
WATER MAIN
PLAN VIEW

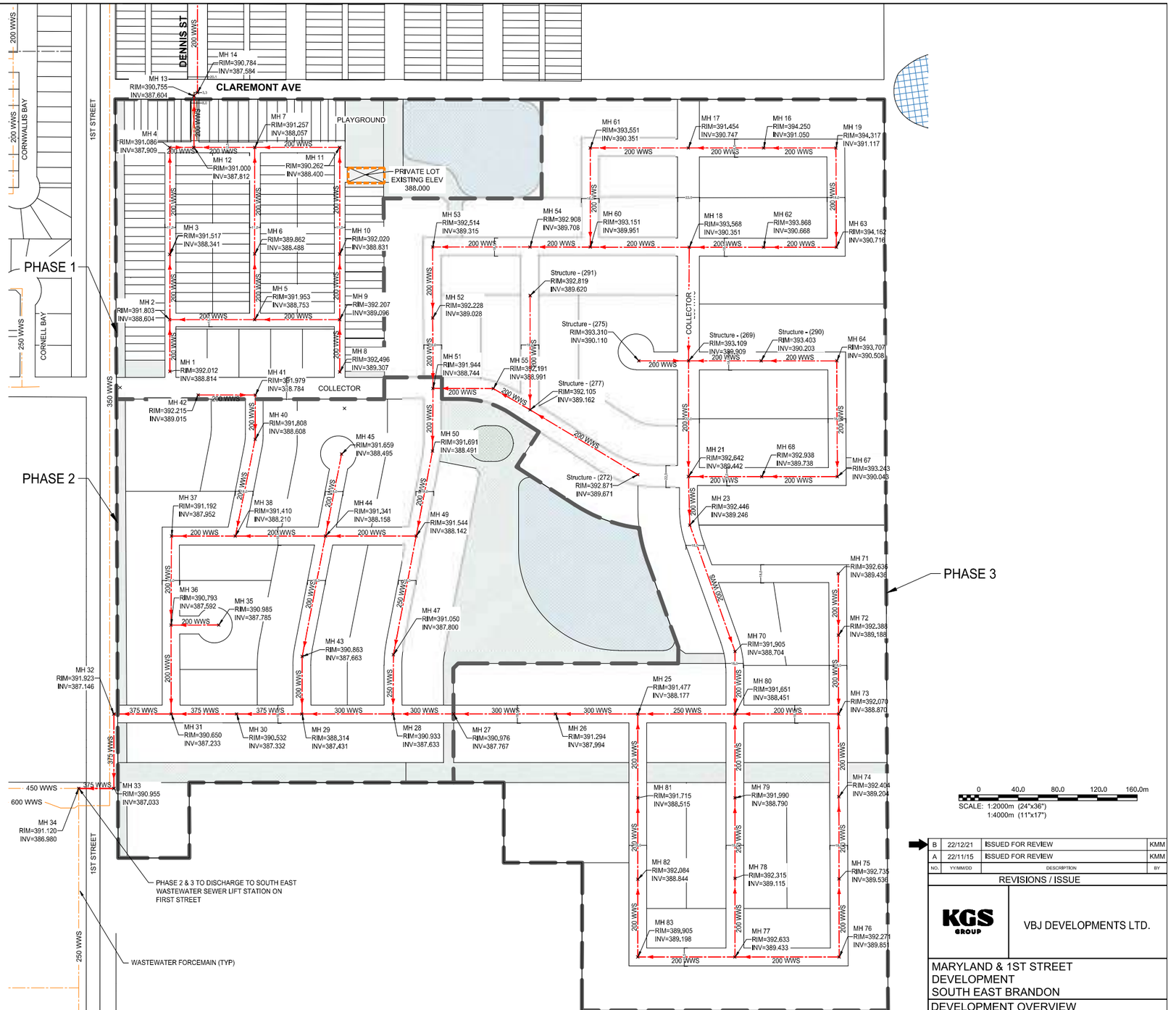
NOVEMBER 2022 | FIGURE 5 | REV: A

FileName: U:\FMS\21-22\10-00321-2210-003_DESIGN.dwg - Tab: F05 Plotted By: KMost 22/12/23 [Fri 10:08am]
11"x17" PLOT SCALE: 1:2

11x17



DENNIS ST CONNECTION



0 40.0 80.0 120.0 160.0m

SCALE: 1:2000m (24"x36")
1:4000m (11"x17")

NO.	YY/MM/DD	DESCRIPTION	BY
B	22/12/21	ISSUED FOR REVIEW	KMM
A	22/11/15	ISSUED FOR REVIEW	KMM

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MARYLAND & 1ST STREET
DEVELOPMENT
SOUTH EAST BRANDON

DEVELOPMENT OVERVIEW
WASTEWATER SEWER
PLAN VIEW

NOVEMBER 2022 | FIGURE 6 | REV: A

FileName: U:\FMS\21-2210-00\21-2210-003_DESIGN.dwg - Tab: F06 Plotted By: KMoist 22/12/23 [Fri 10:08am]
11"x17" PLOT SCALE: 1:2

11x17

N

PHASE 1

PHASE 2

PHASE 3

PROP. NORTH POND (2.91 AC) NWL = 388.109

PROP. SOUTH POND (4.44 AC) NWL = 388.109

FUTURE LDS SEWER (BY OTHERS)

FUTURE DETENTION POND (BY OTHERS)

FUTURE LDS TRUNK SEWER (BY OTHERS)

POND TO DISCHARGE TO CITY TRUNK MAIN (BY OTHERS)

MH 4 MH 7 MH 12 MH 3 MH 6 MH 11 MH 5 MH 10 MH 2 MH 8 MH 9 MH 30 MH 31 MH 35 MH 38 MH 32 MH 43 MH 36 MH 39 MH 33 MH 40 MH 42 MH 41 MH 46 MH 50 MH 44 MH 48 MH 49 MH 45 MH 72 MH 70 MH 71 MH 29 MH 83 MH 14 MH 15 MH 28 MH 26 MH 27 MH 25 MH 24 MH 22 MH 23 MH 13 MH 82 MH 31 MH 77 MH 75 MH 76 MH 51 MH 20 MH 74 MH 52 MH 54 MH 53 MH 56 MH 78 MH 79 MH 81 MH 80 MH 62 MH 63 MH 61 MH 60 MH 57 MH 58 MH 59

600 LDS 750 LDS 900 LDS 1200 LDS

0 40.0 80.0 120.0 160.0m

SCALE: 1:2000m (24"x36")
1:4000m (11"x17")

NO.	YY/MM/DD	DESCRIPTION	BY
B	22/12/21	ISSUED FOR REVIEW	KMM
A	22/11/15	ISSUED FOR REVIEW	KMM

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MARYLAND & 1ST STREET
DEVELOPMENT
SOUTH EAST BRANDON

DEVELOPMENT OVERVIEW
STORM SEWER
PLAN VIEW

NOVEMBER 2022 | FIGURE 7 | REV: A

FileName: U:\FMS\21-2210-003\21-2210-003_DESIGN.dwg - Tab: F07 Plotted By: KMoist 22/12/23 [Fri 10:08am]
11"x17" PLOT SCALE: 1:2

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