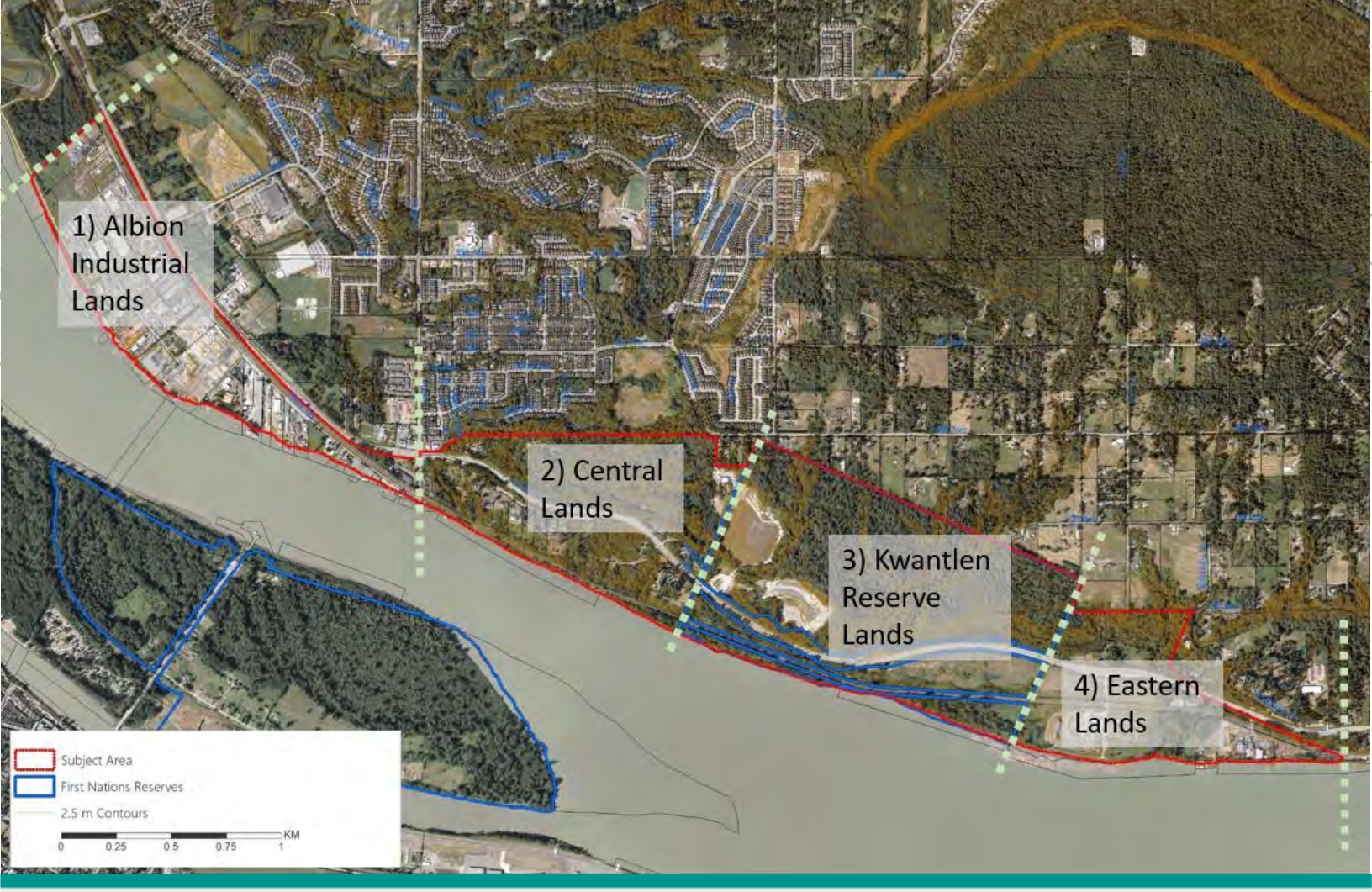

Bring to Market Industrial Land Study

April 23, 2025

Submitted to City of Maple Ridge, Kwantlen First Nation, and Metro Vancouver

Prepared by McElhanney

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Our file: 2111-06526-00

McElhanney

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Land Acknowledgement

McElhanney's project team respectfully acknowledges and respects that the City of Maple Ridge is situated on the traditional territories of the Katzie (q̓i̓c̓əy̓) First Nation and Kwantlen (qʼʷaːn̓ƛʼən̓) First Nation. We are grateful for their stewardship of these lands since time out of mind.

Our File: 2111-06256-00

April 23, 2025

City of Maple Ridge
Economic Development
11995 Haney Place Maple Ridge, BC, V2X 6A9

Attention: Eric Aderneck, Industrial Lands Program Manager, City of Maple Ridge

Bring to Market Industrial Land Study

The City of Maple Ridge (the City) is taking proactive steps to study and enhance the long-term supply of industrial lands in the community and to guide decisions related to servicing, phasing, and optimal use of the subject lands (*Figure 1*). This project involves three organizations – Kwantlen First Nation, the City of Maple Ridge, and Metro Vancouver (the Client Group). To determine a focus for investment and development efforts, this *Bring to Market Industrial Land Study* evaluates the planning, servicing, economic, and market considerations to understand what actions can be taken to facilitate and attract industrial users to sites in the study area. Retaining industrial land, which is in limited supply relative to other types of land in the region and attracting industry and jobs aligns with the City's and region's long-term vision for economic growth and sustainable development. This study entailed:

- Seven meetings with the Bring to Market Client Group
- Review of current uses and servicing of sites in the study area
- Site visit and on-site tours and discussions with industrial businesses
- Mapping and constraint analysis of the study area and potential development sites
- Discussion and collaboration to produce a short list of future industrial uses for sub-areas
- High-level servicing analysis and cost estimates
- Industrial market research and interviews
- Development financial analysis
- Formulating recommendations

The study outlines ways to accommodate industrial uses through development, redevelopment, and densification in the short term along with a plan for achieving fully serviced uses over time.

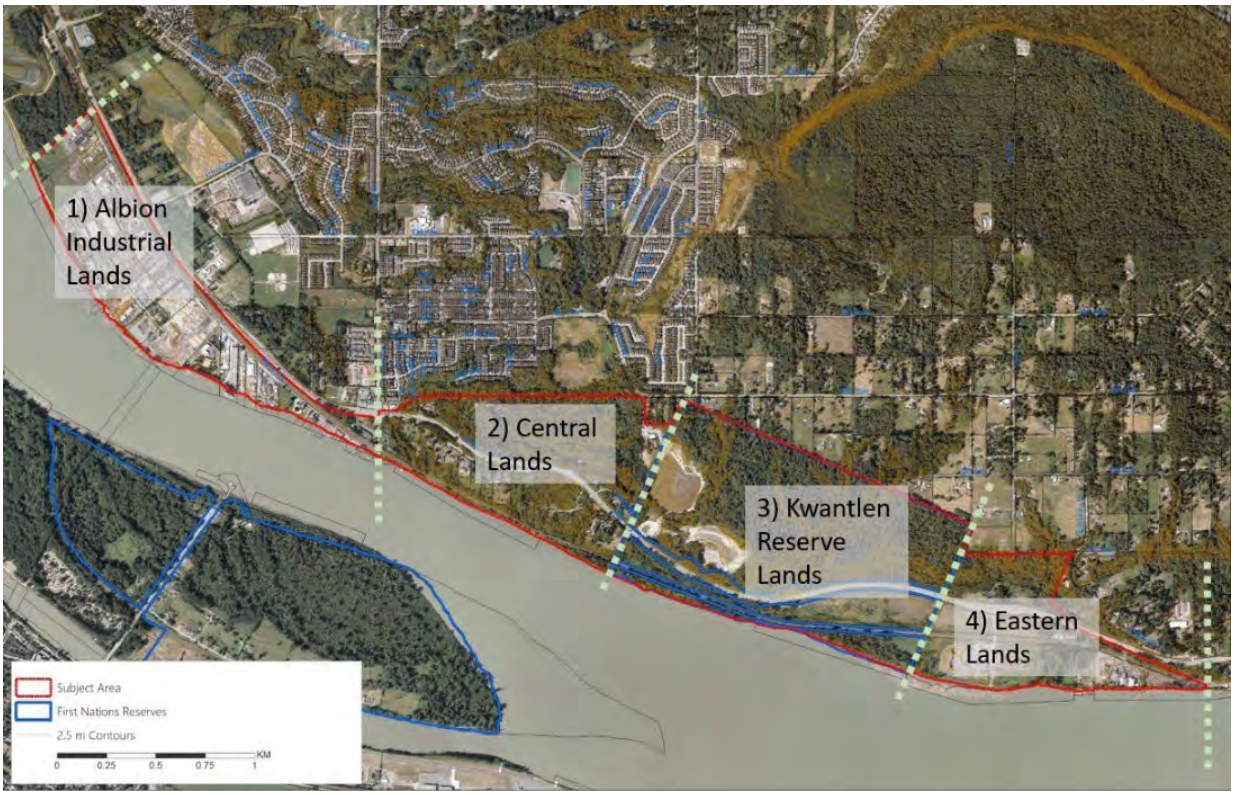

Figure 1: The subject sites are grouped into 4 sub-areas, with each sub-area containing a number of smaller sites. Image supplied by City of Maple Ridge.

The attached report identifies land use directions and servicing investments and actions that the Client Group can take to strategically position the industrial lands. The findings can assist the Client Group to make informed decisions about capital efficient industrial land development.

The recommendations in this report are supplemented by two technical memos on servicing prepared by McElhanney (see *Appendices C* and *D*), and industrial market research and interviews, as well as development financial analysis, prepared by Mulholland Parker Land Economists.

Sincerely,
McElhanney Ltd.

Prepared by:

Colton Kirsop, Senior Planner and Division Manager
ckirsop@mcelhanney.com
778-554-0590

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1. Introduction

The City of Maple Ridge (the City), Metro Vancouver, and the Kwantlen First Nation (KFN) have been working together, along with other interested parties, to identify mutually beneficial industrial lands development opportunities that could result in enhanced economic development in Maple Ridge and on KFN land at I.R.#5 (IR5). This report will refer to the three partners – the City, Metro Vancouver, and KFN – collectively as the Client Group.

McElhanney Ltd (McElhanney) was retained by the Client Group to prepare a Bring to Market Industrial Land Study for a number of sites located along the Fraser River, located within the City or in the Kwantlen First Nation I.R.#5. Mulholland Parker Land Economists (MPLE) provided industrial market research and interviews and development financial analysis which can be found in *Section 9* of this report.

The subject sites are approximately between 232 Street and 261 Street, south of Lougheed Highway (Highway 7) and extending to the Fraser River. The overall study area is 355 hectares (877 acres), and the potential development sites have a total area of approximately 119 hectares (294 acres), noting that the net developable area of these sites will be much less when accounting for internal roads, utility right of ways and development setbacks. More specifically, the study area includes the *Albion Industrial Lands* (Areas 1A, 1B, and 2), the *Central Lands* (Areas 3 and 4), the *Kwantlen Reserve Lands* (Areas 5A, 5B, 5C, 5D, and 6A), and the *Eastern Lands* (Areas 6B, 6C, and 7). These study area sites of interest are shown in *Figure 2* and can also be found in *Appendix A* – Maps.

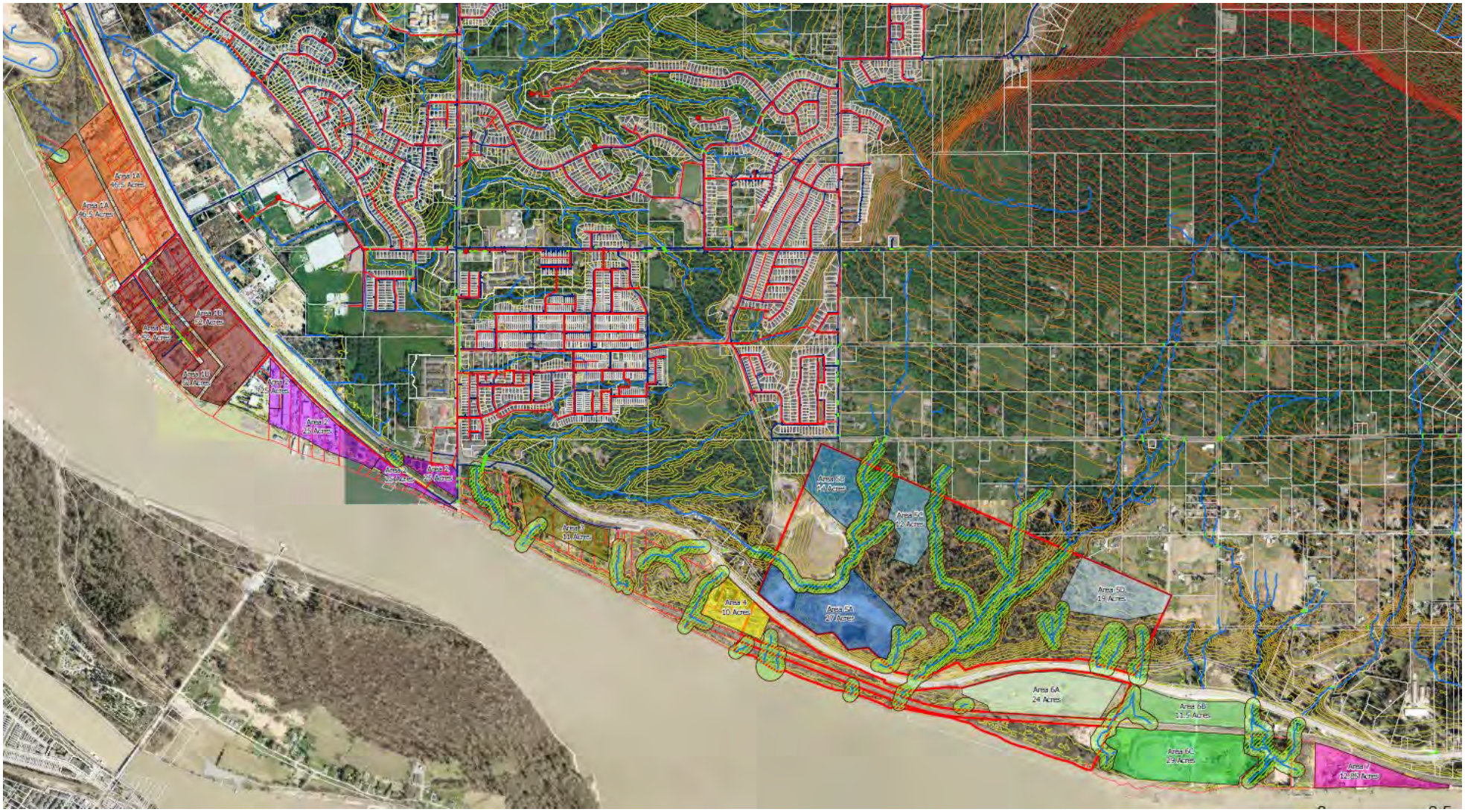


Figure 2: Study Area Sites Overview – Larger map in Appendix A

2. Executive Summary

Maple Ridge is one of the fastest growing municipalities in Metro Vancouver; however, much of that growth has been residential, while industrial development and job growth has lagged. Within Maple Ridge, there are limited developable industrial areas; lands that do exist have notable challenges, including infrastructure servicing, transportation access, environmental features, etc. Furthermore, potential industrial areas are limited by competing land uses such as ALR, commercial, residential, or environmental, or are not located close to transportation corridors or logistics hubs.

For many years, industrial activity within Metro Vancouver has shifted away from the central municipalities of Vancouver and the North Shore towards outlying areas such as Maple Ridge, Pitt Meadows, and Surrey. Increased demand for industrial space in Surrey caused increased rents and decreased vacancy, leading to increased demand in Langley, and so on. A wave of industrial demand and supply shortage therefore spread eastward and has reached Pitt Meadows and Maple Ridge.

The Hammond industrial area at the foot of the Golden Ears Bridge, south of the Lougheed Highway, is nearly at capacity and has evolved into a full-service area built to an urban standard. With this level of completion attained, new industrial areas are needed to ensure Maple Ridge can capture additional industrial market share and support the continued growth of the region's economy and workforce. Industrial growth in Maple Ridge and on KFN lands contributes to the prosperity of the local community, Metro Vancouver region and beyond.

The process for this project entailed the following key activities:

- Project kick off meeting held on November 25, 2024, with the Client Group.
- Site tour and onsite interviews with local industries held on December 13, 2024.
- Seven Client Group progress meetings (on-line and in-person format) were held to review study progress and provide updates five times over the course of the study.
- Identified the site gross areas based on desktop analysis informed by topographic and fixed infrastructure constraints and riparian setbacks, further investigations are required to verify net development areas, see maps in *Appendix A*.
- Created draft development scenarios for distribution and discussion with the Client Group, which were refined through collaboration, see Appendix B, prior to being distilled to a short list of the most realistic future uses, see *Section 7* and *Appendix B*.
- Servicing analysis explored the potential for independent water and sanitary servicing, through groundwater supply and developing an independent sanitary treatment system (see *Appendix C and D*) and provided a high-level opinion on the potential costs.
- Servicing analysis explored the potential for extending sanitary and water supply to the study area site and provided a high-level opinion on the potential costs of servicing (see *Appendix D*).
- High level estimates of servicing costs for the area under the noted development scenarios.

- MPLE conducted industrial market research and interviews with market sector participants and prepared development financial analysis (see *Section 9* of this report).
- Recommendations to bring underutilized industrial lands to market or to achieve enhanced utilization and intensification are provided in *Section 10*.

The findings of this study are summarized as follows:

- The geography of the study area sites are challenging, with sites either located in the 200-year flood plain or on hilly sites constrained by creeks, riparian areas and poor soil conditions.
- Transportation is a key driver of industrial use of land and the marketability of sites; the sites in the study area are located away from Highway 1 and the Golden Ears Connector but are very close to Lougheed Highway. However, Lougheed Highway access points from the site tend to be inconvenient due to constrains in the form of right-in, right-out, and CPKC railway grade crossings and narrow local roads.
- Transit service in the study area is limited to the Albion Industrial area; all other sites lack transit services.
- Preliminary investigations showed limited aquifer supply and would require more wells to meet demand than is practical, while developing an independent sanitary treatment system would require a similar investment to that required to extend traditional servicing into the area (see *Appendix C and D*).
- Servicing the sites remains a challenge. Some sites in the study area are serviced but would need upsizing to meet modern fire flow needs, while other sites, located outside the Greater Vancouver Sewerage and Drainage District and the Metro Vancouver Urban Containment Boundary, have no access to sanitary sewers or water mains.
- Traditional industrial zoning has been applied to most sites in the City, while sites in the KFN lands are outside of the jurisdiction of the City. The current zoning assumes a fully serviced industrial area; however, servicing to an urban standard is not likely to be achieved for many years.
- There is some misalignment of land use designations in the Regional Growth Strategy and the City's Official Community Plan.
- Interviews and market research by MPLE revealed the use of study area sites are most likely to be:
    - Storage and processing of aggregates.
    - Outdoor storage.
    - Small bay space, particularly spaces of less than 5,000 ft^2.
- Servicing networks for sanitary and water have been getting incrementally closer to the study area sites as the City has grown. Extensions of traditional servicing methods can be completed and cost recovery mechanisms such as Development Cost Charges (DCCs) could enable the extension of services into the study area.

The recommendations of this study include:

- To account for the challenges posed by the flood plain, establish flood construction levels of sites and undertake further soil condition investigation and analysis to inform how sites can be developed.
- Transportation improvements can make accessing certain sites in the study area more convenient, overcoming the constraints that make these sites difficult to access. Engage MOTT and CPKC to assess the feasibility of improvements designed to increase convenience for industrial users and to address safety concerns.
- The level of transit service in the Albion Industrial area has been mentioned by employers as a limiting factor in accessing the labour pool, therefore exploring service level improvements with TransLink could benefit employers' ability to attract and retain staffing.
- Improve the servicing of the Albion Industrial area through water main looping and consider working with Metro Vancouver to assess the potential to extend regional sewer and water servicing to support industrial development as an extension of existing water and sanitary servicing is more cost effective and functionally advantageous over independent water and sanitary.
- Introduce a new type of Dry Industrial zoning for sites in the City, to permit a wider variety of interim / temporary uses, with low servicing needs, so that sites can be productively used until they become more fully serviced.
- KFN may wish to consider changes to their land use plan, changing land use designations from commercial to industrial, if they determine an industrial use case offers advantages over commercial uses of the sites in this study.
- Update the City's Official Community Plan and apply for relevant amendments to the Regional Growth Strategy to align land use designations for sites in the study area.
- Consider marketing the sites for the uses most likely to find market interest and ensure that land designations, zoning, and servicing are in place to enable rapid review and permitting approvals of these uses.
- Devise cost-sharing plans for allocating shared infrastructure costs within the study area, such as an area-specific municipal DCC to fund servicing extensions into the area.

Appendices that support this report include the following documents:

A. Maps: Site Overview Map, Site Overview with Topography Map, Site Constraints Map, Existing Utilities and Flood Plain Map, Comparison of OCP and Metro 2050 Land Designation Map

B. Future Use Case Discussion Document

C. Groundwater Supply Feasibility Memo

D. Servicing Analysis Memo

3. Objectives of the Analysis

The Client Group and its partners wish to develop a comprehensive industrial development strategy for the subject lands (*Figure 2*), addressing both current conditions and future development potential with the goal of securing a long-range supply of industrial land and supporting the growth of the City. This *Bring to Market Industrial Land Study* focuses on creating a strategic framework to guide decisions related to infrastructure servicing, phasing, and optimal use of the lands, and on delivering an actionable strategy that aligns with Metro Vancouver's long-term vision for economic growth and sustainable development. The redevelopment of the subject lands is a collaborative effort between three organizations – City of Maple Ridge, Kwantlen First Nation, and Metro Vancouver (the Client Group).

Key objectives of this study are to:

- Support regional objectives to work with members to advance industrial lands through developing local Bring to Market Strategies as detailed in Recommendation 16 of Metro Vancouver's *Regional Industrial Lands Strategy*.
- Identify future potential uses of the study are sites.
- Determine the potential servicing options for the study area sites.
- Determine Class D[1] (±50%) cost estimates for servicing the study area sites.
- Complete industrial market research and interviews.
- Prepare a financial analysis of the study area sites based on their future potential uses.
- Make recommendations for further studies, analysis, and other actions that the Client Group can take to position the lands for industrial development.

This study contains detailed analysis and recommendations to guide future development and infrastructure planning efforts for the subject lands and outlines ways to accommodate different site uses in the short to medium term along with options for achieving fully serviced sites over the long term.

3.1. METHODOLOGY / APPROACH

The subject site consists of various sub-areas which have varying attributes in terms of topography and infrastructure capacity. The Client Group's intent is to document the area and site-specific matters that have been and continue to be obstacles to developing, redeveloping, densifying, and intensifying these lands with industrial uses.

[1] Class D estimate (±50%): A preliminary estimate which, due to little or no site information, indicates the approximate magnitude of cost of the proposed project, based on the client's broad requirements. This overall cost estimate may be derived from lump sum or unit costs for a similar project. It may be used in developing long term capital plans and for preliminary discussion of proposed capital projects. https://www.egbc.ca/getmedia/c31c2f50-83fe-4cc2-83a6-f3d9f81c6905/APEGBC-Budget-Guidelines-for-Consulting-Engineering-Services.pdf.aspx

3.1.1. McElhanney's Tasks

The project methodology for McElhanney included the following:

- **Task 1.01**: Kick-Off Meeting with the Client Group and relevant stakeholders to discuss the project outline.
- **Task 1.02**: Study area site visit and mapping including assessment of current land uses, to identify sites that are most feasibly / practically developable.
- **Task 1.03**: Servicing and water workshop and/or meetings.
    - Identify most feasible servicing and water supply opportunities and approaches.
    - Determine what additional information and studies are required to support design and construction of servicing.
- **Task 1.04**: Prepare high-level cost estimate for preferred servicing solutions.
- **Task 1.05**: Prepare a phasing plan including planning considerations.
- **Task 1.06**: Summarize findings in a technical memorandum.
- **Task 1.07**: Meet with the Client Group to discuss information gathered.
- **Task 1.08**: Meetings between McElhanney and MPLE for collaboration on draft combined report.
- **Deliverables:** Mapping and Technical Memos.
- **Task 1.09**: Prepare a draft report including findings and recommendations. Meet with the Client Group to present and discuss the draft report and complete a round of revisions to the report.
- **Deliverable:** Draft combined report and final report.

3.1.2. Mulholland Parker Land Economists Tasks

Mullholland Parker Land Economists' (MPLE) scope of work includes the following:

- **Task 2.01**: MPLE will meet with the Client Group to establish a shared language and vision for the project and to discuss project assumptions, methodology, data requirements, deliverables, reporting, and timing.
- **Task 2.02**: MPLE will review all relevant documents and materials including existing industrial market studies, property assessments for the Site, and any OCP and Local Area Plan components that pertain to the Site.
- **Task 2.03**: MPLE will visit the study area sites to better understand its physical characteristics, local economic and development context, constraints, and opportunities.
- **Task 2.04**: In consultation with the Client Group, MPLE will identify a set of at least ten local stakeholders with expertise in the industrial development sector.
- **Task 2.05**: For each of up to five development scenarios identified and explored through stakeholder interviews, MPLE will create a pro forma financial model representing the development

and ongoing operation of the Site from the perspective of a hypothetical developer or developer operator.

- **Task 2.06**: MPLE will contribute to the report sections that presents the methodology, assumptions, and results of Tasks 2 – 5 above using prose, graphics, and tables. MPLE and McElhanney will submit this report to the Client Group for discussion and revision.
- **Task 2.07**: MPLE will incorporate all comments, corrections, and revisions provided by the Client Group and Project Team to produce a final report.
- **Deliverable:** McElhanney and MPLE have collaborated to produce this summary report.

4. Study Area and Site Overview

The subject lands (*Figure 3*) are located approximately between 232 Street and 261 Street and south of Lougheed Highway (Highway 7), in Maple Ridge and include the Albion Industrial Lands, the Central Lands, the Kwantlen Reserve Lands, and the Eastern Lands, as shown in *Appendix A*. The overall study area is 355 hectares (877 acres), inclusive of the KFN I.R. #5. Within the study area, the potential development sites have a total area of approximately 119 hectares (294 acres); these figures are inclusive of riparian area setbacks, but exclusive of internal roads and rights of way, except for sites 1A, 1B, and 2, which include setbacks from roads and statutory rights of way.

1. **Albion Industrial Lands** is located west of 240 Street between Lougheed Highway and the CPCK railway mainline and the Fraser River. This area is about 50 hectares (123.5 ac) in size. The Albion Industrial Lands are an established industrial area with existing industrial designations and zoning. The lands have access to the Highway 7 via River Road and other local roads, as well as a connection to 240 Street leading to Dewdney Trunk Road. The site is visible from Highway 7, offers direct access to the CPKC rail line including one existing spur line, and has partial waterfront access (Sites 1B and 2) with docks on the Fraser River. The area is under fee simple land ownership and includes some large parcels and many smaller parcels. The fragmented ownership of these lands limits their redevelopment potential and is a challenge for land assemblies. There is also potential soil contamination associated with past and ongoing industrial uses, and potential flooding and drainage issues given the location in the flood plain. High initial investment is required on these sites to address flood mitigation, though most of the Albion Lands are fully serviced. Another issue is whether the dike along the waterfront needs improvement or extension, which could decrease the developable area of sites along the river and increase development costs.

    a. **Site 1A: West of McKay Avenue (18.8 ha / 46.5 ac)**: Current uses on Site 1A include manufacturing, a lumber mill, and various open storage and enclosed industrial uses. Specific companies located on Site 1A: Maple Ridge Towing, Van Der Wal Equipment Sales, Vista Railings, Mr. Nu Building Materials, and Partap Forest Products. There are 2 to 3 vacant lots within Site 1A.

    b. **Site 1B: East of McKay Avenue (21 ha / 52 ac)**: Current uses on Site 1B include open storage and enclosed industrial uses. Specific companies located on Site 1B: Stella Jones Pole Yard, Gary's Auto Wrecking, Conteco Molds Plastic, Pacific Bending and Machine, Jewel Welding, Allied Crane, ProMix Concrete, and Eagle Tech Salvage. There is 1 vacant lot within the site.

    c. **Site 2: Albion River Lots (10.1 ha / 25 ac)**: Current uses on site include open storage, warehouses, and manufacturing, primarily for ceder products. Specific companies located on Site 2: Streifel Industries, Supreme Barge, and Lafarge Concrete. There are no vacant lots on the site.

2. **Central Lands** are located east of 240 Street between Jackson Farm Park and the Fraser River. The area is about 8.5 hectares (21 acres) in size. The Central Lands benefit from high visibility along the highway, access from Highway 7 and the 240 Street intersection, and fee simple land ownership with large parcels. The southern portion of the lands has potential access to the CPKC rail line and Fraser River waterfront, though feasibility for a spur line or docks is uncertain. Site challenges include conflicting designations in the Metro Vancouver Regional Growth Strategy and Maple Ridge Official Community Plan (OCP), including a non-industrial designation on Site 3, existing rural and residential uses, fragmented land ownership, steep terrain, environmental constraints, and heavily treed areas requiring clearing. Limited infrastructure, restricted highway and transit access, the need for additional roads, and high upfront costs further impact development potential.

    a. **Site 3: Residential (4.5 ha / 11 ac)**: The site is currently used as single-detached residential housing on seven titled lots.

    b. **Site 4: Residential and Hide-Away RV Park (4 ha / 10 ac)**: This site is currently used as residential with two lots used for single detached homes and one lot used for an RV / trailer park. The eastern portion of the site includes KFN lands.

3. **Kwantlen Reserve Lands** are located between 100A Avenue and the Fraser River. The area is about 38.9 hectares (96 acres) in size. The Kwantlen Reserve Lands benefit from high visibility along Highway 7 and access to the CPKC rail line and the Fraser River waterfront. The lands have a single owner which allows for flexible site design and phased development. Potential site challenges include lack of water and sewer infrastructure, potential soil contamination from historic landfill use, steep terrain, environmental constraints, heavily treed areas, and a significantly reduced net developable area. High upfront infrastructure costs, tenure limitations, limited access to transit, and adjacent land requirements from the CPKC may impact development feasibility.

    a. **Site 5B, 5C, 5D: Kwantlen Lands Hillside (18.2 ha / 45 ac)**: The site is currently undeveloped forested land.

    b. **Site 5A: Kwantlen Lands Gravel Pit (10.93 ha / 27 ac)**: The site is currently used as an aggregate / gravel pit.

    c. **Site 6A: Kwantlen Lands River Bench (9.7 ha / 24 ac)**: The site is currently undeveloped lands located within the KFN and a portion of land outside the KFN where an RV park and single-detached residences are located.

4. **Eastern Lands** are located west of KFN and east of Spilsbury Street. The area is about 21.6 hectares (53.4 acres) in size. The Eastern Lands benefit from high visibility along the highway, access to the CPKC rail line with potential for a spur, and existing docks along the Fraser River. The southern portion of the site is already cleared, and fee simple land ownership with larger lots and fewer owners may accelerate land assembly and development opportunities. Site challenges include lack of water and sewer infrastructure, potential constraints on electrical and gas services,

and drainage issues or flooding risks in low-lying areas. Soil contamination from past industrial uses, heavily treed northern lands requiring clearing, high initial infrastructure costs, and restricted access to the highway and transit further impact development feasibility.

a. **Site 6B and 6C: Sanscorp (16.4 ha / 40.5 ac)**: Current uses on Site 6C south of the CPCK railway include a gravel and landscape site owned by Sanscorp. Lands north of the railway are vacant (Site 6B).

b. **Site 7: Old Lumber Mill (5.2 ha / 12.85 ac)**: Site 7 includes a disused timber mill with indoor and outdoor storage.

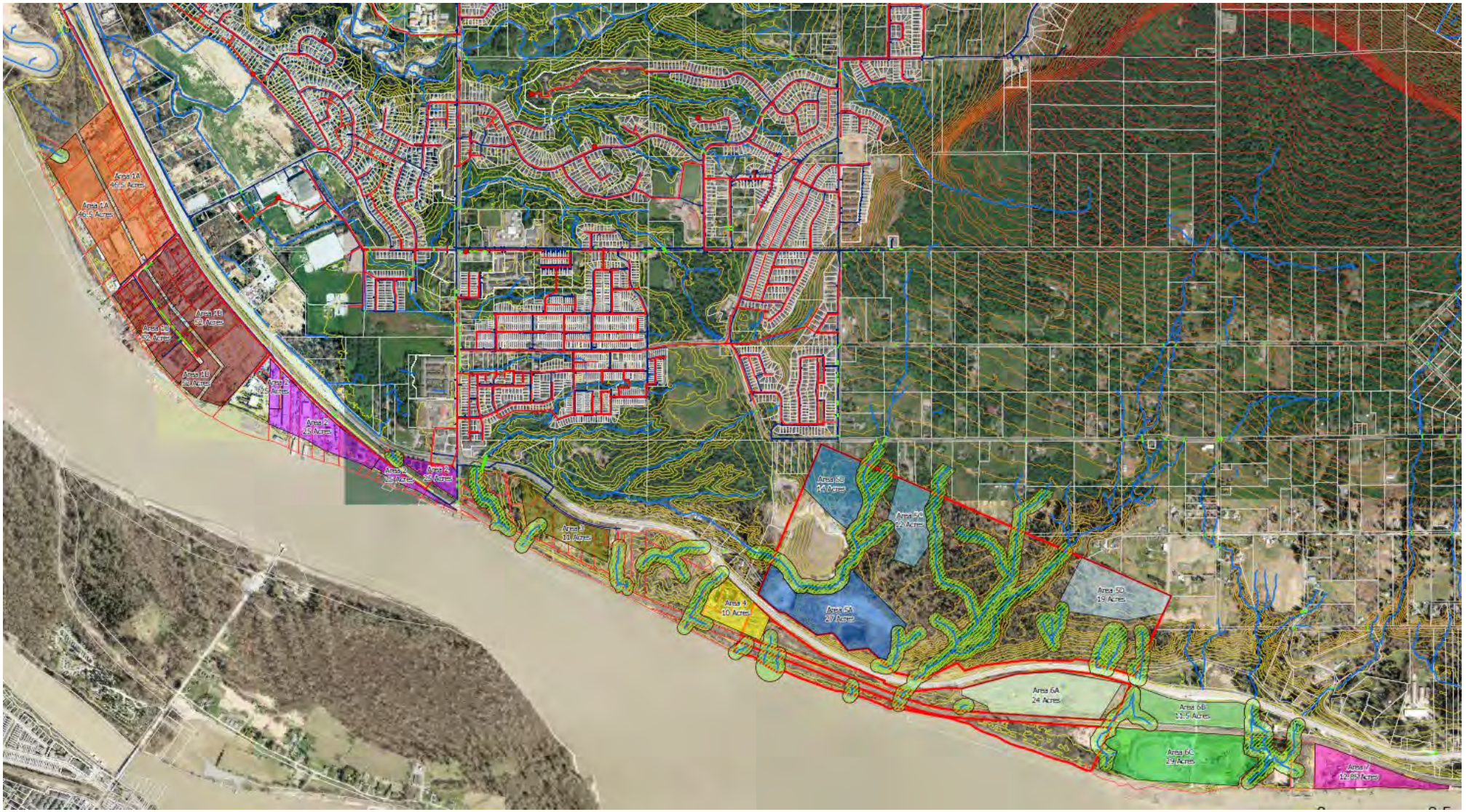


Figure 3: Subject Lands – and opportunity sites within the overall study area.

4.1. OPPORTUNITIES AND CONSTRAINTS

The demand for industrial land in Metro Vancouver remains elevated relative to supply especially when compared to other jurisdictions. Current market trends are somewhat less pronounced than they have been in the last decade due to high interest rates, inflationary pressures driving up construction costs, and concerns about the economic relationship with the United States. Nevertheless, the long-term fundamentals of the region with a limited industrial land stock and strong demand remain in place. Coordinated efforts to grow and diversify the regional economy means all subject sites have potential to support industrial development. At the same time, each of the subject lands have their own unique sets of opportunities and challenges that could limit the scope, scale, and form of their development capacity.

The **Albion Industrial Lands** present strong land use opportunities due to its excellent transportation access by highway, rail, and water, including potential for short sea shipping. However, challenges include varying landowner interests (most existing business occupants are associated with the forestry sector), environmental considerations such as wetlands and flooding, market-dependent industrial demand, and high upfront infrastructure costs that may deter redevelopment.

1. **Site 1A: West of McKay Avenue**: This site is fully serviced and has the option of maximizing utilization of existing servicing (water, sewer, storm, power, natural gas). The site also benefits from nearby transit access. The site is cut off from the Fraser River by a dike and the opportunity for river access is unclear. This area also has a public walkway and trail along the waterfront on the dike which restricts the site from introducing more heavy industrial uses. The site also has a Fortis pipeline right of way (ROW) that could be subject to restrictions prior to any future development on site. Coordination with the CPKC and the Ministry of Transportation and Transit (MOTT) is recommended prior to any development applications on site.

2. **Site 1B: East of McKay Avenue**: This site is fully serviced and has the option of maximizing utilization of existing servicing (water, sewer, storm, power, natural gas). The site also benefits from nearby transit access. Lots south of Fisherman Road have access to the Fraser River. This site features a CPKC rail spur for Stella Jones south of River Road which can be an asset for the site's interim redevelopment opportunities, such as transload or future users of the site that require bulk commodities import or export. Site 1B also has a Fortis pipeline ROW that could be subject to restrictions or covenants prior to any future development. Coordination with the CPKC and MOTT is recommended prior to any development applications on site.

3. **Site 2: Albion River Lots**: This site has access to the Fraser River and is fully serviced, providing the option of maximizing the utilization of existing servicing (water, sewer, storm, power, natural gas). The site also benefits from nearby transit access. The site is challenged by shallow site depth. Extending the site eastward would place a portion of the site in the floodplain, while extending the site westward would encroach on an easement on title.

The **Central Lands** offer strong opportunities due to its natural extension from an existing industrial area. Greenfield development allows for flexible infrastructure planning, with strong transportation access by highway, rail, and water, including potential for a short sea shipping facility. However, challenges include varying landowner interests, perceived remoteness, potential rail access / crossing constraints, adjacent

land requirements from CPKC, and the need for easements if crossing agreements are unavailable. Additional planning may be required to attract investors, while extensive tree removal, market fluctuations, and high upfront infrastructure costs could further impact development feasibility.

1. **Site 3: Residential**: This site is semi-serviced, with municipal water but without sanitary sewer servicing. There is no transit access to the site. The site has potential for residential buyouts as a land assembly by a private or public entity on an opportunity basis to change to industrial use. The site also has potential for civic facilities and amenities, such as a firehall, to help serve the area's expanding business and industrial community. The site is challenged by a high cliff over the CPKC railway and a riverbank. Due to the lack of existing sewer servicing, there are limited short-term industrial prospects for the site.

2. **Site 4: Residential and Hide-Away RV Park**: This site is not serviced with water or sanitary connections and it is therefore assumed to be self serviced via wells or trucked in water and sanitary septic fields. The site has two residential lots, one on either side a small RV / trailer park, and the easternmost portion of the site extends into the KFN Reserve. The westernmost residential lot and the RV / trailer park are accessed by a short dead-end section of River Road, while the easternmost residential lot is accessed directly by a driveway from Lougheed Highway. The KFN portion of the site is undeveloped and has an unimproved driveway to Lougheed Highway.

The **Kwantlen Reserve Lands** offer the potential opportunity to re-contour the land during ongoing site filling, minimal municipal and regional regulatory constraints, and the potential to integrate complimentary uses, parks, and environmental protections and riparian area setbacks from creeks. The site may also attract interim dry industrial uses if servicing remains limited, with possible funding from federal or provincial government sources. However, securing funding for servicing, obtaining a servicing agreement with the City or Metro Vancouver, and arranging highway access with MOTT present hurdles. Market perceptions of remoteness, industrial demand fluctuations, and the need for area planning to attract investors further contribute to development uncertainties.

1. **Site 5A: Kwantlen Lands Gravel Pit**: The site is without servicing and has no access to transit. The site is a good candidate for dry industrial uses, as it is currently used as an aggregate / gravel pit. It is understood from representatives of KFN that ongoing land contouring has filled in the waterbody that is visible on the site from aerial imagery. Coordination with MOTT for Lougheed Highway access improvements would be needed and preparation of lands and the filled waterbody through proper filling and grading is recommended prior to any development applications on site. The *Kwantlen First Nation Land Use Plan Summary Report* noted the following:

    a. **Expected Contaminate Condition**: Contaminated surface water and groundwater, localized soil contamination. Iron staining along foreshore of Fraser River indicates probable discharge of deeper groundwater with metals contamination into riverbed. Surface water has been shown previously to have toxicity to aquatic organisms (This has been confirmed by recent tests with greatest toxicity at culvert discharge from north of Lougheed Highway).

2. **Site 5B, 5C and 5D: Kwantlen Lands Hillside**: These sites are without servicing and have no access to transit. The sites have potential for residential uses as they are close to significant

amounts of new residential development at Jackson Ridge (100 Avenue and 248 Street). There are nearby residential services such as a daycare in Jackson Ridge, and the sites would offer expansive south facing views of the Fraser River and Mount Baker. Coordination with the City and private landowners would be required to secure road rights of way and connections to 100 Avenue from Sites 5B and 5C; Site 5D could be accessed from 98 Avenue. Should Site 5B be developed, the roadway network will need to be designed in a way that retains a maintenance access road to the former landfill located immediate south of Site 5B.

3. **Site 6A: Kwantlen Lands River Bench**: The site is without servicing and has no access to transit. At the western tip of the site there is an existing graveyard that needs appropriate setbacks and preservation. The site is a good candidate for dry industrial uses as the majority of the site is currently undeveloped, relatively flat and only partially forested. The site may be an opportunity for rail line access via spurs off the CPKC rail line. Coordination with CPKC and MOTT is required for vehicle highway access, prior to development of the site. An internal road connecting to this site from Site 6B may be possible; however, there is a small creek crossing that would be required. The *Kwantlen First Nation Land Use Plan Summary Report* noted the following:

    a. **Expected Contaminate Condition**: Localized soil contamination (primarily metals) associated with debris in preload fill. Groundwater and surface water in receiving environment south of recently filled areas has been impacted by burial of stumps and wood waste resulting in low dissolved oxygen, and elevated metals and other parameters. Decaying wood waste is generating concentrations of methane and other combustible gases that could migrate into building structures unless controlled.

The **Eastern Lands** include one large property currently under review for rezoning to industrial and the potential for rail spur and short sea / river shipping and barging functions. The site offers strong potential for improved transportation access to Highway 7, the CPKC rail line, and the Fraser River. Some challenges for these sites include securing infrastructure funding, addressing land adjacency requirements from CPKC, and the need for area planning to attract investors.

1. **Site 6B and 6C: Sanscorp**: The site is without servicing and has no access to transit. Site 6C is currently being used by Sanscorp for off loading dredging spoils (primarily sand) to land for sale to contractors and the public. The site is a good candidate for dry industrial uses as lands north of the CPKC railway are relatively flat and vacant. Coordination with MOTT and CPKC could yield some access improvements or a better understanding of access constraints. Improved highway access and preparation of lands through filling and grading could be beneficial prior to any development of the site. An internal road connecting Site 6B to KFN Site 6A could benefit both sites by providing access to multiple future development lots.

2. **Site 7: Old Lumber Mill**: The site is without servicing and has no access to transit. The site was used for a cedar mill in the past with the logs coming off the river for milling; however, the mill appears marginally used or shuttered. The site is a good candidate for dry industrial uses as the site currently houses a disused timber mill with existing indoor and outdoor storage space. Coordination with MOTT and CPKC could yield some access improvements or a better

understanding of access constraints. The site has a lot of grade variations and preparation of lands through filling and grading may be beneficial prior to any development applications on site.

4.2. SITE VISIT FINDINGS

A site visit to the subject properties took place on December 13, 2024, and included representatives from the Client Group and consultants from McElhanney. Some key findings from the site visit include the following.

The Client Group walked along Albion Dike from Kanaka Creek Regional Park (*Figure 4*) to observe undeveloped potential of the lands in Site 1A immediately abutting the dike and south of Vista Railings. This portion of Site 1A represents untapped industrial development potential for manufacturing or light industrial uses. Access could be from River Road along the northeast side of Vista Railings (2328 River Road) or from one of the two undeveloped lot frontages on River Road that abut this site (23296 and 23320 River Road). There is also the potential for river access if right of way and access across the Albion Dike could be secured, although McElhanney has no knowledge as to the feasibility of dike crossing or river lot permits.

Figure 4: Vacant industrial land abutting Kanaka Creek Regional Park and the Albion Dike

Vista Railings (Vista) was visited on December 13, 2024, early in the afternoon (*Figure 5*). Vista is an example of local manufacturing of a value-add product and a company that transitioned from milling wooden railings and posts to manufacturing a variety of weatherproof railing systems and products. Vista noted the benefit of transit service that allows labourers to get to the site without a vehicle, but the limited number of trips (AM and PM peak service) limits how much the workforce can rely on transit. Vista likes the site and notes the location works well for their business but is concerned about increases in lease rates. Other concerns expressed were the limited access to and from Lougheed Highway via River Road.

Figure 5: December 13, 2024, Site Visit at Vista Railings

Workers were observed waiting for the bus at some bus stops in the area.

The Stella Jones pole yard spur was being switched by CPKC who were bringing out empties from the yard and replacing them with loaded lumber cars (*Figure 6*).

Figure 6: CPKC switching the spur at Stella Jones

Jewel Welding and Fabrication (Jewel) was visited in the mid-afternoon on December 13, 2024 (*Figure 7*). Jewel receives coated pipe in a variety of dimensions from suppliers in Oregon and California and then creates customized welded coated pipe junctions and curves for water and sanitary distribution mains for Metro Vancouver and municipalities. Jewel is part of a larger company that has sites on Vancouver Island; they have an interest in shipping components and equipment by sea and river to their site, especially if they move forward with an expansion that relocates their fabrication to another site. Their site is constrained and they have attempted to buy adjacent lots to expand their operations, but have not met success, leading them to consider relocation to a larger site. They noted access along Fisherman Road is tight and narrow and access to Lougheed Highway generally meets their needs, but improvements would be welcome.

Figure 7: Jewel Welding and Fabrication

Sanscorp was visited after the site had closed for the day late in the afternoon of December 13 (*Figure 8*). The Client Group and McElhanney were not able to meet with any representatives from the company but were able to view the site and noted the relatively flat and level nature of Site 6B with sight lines into Sites 6A and 6C, which exhibited a similar flatness. Highway access from an existing slip lane separated from Lougheed Highway provides for deceleration and acceleration. The separated slip lane with Jersey barrier prevents any left turn movements onto or from Lougheed Highway.

Figure 8: Looking south into site 6B and site 6C

5. Planning Policy Framework

This section provides a review of the planning framework that governs the expansion of industrial lands within Metro Vancouver and the City. Metro Vancouver considerations include the Regional Growth Strategy, amendments to the Regional Growth Strategy, Greater Vancouver Sewerage & Drainage District (GVS&DD) boundaries and modeling submissions, Greater Vancouver Water District modeling submissions, and a Regional Context Statement Amendment. The City's planning considerations include the Official Community Plan and Zoning Bylaw and area servicing.

5.1. METRO VANCOUVER REGIONAL GROWTH STRATEGY (METRO 2050)

Metro Vancouver, a federation of 23 member jurisdictions, guides development using a Regional Growth Strategy (Metro 2050). Metro 2050 was adopted on February 24, 2023. Metro 2050 is the region's shared vision for how growth will be managed to support the creation of complete, connected, and resilient communities, while protecting important lands and supporting the efficient provision of urban infrastructure like transit and utilities. It also describes how projected population, housing, and job growth will be managed over the next 30 years.

Like an OCP, Metro 2050 uses high level land use designations to guide development. The land use designations within the Regional Growth Strategy are high level and, for the purposes of this study, the most relevant land use designation is Industrial. There is also a policy that directs the GVS&DD not to allow connections to regional sewerage areas for lands with a Rural, Agricultural, or Conservation and Recreation regional land use designation, except in certain circumstances.

Within the City, 5 regional land use designations apply:

- **Conservation and Recreation** are intended to protect significant ecological and recreation assets, including drinking water supply areas, environmental conservation areas, wildlife management areas and ecological reserves, forests, wetlands, riparian areas, major parks and outdoor recreation areas.
- **Rural** generally comprises natural areas, agricultural lands, lands with low-intensity residential or built environments that are historical, remote, or not contiguous with the urban area, may have topographic constraints, and do not require urban services such as sewage services or transit.
- **Agricultural** designates lands protected and intended for agricultural production and agriculture-related uses.
- **General Urban** is intended for residential neighbourhoods and centres, including commercial, employment, and residential development, supported by shopping, services, institutions, recreational facilities and parks.
- **Industrial** is intended for heavy and light industrial activities. The intensification and densification of industrial, as contextually appropriate, is encouraged and limited industrial-serving commercial uses that support the primary industrial functions are also appropriate.

The Industrial designation also applies to the Albion Industrial Area, Sites 1A and 1B and Site 2, as well as Sites 6B, 6C, and Site 7. Site 3 and most of Site 4 are designated as Rural. KFN lands, including a portion of Site 4, Sites 5A through 5D and Site 6A, are not regulated by Metro 2050.

5.1.1. Metro 2050 Maple Ridge OCP Alignment

Maple Ridge, like all municipalities in the Metro Vancouver Regional Planning area, must align their Official Community Plan and the Regional Growth Strategy, through their Regional Context Statement.

5.1.2. Current Alignment

The Maple Ridge OCP was reviewed for alignment with the Metro 2050, noting that the OCP was initially prepared in 2014, when the earlier Regional Growth Strategy (Metro 2040) was in place. The regional and municipal land use policies are connected via a Regional Context Statement. The Albion Industrial Area Sites 1A, 1B, and 2 are aligned. Site 3 is designated in the OCP as Rural Residential and all other study area sites have an OCP designation of Industrial, with the exception of the KFN sites which are not subject to the OCP or Metro 2050. As shown below in *Figure 9* areas in red outline and cross hatching show misalignment between the OCP and Metro 2050.

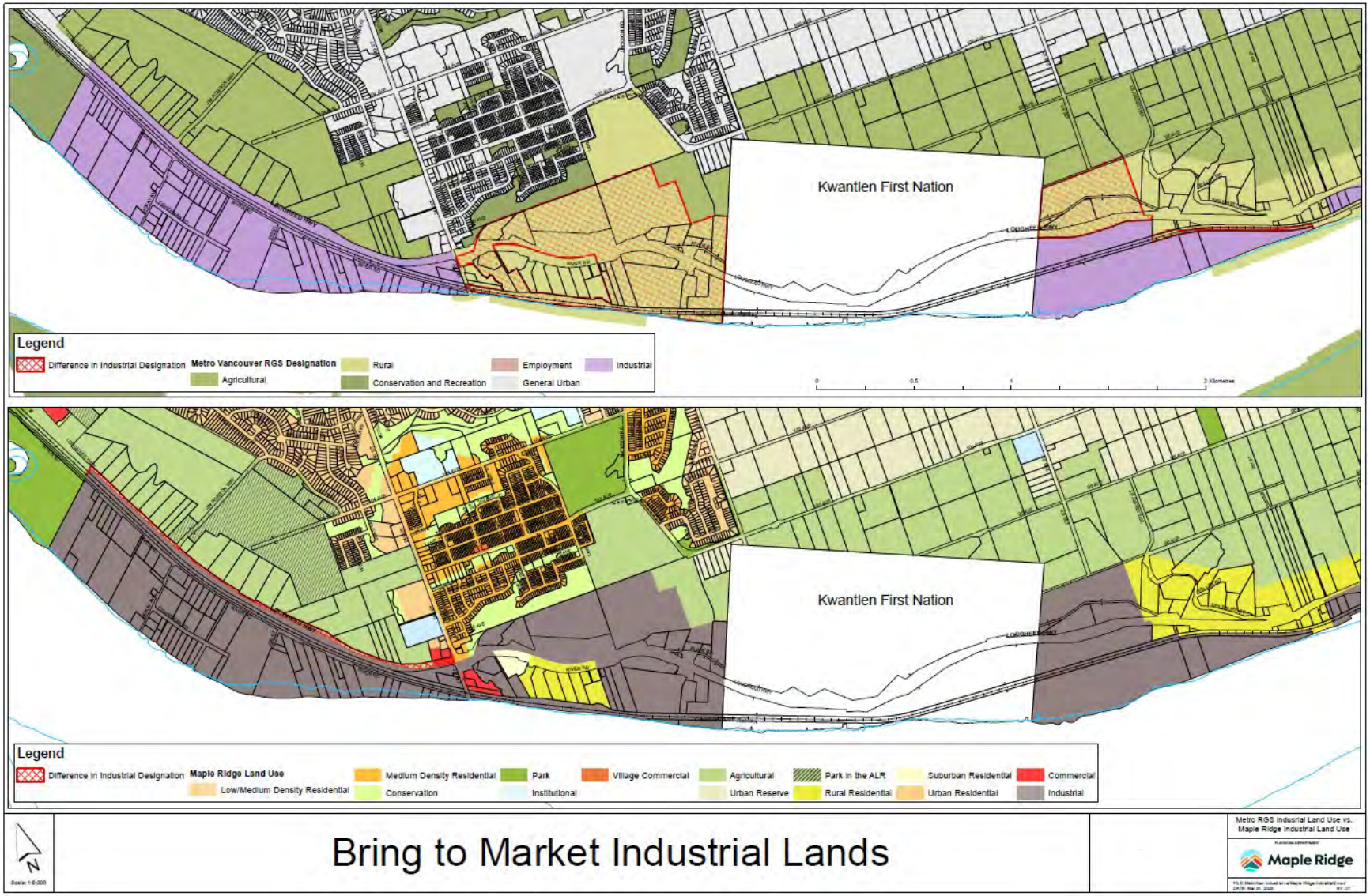


Figure 9: Metro 2050 Industrial Land Use vs. Maple Ridge Industrial Land Use Map

5.1.3. Future Alignment

Municipalities in Metro Vancouver are required to prepare a regional context statement that aligns with Metro 2050 – the Regional Growth Strategy.

5.1.3.1. Maple Ridge Regional Context Statement Update / Metro 2050 Regional Context Statement

For Maple Ridge to increase the industrial land base beyond what is currently provided for in Metro 2050 -- through a change in regional land use designations -- the City must provide Metro Vancouver Regional District with an updated Regional Context Statement and submit a Metro 2050 Map 2 Regional Land Use Designation Amendment application. Upon approval, the City may then adopt its updated OCP to reflect the alignment of industrial land designations in the OCP and Metro 2050.

5.1.3.2. Type II Metro 2050 Amendment Process

Some of the lands in the study area are classified Industrial in the City's OCP but are designated Rural in Metro 2050, as shown in *Figure 9*. Type II amendments to the Metro 2050 would be required in the future to permit industrial development. Metro 2050 offers amendment process guidance in the Metro 2050 Implementation Guideline Regional Growth Strategy Amendments (2023).

In addition to the Amendment process, two other requirements must be considered and planned for: The Greater Vancouver Sewerage and Drainage District Requirements and Greater Vancouver Water District Requirements.

5.1.3.3. Greater Vancouver Sewerage and Drainage District Act Requirements

An application to the GVS&DD will be required should the intent be to service and connect these lands to the regional sewer system, following an amendment of Metro 2050 land use designations.

Similar to the City's previous application for the Yennadon Lands, the City could benefit from sanitary and water modeling to support the policy that enables servicing of industrial lands outside the Greater Vancouver Sewerage and Drainage District sewerage area.

5.1.3.4. Greater Vancouver Water District Requirements

The Metro Vancouver staff report for the Yennadon Lands indicates that the City's applications and supporting reports do not provide an estimation of the increase in population served and associated water demand resulting from this redesignation and rezoning. As soon as the water demand and population details are available, the City is requested to forward the information to Metro Vancouver's Water Services. The City's water distribution system must be capable of providing fire flows to the subject lands.

The City could benefit from modeling of water service patterns and capacity to prove the feasibility of additional demands for developed industrial land on the sites located west of 240 Street.

6. Physical Constraints Analysis

Following the December 13, 2024, site visit, McElhanney incorporated the existing physical site features and constraints, such as stream setbacks, culverts, water and sanitary servicing, and steep slopes, into a map, found in *Appendix A*, to identify gross developable area of the various sites. Contour lines on the map denote elevation change in 5m intervals. The map was distributed to the Client Group for review and comment and a number of refinements were made based on input received. The following list highlights obvious and known constraints; this list is not exhaustive and is based on desktop review.

- **Site 1A: West of McKay Avenue**:
    - Has a stream and drainage culvert on the western edge leading to the Fraser River.
    - A public trail extends the entire length of the dike along the waterfront, further restricting river access for future site uses.
    - Bisected by a Fortis pipeline right of way.
    - Located in the floodplain.
- **Site 1B: East of McKay Avenue**:
    - Bisected by a Fortis pipeline right of way.
    - Located in the floodplain.
- **Site 2: Albian River Lots**:
    - Located in the floodplain.
    - Bisected by the CPKC tracks and River Road.
    - Shallow lots along the Fraser River.
- **Site 3: Residential**:
    - Located at top of a steep bluff above the CPKC railway tracks.
    - Bracketed by creeks and their riparian setbacks.
- **Site 4: Residential and Hide-Away RV Park**:
    - Bracketed by creeks and their riparian setbacks.
    - Located on a bench below Lougheed Highway and above the CPKC railway tracks.
- **Site 5A: Kwantlen Lands Gravel Pit**:
    - Located in gravel extraction and fill site, with steep slopes.
    - Site is bracketed by creeks and their riparian setbacks.
    - Contamination issues need to be resolved or managed.
- **Site 5B: Kwantlen Lands Hillside**:
    - Bounded on the east by a creek and riparian setback.
    - Forested.

  - Bounded to the south by an inoperative former landfill.

- **Site 5C: Kwantlen Lands Hillside**:
  - Bracketed by creeks and their riparian setbacks.
  - Forested.
- **Site 5D: Kwantlen Lands Hillside**:
  - Bounded on the west by a creek and riparian setback.
  - Bounded on the south by multiple creeks and riparian setbacks.
  - Forested.
- **Site 6A: Kwantlen Lands River Bench**:
  - Bracketed by creeks and their riparian setbacks.
  - Site is located on an upland bench that falls off just north of the CPCK railway tracks.
- **Site 6B: Sanscorp**:
  - Bracketed by creeks and their riparian setbacks.
  - Bounded on the south by CPKC railway tracks.
  - Bounded on the north by Lougheed Highway.
- **Site 6C: Sanscorp**:
  - Located in the floodplain.
  - Bracketed by creeks and associated riparian setbacks.
- **Site 7: Old Lumber Mill**:
  - Located in the floodplain.
  - Bounded on the west by a creek and riparian setback.
  - Site is located below Lougheed Highway and the CPCK railway track beds.

7. Future Use Scenarios

McElhanney created draft development scenarios for review and discussion with the Client Group (included in *Appendix B*). The purpose of these drafts was to ideate about hypothetical future uses in the near term and longer term for each site. The development scenarios were refined in collaboration with the Client Group (see *Appendix B*); further discussion led by MPLE and the Client Group resulted in a short list of use / development scenarios. MPLE shared this short list with McElhanney; it was reviewed and verified as feasible development scenarios for financial analysis and for McElhanney's servicing analysis and cost estimates in *Section 8* of this report. The shortlisted development scenarios for each site are shown in *Table 1*.

Table 1: Development Scenarios

Site	1A	1B	2	3	4	5A	6	7
Open storage				X	X	X	X	X
Generic industrial (25% site coverage)	X	X	X	X		X		X
Generic industrial (40% site coverage)	X		X	X		X		
Film studio					X			
Marine industry			X					
Short sea shipping		X	X				X	
Aggregate processing		X			X		X	
Concrete plant[2]		X	X				X	

7.1. FUTURE USE DESCRIPTIONS

Following is a description of the finalized short list of future land uses considered for each site and used in the financial analysis being prepared by MPLE and presented in *Section 9* of this report.

- Outdoor storage: (Sites 3,4, 5A, 6, & 7)
    - These are gravel lay-down yards for storage, parking, and similar outdoor use. They will have minimal built space.
    - These yards will be graded and prepared to either a gravel standard or a paved standard. MPLE has yet to determine the relative economics of these options.

[2] MPLE was unable to acquire local data regarding the economics of concrete plants, in part because this research took place in late February and early March of 2025, at which time Canada's industrial sector was focused on its strategic response to the threat of US tariffs. As such, MPLE has not performed financial analysis of concrete plant scenarios. They are included in this table in the interest of completeness and to suggest further investigation.

- Generic industrial (Sites 1A, AB, 2, 3, 5A, 6, & 7):
    - This is a mix of industrial space with bays (80%) and mezzanine office space (20%).
    - Outdoor space is productive yard.
    - Generic industrial varies site coverage and building height (suggestion from McElhanney based on previous jurisdictional scan: 15m to 18m and 40 foot / 12m clear heights), with the following sub-categories:
        - 25% site coverage.
        - 40% site coverage.
    - Examples:
        - Blue Mountain Business Park.
        - Webster's Corner Business Park.
        - Kanata Business Park.
        - Raven's Landing and Sean Heights Business Park, Central Saanich.
        - Many other examples.
- Film studio (Site 4):
    - A film studio would occupy two to three large industrial buildings of 30,000 – 70,000 ft^2 each. Each building would contain a large internal space with no posts in the middle or limited to one or two main beams. Each would require high ceilings, soundproofing, insultation, and sturdy construction to accommodate rigging equipment and 60 – 80 ft boom lifts.
    - The studio would also contain some office space, at least 10,000 ft^2 of mill space for carpenters, and 5,000 – 10,000 ft^2 for wardrobe.
    - The site would need sufficient parking for workers and hair and makeup trucks, or 80 – 100 stalls.
    - The studio would require 2,400 amps of power per studio building, water, and sanitary service.
    - Examples:
        - Bridge Studio, Boundary.
        - Bridge Studio, Lake City.
        - Bridge Studio, Griffiths.
        - Vancouver Film Studios.
    - Local examples of film studios investigated by MPLE exhibit total built area ranging from 112,000 – 841,000 ft^2 and overall density ranging from 0.39 – 1.07 FSR. Regarding a potential film studio at Site 4, MPLE assumes 258,000 ft^2 of built space to achieve overall density of 0.6 FSR. This studio would be typical in size and built form for the region.
- Marine industry (Site 2):
    - Chiefly boat repair and maintenance.
    - Possibly boat construction and sales, although this would be a niche use with an unproven market in this location.
    - Examples of similar operations include Lions Gate Marine Centre in North Vancouver.

    - Market research by MPLE suggests that marine industrial uses of this kind occupy generic industrial space with normal tenure (either owner-operated or rented) except that access to a dock or bulkhead is required.

- Short sea shipping (Sites 1B, 2, & 6):
    - A barge or dock for river access, and yard space for associated preparation, staging, and transload, such as cargo container storage.
    - Only modest buildings for administration and bathrooms.
    - Operator would be a major operator, either Seaspan or the Port of Vancouver.
- Aggregates processing (Sites 1B, 4, & 6):
    - Like short sea shipping, this use consists mostly of yard space for materials storage.
    - This use requires a dock because its operations consist of cleaning and straining aggregates using the river. The river is also an important means of transportation for this use.
    - Example: Sanscorp.
- Concrete plant (Sites 1B, 2, & 6):
    - Ready-mix.
    - Examples:
        - Lafarge.
        - Vancouver Pipe Concrete Products.
        - Lehigh Northwest Cement.
        - Heidelberg Materials.
    - This could be driving wet concrete to local users for “cast in place” or pouring concrete into molds such as a pipe or sheet and shipping those pre-cast items as products.

8. Servicing Analysis and Cost Estimates

McElhanney explored high level opportunities to service the study area sites. The largest constraints on industrial lands in this corridor is the absence of water and sanitary servicing. The corridor is located outside of the Metro Vancouver Urban Containment Boundary and the Greater Vancouver Sanitary Sewage District. These sites presently obtain water from wells on site, or trucked in water, and use on site sanitary treatment approaches. Storm water is generally managed on site. The Lougheed Highway and CPKC railway are constraining features to the development of any future servicing corridor for water or sanitary lines. *Section 8.1* below describes the desktop investigation of groundwater feasibility. *Section 8.2* below describes the desktop feasibility of a centralized sanitary treatment facility and *Section 8.3* describes the ability to service sites by extending Metro Vancouver sanitary and the City's water lines.

Infrastructure servicing costs are typically the responsibility of the developer for individual sites. There is the opportunity to service the area or parts of the area in a coordinated manner which may provide for more cost-effective results. The City could facilitate such servicing through different funding mechanisms, for example, such as an area-specific municipal Development Cost Charge.

8.1. GROUNDWATER – HIGH LEVEL FEASIBILITY OF CENTRALIZED WATER SYSTEM

To support the consideration of options for water supply, McElhanney conducted a preliminary desk-top level groundwater study. The goal of this study was to assess the potential feasibility of using groundwater as source water to supply an independent centralized water system (i.e. private utility) for future industrial development. The complete details of the groundwater study are contained in *Appendix C*.

Assessing the feasibility of groundwater (wells) as a new source of water supply typically includes:

- Technical assessment of available groundwater resources and their potential to meet the community water needs with water wells.
- A preliminary analysis of unknowns, risks, and relative costs to develop and license groundwater sources for a potable water supply.

Groundwater resource assessment typically occurs in phases, starting with a technical desktop assessment. The scope for this limited desktop assessment included:

- A high-level review of publicly available information on local hydrogeology, provincially delineated aquifers, water well records, and existing groundwater licenses to understand aquifers in the area, potential well yields, and existing water users.
- Provision of a professional opinion regarding the technical feasibility and practicality of groundwater as the source for the centralized water supply.

The scope for this feasibility assessment did **not** include site visits or field work, such as geologic mapping or study, selection of well locations, or water well drilling and testing.

This assessment of groundwater supply feasibility from a desktop study alone is limited. Further work is required to verify whether groundwater wells can provide adequate water supply and that the groundwater resources can be exploited without unreasonable negative effects to other existing users and to environmental flows (i.e., groundwater contributions to surface water). Generally, if there is adequate information available on local aquifers and water well yields, a desktop assessment can inform a decision about whether to proceed with drilling exploratory wells and can provide a general understanding of the number of wells that might be required to meet the area water demand.

The Province has designated two aquifers in the Study Area: sand and gravel Aquifer No. 970 and fractured bedrock Aquifer No. 19. Additional details about these aquifers are provided in *Appendix C.*

Based on the limited desktop assessment, the technical feasibility of sourcing groundwater for a centralized water system appears to range from unlikely to challenging. The required water demand is high compared to both average and maximum groundwater yields available from existing wells in the area.

Based on average well yields, an unreasonably large number of water wells would be required to meet project water demands, even in a low water demand scenario. Logistically, it becomes challenging to manage and operate a water system with more than 3-5 water wells.

Further desktop hydrogeological assessment and exploration well drilling would be needed to properly assess the possibility of developing a suitable number of high-yielding wells for the proposed development.

Table 2 outlines the next steps and associated costs to progress assessment, exploration, and development of a groundwater source for the project, based on the assumption that at least 9 wells would be required to meet the water demand.

Table 2: Estimate of costs for next steps in groundwater source development

Task Description	Estimated Cost
Additional desktop study: to better understand aquifer lithology (Aquifer 970) and fracture potential (Aquifer 19), assess potential well yields, and prepare preliminary well designs for contractor estimates (including total drilling depth)	$ 8,000 to $ 15,000
Well Drilling: exploration and production wells **(*cost per well*)**	$ 30,000 to $ 75,000
Pumping Tests: recommended to determine the long-term capacity of each production well. They are required in support of a water license for groundwater extraction. (***Cost per test)***	$ 28,000 to $ 65,000
Data analysis in support of water license application (depends on number of production wells, potential for mutual well interference, and potential impacts on other users and environmental surface water flows)	$ 10,000 to $ 50,000
Total Estimated Cost assuming NINE production wells	**$ 540,000 to $ 1,325,000**

Note that the estimated costs in *Table 2* are for development of the water source wells only. The costs presented in *Table 2* do not include costs for well pump, well pump installation, electrical connection, pump and water system controls, water conveyance, pressurization, water storage, water treatment (if necessary), or other costs associated with design and construction of a water utility.

8.2. SANITARY – HIGH LEVEL FEASIBILITY OF CENTRALIZED TREATMENT SYSTEM

Given the costs for upgrading and connecting to the sewer system and the fact that the Study Area is outside the Metro Vancouver Urban Containment Boundary and the Greater Vancouver Sewerage Service Area, an option for a centralized sewage treatment and disposal facility for the development of the KFN sites has been considered. The complete details of a centralized sewage treatment facility are contained in Section 5.1.1 of *Appendix D* – Infrastructure Servicing Memo.

Given the size of the required sewage treatment plant, ground disposal is not a practical option; a riverine outfall must be considered. The scope for this feasibility assessment did **not** include site visits or field work for this purpose, or for locating and estimating the cost of an outfall.

It is likely that the chosen treatment technology will be in the form of an advanced biological process such as a moving bed bio-reactor (MBBR), membrane bioreactor (MBR), or other such technologies where the plant footprint can be optimized within the given space. The plant will require a sludge management plan for disposal of process solids within the regulatory framework.

Considering the need for site preparation, plant servicing, civil, structural, geotechnical, as well as mechanical and electrical system, plus a riverine outfall and diffuser, a possible central plant is likely to be in the order of **$16M-$20M**. This cost does not include individual land costs for a 0.5ha / 1ac lot for the plant site, site servicing, collection or conveyance to the plant site, which at this time has been identified as located on Site 5A, which is the most central in the study area.

Before committing to the idea of a centralized plant, more assessment is required and should start with the feasibility and cost for the outfall. Once it is determined that an outfall is feasible, site selection should commence with the intent of optimizing the collection system to the plant, while minimizing site development costs. From there, technology selection would precede final detailed design and approvals.

8.3. HIGH LEVEL FEASIBILITY OF SERVICING BY EXTENSION OF TRADITIONAL SERVICING

McElhanney has completed a high-level assessment of conventional servicing strategies for Sites 3 to 7 in the study area, the complete details are contained in the Infrastructure Servicing Analysis Memo in *Appendix D*.

8.3.1. Sanitary Servicing

It is understood that existing industrial sites along the Lougheed Highway east of 240 Street manage sanitary flows onsite since there are no municipal utilities servicing these areas. Existing constraints for servicing the Central Lands, KFN Lands and the Eastern Lands Area include the Lougheed Highway and CPKC rights-of-way (ROW) which obstruct proposed utility ROWs to KFN Lands. There may be opportunities to connect the Central Lands, KFN Lands, and Eastern Lands to the gravity sanitary sewer

at 240 Street and River Road with a pump station on the KFN Lands and approximately 1.5 km of forcemain and gravity sewer adjacent to the Lougheed Highway / CPKC ROWs to 240 Street and River Road. An analysis of downstream infrastructure impacts would be required for the gravity sewers between 240 Street and the 225 Street Pump Station, and the 225 Street Pump Station and forcemain / gravity sewer to the Metro Vancouver Katzie Pump Station. In addition, the Study Area east of 240 Street is also outside the Metro Vancouver Urban Containment Boundary and regional sewerage area and would require additional coordination with the Greater Vancouver Sewerage & Drainage District to understand wastewater treatment capacity. Class D cost estimates have been generated for the sanitary pump station and sewer system to connect the KFN lands to the 240 Street gravity sewer.

The Sanitary Master Plan (AECOM, November 2016) recommended upgrades for the sanitary sewer along River Road, which services the Albion Industrial Lands. These upgrades have been completed, and the sanitary sewer currently has capacity to service the Albion Industrial Lands. Additional identified upgrades which could service the Central Lands, KFN Lands, and Eastern Lands include the option for twinning the existing gravity sanitary sewer along River Road from 240th Street to the 225 Street Pump Station. This upgrade was identified to service possible future densification of the Thornhill Urban Reserve development. The Sanitary Master Plan (AECOM, November 2016) estimated an approximate cost of $6.2M (2016 dollars) for offsite works only, and did not include purchase of land / ROW, or additional pump station requirements. The engineering and contingency contributions for this cost estimate were not reported in the Sanitary Master Plan (AECOM, November 2016). For the purposes of this study, 5.5 km of sewer twinning was considered for the Class D cost estimate. The cost of sewer twinning could potentially be shared between the proposed industrial lands and Thornhill Urban Reserve.

Following serving the KFN Lands and Eastern Lands, local collection system to direct flows from sites to a centralized pump station system would be required.

Table 3 below summarizes sanitary servicing strategies and associated high-level class D cost estimates.

Table 3: Summary of Sanitary Services Strategies

Strategy Name	Description	Class D Costs (2024 Dollars)
S1	KFN Lands Sanitary Pump Station	$2,000,000 to $3,000,000
S2	1.5 km of Forcemain / Gravity Sewer from KFN Lands to 240 Street with the option to connect Area 3	$4,200,000
S3	5.5 km of Gravity Sanitary Sewer Twinning from 240 Street to 225 Street Pump Station	$12,900,000
Total		**$19,100,000 to $20,100,000**

*Cost could be shared with Thornhill Urban Reserve

8.3.2. Water Distribution

Similar to the sanitary system, there are no local municipal water distribution systems servicing the KFN Lands and Eastern Lands. The Master Water Distribution Plan (KWL, 2016) assessed the option of servicing the KFN Lands through the 158 m Albion zone. This option would avoid the Lougheed Highway

and CPR ROWs, but requires upgrades to the Albion Booster Pump Station and feeder transmission watermain along 240th Street and 104th Avenue. A feeder pipe would be installed on 248th Street between 100th Avenue and the KFN Lands. In addition, a local distribution system including reservoir sizing for system balancing, fire protection, and emergency storage, and potential pressure reducing values, pumps, etc. would be required to service each site. The Eastern Lands could be serviced by the water distribution system in the KFN Lands.

Based on findings in Master Water Distribution Plan (KWL, 2016), the Albion Booster Pump Station upgrade would involve increasing the firm pumping capacity to provide the addition MDD from the KFN Lands and Eastern Lands (e.g. increase firm capacity by an additional 31 to 34 L/s) and be used to refill a new reservoir on the KFN Lands. Proposed upgrades to the 240th Street and 104th Avenue transmission main would likely require upsizing segments of 400mm to 450mm or 500mm, however this upgrade will need to be re-assessed if development in the Thornhill Urban Reserve or densification in the Albion area proceed. The feeder transmission main has approximately 320 metres of 400mm pipe along 240th Street which is considered as a required upgrade as part of this study. The feeder main to connect the 158 m Albion zone to the KFN Lands is assumed to be a 75-metre-long feeder main, as per the Master Water Distribution Plan (KWL, 2016).

For the Albion Industrial Lands, the Master Water Distribution Plan (KWL, 2016) recommended upsizing local watermains along McKay Avenue and Fisherman Road to 250mm pipe and adding looping the local watermain system with the River Road watermain for redundancy.

Water distribution system servicing strategies are summarized below in *Table 4*.

Table 4: Summary of Water Distribution System Servicing Strategies

Strategy Name	Description	Class D Costs
W1	Increase firm capacity of the Albion Booster Pump Station	$1,500,000 to $2,000,000
W2	320m of Feeder Transmission Main Upgrades along 240 Street	$600,000
W3	75m of Feeder Main from 248 Street to KFN Lands boundary	$120,000
W4	450m of 250mm Watermain Upsizing and Looping	$700,000
Totals		**$2,920,000 to $3,420,000**

8.4. COST ESTIMATES

This section summarizes cost estimates for the servicing explored in the servicing memos in *Appendix C* and *Appendix D*. Cost estimates for servicing strategies in *Table 5* use "Class D" (±50%) planning-level unit rates which are based on recent similar projects in the City of Maple Ridge and the Lower Mainland. The memos in *Appendix C* and *Appendix D* provide more complete details, assumptions, and exclusions associated with these estimates.

Table 5: Summary of Servicing Costs Per Item

Task Description	Estimated Cost (low end of range)	Estimated Cost (high end of range)
Additional desktop study: to better understand aquifer lithology (Aquifer 970) and fracture potential (Aquifer 19), assess potential well yields, and prepare preliminary well designs for contractor estimates (including total drilling depth)	$8,000	$15,000
Well Drilling: exploration and production wells (*cost per well*)	$30,000	$75,000
Pumping Tests: are recommended to determine the long-term capacity of each production well. They are required in support of a water license for groundwater extraction. (*Cost per test)*	$28,000	$65,000
Data analysis in support of water license application (depends on number of production wells, potential for mutual well interference, and potential impacts on other users and environmental surface water flows)	$10,000	$50,000
Total Estimated Cost assuming NINE production wells	**$540,000**	**$1,325,000**
S4 - Centralized sanitary treatment plant on KFN lands (Strategy S4 would be implemented instead of S1-S3 below)	$16,000,000	$20,000,000
Total cost of independent treatment plant	**$16,000,000**	**$20,000,000**
S1 - KFN Lands Sanitary Pump Station	$2,000,000	$3,000,000
S2 - 1.5 km of Forcemain / Gravity Sewer from KFN Lands to 240th Street with the option to connect Area 3	$4,200,000	$4,200,000
S3 - 5.5 km of Gravity Sanitary Sewer Twinning from 240th Street to 225 Street Pump Station	$12,900,000	$12,900,00
Total Estimated Cost of Sanitary Servicing Extensions	**$19,100,000**	**$20,100,000**
W1 - Increase firm capacity of the Albion Booster Pump Station	$1,500,000	$2,000,000
W2 - 320m of Feeder Transmission Main Upgrades along 240th Street	$600,000	$600,000
W3 - 75m of Feeder Main from 248th Street to KFN Lands boundary	$120,000	$120,000
W4 - 450m of 250mm Watermain Upsizing and Looping	$700,000	$700,000
Total Estimated Cost of Water Extensions and Upgrades	**$2,920,000**	**$3,420,000**

8.4.1. Costs Per Site

In *Table 6* below the cost of servicing upgrades has been attributed to each site on an area basis. Note that a significant amount of the cost is for site preparation, rather than infrastructure extension, as the soil conditions in the area are poor and require removal and replacement with up to one metre of construction grade fill and other works to develop.

Table 6: Summary of Servicing Costs Per Site ($100,000s)

Site	Site Area (ac)	Geotechnical Study	Transportation Impact Analysis	Site Preparation[3]	S1 [4]	S2	S3	W1 [3]	W2	W3	W4	TOTAL	TOTAL per ac
1A	**46.5**	$0.20	$0.25	$282	-	-	-	-	-	-	$2.79	**$285**	**$6.13**
1B	**52**	$0.20	$0.25	$210	-	-	-	-	-	-	$3.12	**$214**	**$4.11**
2	**18**	$0.20	$0.25	$73.1	-	-	-	-	-	-	$1.09	**$74.6**	**$4.14**
3	**11**	$0.20	$0.25	$135	-	$3.73	$8.41	-	-	-	-	**$148**	**$13.4**
4	**10**	$0.20	$0.25	$120	$2.16	$3.31	$7.48	$1.09	$0.37	$0.07	-	**$135**	**$13.5**
5A	**27**	$0.20	$0.25	-	$5.90	$9.03	$20.4	$2.96	$1.01	$0.20	-	**$39.9**	**$1.48**
5B	**14**	$0.20	$0.25	-	-	-	$10.7	$1.55	$0.53	$0.11	-	**$13.3**	**$0.95**
5C	**12**	$0.20	$0.25	-	-	-	$9.16	$1.33	$0.46	$0.09	-	**$115**	**$0.96**
5D	**19**	$0.20	$0.25	-	-	-	$14.4	$2.09	$0.72	$0.14	-	**$17.8**	**$0.94**
6A	**24**	$0.20	$0.25	$291	$5.25	$8.04	$18.1	$2.63	$0.90	$0.18	-	**$327**	**$13.6**
6B	**11.5**	$0.20	$0.25	$141	$2.54	$3.89	$8.79	$1.28	$0.44	$0.09	-	**$158**	**$13.8**
6C	**29**	$0.20	$0.25	$117	$6.33	$9.69	$21.9	$3.17	$1.09	$0.22	-	**$160**	**$5.51**
7	**13**	$0.20	$0.25	$156	$2.81	$4.31	$9.72	$1.41	$0.48	$0.10	-	**$175**	**$13.6**
TOTAL	**287**	**$2.60**	**$3.25**	**$1,525**	**$25.0**	**$42.0**	**$129**	**$17.5**	**$6.00**	**$1.20**	**$7.00**	**$1,759**	**$6.13**

[3] Site preparation costs $1.21 million per ac for all sites except for Site 1A ($607,000 per ac) and Sites 1B, 2, and 6C ($405,000 per ac). Site preparation costs for Site 5 are assumed to be zero because this work is already underway and may be considered a sunk cost for our purposes.

[4] For cost items with a range ($2 - $3 million for S1 and $1.5 - $2 million for W1), the midpoint of the range is applied.

8.5. PHASING CONSIDERATIONS

Typical phasing strategies are developed when more details are known about specific forms of development, including road networks, servicing corridors, and conceptual site design, and are informed by biophysical, geotechnical and hydrological studies, and by decisions made by developers concerning the sequencing of revenue and expenditures associated with specific development sites.

From a cost and ease of servicing perspective, certain sites in the study area will be easier to bring to market than others. The Albion Industrial Area Sites 1A and 1B are already serviced, and upgrades to these water and sanitary systems are well known. What remains to be better understood is flood construction level and flood control improvements and what implications they may have on development in the area.

Given the concerns about the ability to meet water demands through water wells, as described in *Appendix C*, and the need for additional investigations which may or may not provide positive outcomes, it appears that servicing by traditional extension of services (generally from west to east) could offer the greatest certainty to meet servicing demands.

Based on the infrastructure servicing analysis, servicing the Study Area sites will require a staged approach. Stages could include:

1. Conduct additional studies and detailed designs for connecting sanitary and water infrastructure to the KFN Lands and Eastern Lands, and the interaction with the City's and MV's infrastructure. The Central Lands will need to be considered in the sanitary study.
    a. Consider conducting additional technical studies for a centralized sewage treatment and disposal facility including assessments for the feasibility and detailed cost of a riverine outfall and diffuser.
2. Conduct a localized stormwater and flood management study and servicing strategy for KFN Lands and Eastern Lands, and associated watershed / sub-watershed and the Fraser River. Additional studies for stormwater and flood management will be required in the Albion Industrial Area.
3. Conduct additional studies and detailed designs for local sanitary and water servicing, including sanitary sewers, water distribution mains, water reservoirs, and drainage infrastructure.
4. Complete upgrades to the City's 158 m Albion Zone booster pump station, 240th Street transmission feeder main, and connecting the City's water system to the KFN Lands.
5. Construct the KFN Lands' sanitary pump station and forcemain / gravity sewer along the Lougheed Highway / CPR ROW to 240th Street. Complete necessary upgrades to the City's sanitary sewer and 225 Street Pump Station to accommodate additional flows from the KFN Lands. Connect the Central Lands to the proposed sanitary forcemain / gravity sewer.
6. Construct local infrastructure in the KFN Lands and Eastern Lands to service sites.
7. Complete watermain upgrades in the Albion Industrial Lands.

9. Market Factors – Supply and Demand Analysis

9.1. INDUSTRIAL MARKET RESEARCH

9.1.1. Regional Industrial Market

The Lower Mainland is a geographic area that includes Metro Vancouver and the Fraser Valley region. By North American standards, the Lower Mainland is a challenging place for industrial operators according to local experts interviewed by MPLE. The region competes with industrial sites in Ontario, Alberta, and the United States and has very scarce and costly land values compared to those markets. The region's municipalities are also less aggressive in permitting and promoting industrial development here, unlike in Central Canada.

Notwithstanding the above, demand for industrial real estate in the Lower Mainland saw robust growth in the two years of post-pandemic market expansion between 2021 and 2022. The regional industrial vacancy rate sat below 1% for three straight years from mid-2020 to mid-2023. Meanwhile, rental rates rose unsustainably, with annual growth in average asking rates between Q4 2020 and Q4 2021 exceeding 25%[5]. This demand surge and supply shortage were particularly intense in the category of large-scale spaces tailored for distribution and third-party logistics, which are increasingly the backbone of the regional supply chain.[6]

The year 2023 saw normalization for the Lower Mainland industrial market after years of intense shortage. A substantial influx of new supply entered the market compared to the previous three years (7 million sq ft compared to 3.2 – 4.4 million sq ft), the vacancy rate moved closer to the 10-year average of 1.5%, and the average asking rental rates peaked and then declined. With the supply chain bottleneck gradually loosening and the impact of restrictive monetary policies hitting the economy and slowing the expansion of business operations and space demand, industrial rental rate growth slowed to 1.6% in 2023.

2024 saw the continuation and intensification of this trend with an industrial market slowdown unlike anything seen since the Global Financial Crisis of 2008. In response to global economic headwinds, high construction costs and interest rates, and softening revenue potential, the pace of new supply slowed considerably: the Lower Mainland saw 2.8 million sq ft of new industrial space in 2024, the slowest pace of development in more than a decade (annual growth takes in 2015 – 2023 ranged from 3 million to 7 million sq ft). And for the first time since before the Global Financial Crisis, absorption of industrial space in the region was negative, with almost 1 million sq ft less occupied space than one year earlier. Regional industrial vacancy rose to 3.1%, its highest level since 2014.

[5] Source: Colliers International (2024). Metro Vancouver Industrial Market Report Q4 2023.

[6] Source: NAI Commercial (2023). Metro Vancouver Industrial Market Report Q2 2023.

The short-term future of the regional industrial market is currently very uncertain because demand for industrial space will likely depend on the outcomes of trade conflict with the United States driven by US tariff policy and Canadian government responses to that policy at all levels.

At present, according to local experts interviewed by MPLE, the region is experiencing a shortage of land suitable for heavy industrial use. South Burnaby and Mitchell Island are good examples of this. To sustain its growth, the Lower Mainland will need additional warehousing, distribution, and building materials (cement, concrete, and lumber),. By contrast, most new industrial developments have consisted of logistics or business parks without much parking and with retail uses which are not good neighbours for industrial users.

Local experts report that generic industrial are not sufficiently viable to support current land values and that strata space is in low demand.

9.1.2. Maple Ridge and Pitt Meadows Industrial Market

Table 7: Maple Ridge and Pitt Meadows historical annual industrial market activity (2006 to 2024)[7]

Year	Inventory (ft^2)	New Supply (ft^2)	Absorption (ft^2)	Vacancy	Vacant space (ft^2)
2006	1,753,112			3.9%	69,116
2007	*1,791,181*	*38,069*	*25,350*	*4.6%*	*81,835*
2008	*1,829,752*	*38,572*	*25,350*	*5.2%*	*95,057*
2009	*1,868,837*	*39,085*	*25,350*	*5.8%*	*108,792*
2010	*1,877,751*	*8,915*	*25,350*	*4.9%*	*92,357*
2011	1,886,666	*8,915*	-32,191	7.1%	133,463
2012	*2,320,552*	*433,886*	*414,193*	6.6%	*153,156*
2013	*2,760,146*	*439,594*	*414,193*	*6.5%*	*178,557*
2014	2,899,266	*139,120*	133,914	6.3%	183,763
2015	2,899,266	-	134,527	1.7%	49,236
2016	*3,332,998*	*433,732*	*416,308*	2.0%	66,660
2017	3,779,526	*446,528*	*416,308*	2.6%	96,880
2018	3,863,757	84,231	161,612	0.5%	19,499
2019	4,035,798	172,041	55,927	3.4%	135,613
2020	4,035,798	-	79,451	1.4%	56,162
2021	4,180,316	144,518	193,537	0.2%	7,143
2022	4,416,588	236,272	223,247	0.5%	20,168
2023	5,280,588	864,000	859,368	0.5%	24,800
2024	5,392,168	111,580	-151,703	5.3%	288,083
Average		**202,170**	**190,005**	**3.6%**	

[7] Source: Colliers International (2007, 2012, 2014 – 2024). Metro Vancouver Industrial Market Statistics, 2007 – 2024). MPLE possesses only some Colliers industrial market reports. Items in italics are inferred from existing data.

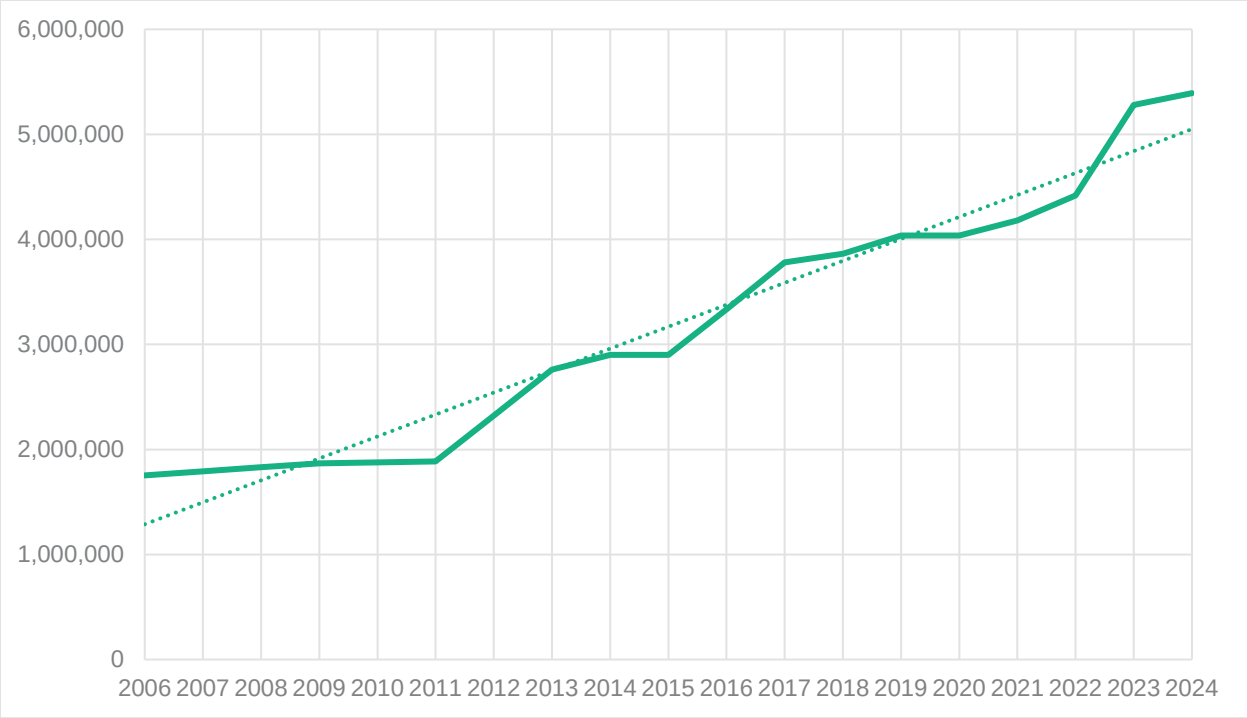


Figure 10: Maple Ridge & Pitt Meadows industrial inventory over time (ft²) [8]

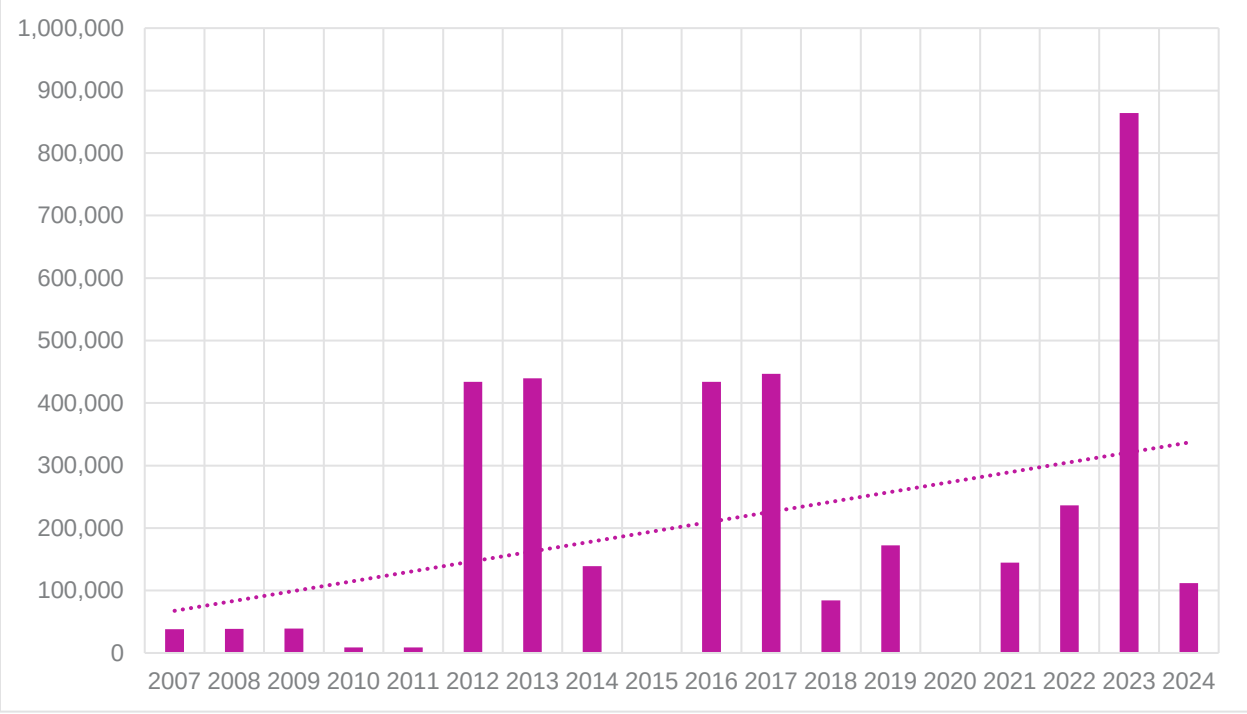


Figure 11: Maple Ridge & Pitt Meadows annual net new industrial supply over time (ft²) [7]

[8] Source: Colliers International (2007, 2012, 2014 – 2024). Metro Vancouver Industrial Market Statistics, 2007 – 2024).
Note that the increase of almost 900,000 sq ft of industrial floor space in Maple Ridge and Pitt Meadows in 2023 was largely due to the arrival of Golden Ears Business Park.

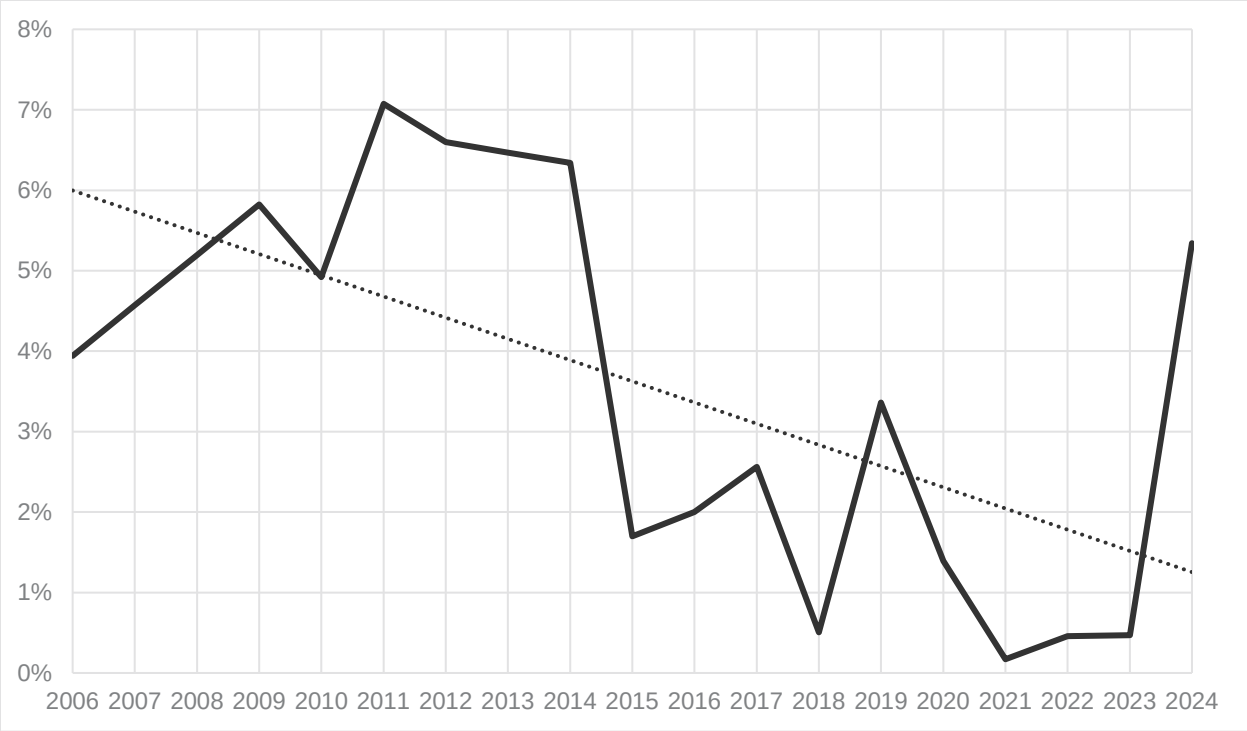


Figure 12: Maple Ridge & Pitt Meadows industrial vacancy over time[9]

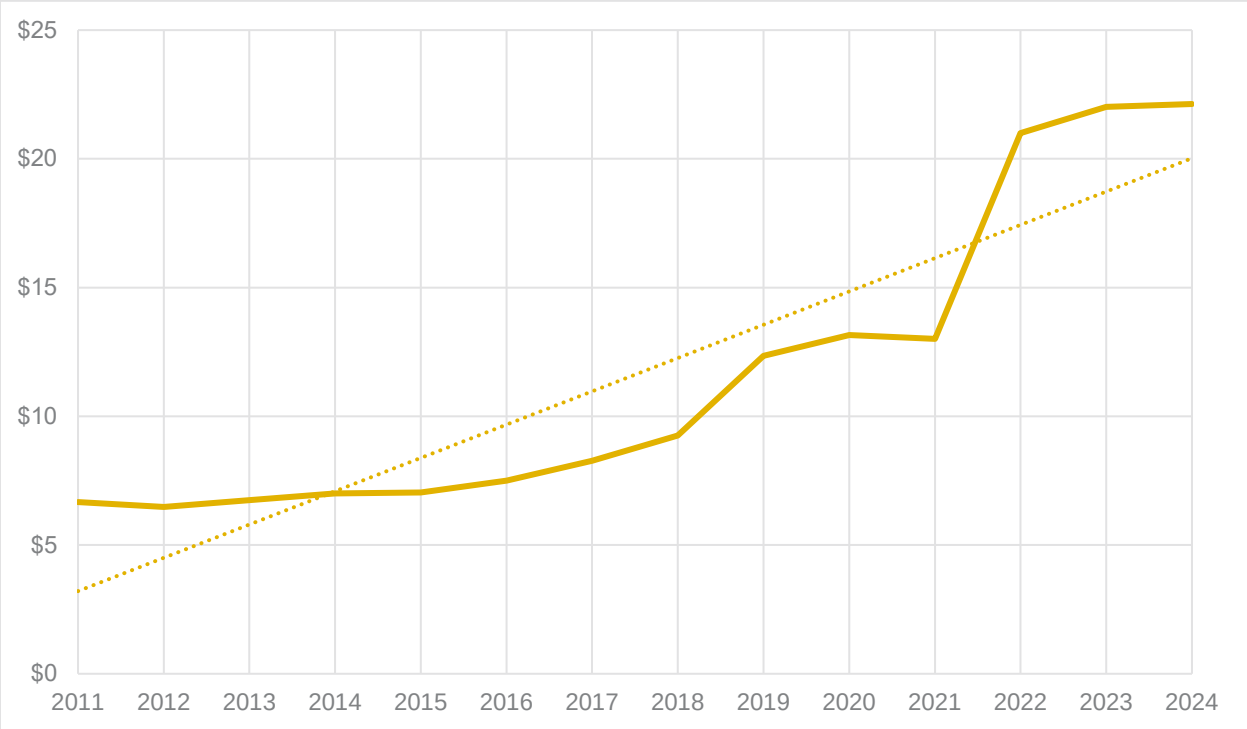


Figure 13: Average industrial asking rents in Maple Ridge & Pitt Meadows ($ per ft², triple net) [8]

[9] Source: Colliers International (2007, 2012, 2014 – 2024). Metro Vancouver Industrial Market Statistics, 2007 – 2024).

For many years, industrial activity has shifted within Metro Vancouver away from the central municipalities of Vancouver and the North Shore and towards more outlying areas such as Maple Ridge, Pitt Meadows, and Surrey. Increased demand for industrial space in Surrey caused increased rents and decreased vacancy, leading to increased demand in Langley, and so on. A wave of industrial demand and supply shortage therefore spread eastward and reached Maple Ridge and Pitt Meadows in 2015 as evidenced by a drop in vacancy rate from more than 6% to less than 2%. Consequently, from 2015 to 2024, industrial built space in Maple Ridge and Pitt Meadows increased by 86% whereas in Metro Vancouver overall it increased by only 19%. Since 2015, industrial vacancy in Maple Ridge has generally remained below 3% with many years below 1%. Asking rental rates have more than tripled from about $7 per square foot in 2015 to more than $22 per square foot in 2024. In line with regional trends described above, industrial vacancy in Maple Ridge and Pitt Meadows in 2024 increased abruptly from 0.5% to more than 5%, its highest level since 2014.

Local experts interviewed by MPLE report that as an industrial location, Pitt Meadows is just more attractive than Maple Ridge, but all throughout the region's northeast sector, available supply is challenged by small sites and poor access compared to the higher-access larger sites south of the Fraser River. Maple Ridge's population density and population composition are *not* barriers to industrial development; many of the community's residents are tradespeople and it is easy to attract employees to industrial businesses in Maple Ridge.

According to local experts interviewed by MPLE, Maple Ridge specializes in the primary sector (processing natural resources) rather than manufacturing. Current opportunities include:

- Storage and processing of aggregates.
- Outdoor storage (currently this is only available in Kanaka Business Park).
- Small bay space, particularly spaces of less than 5,000 ft^2.

By contrast, Maple Ridge is a challenging location for logistics because of its poor highway access and location relative to port terminals. Larger distribution companies might eventually locate in Maple Ridge but, at present, they prefer to locate near the Golden Ears Bridge, or elsewhere in the region, because that is the point of highest accessibility, or elsewhere in the region. In this regard, between Maple Ridge and Pitt Meadows, only Golden Ears Business Park in Pitt Meadows is suitable for logistical operations.

Additional observations about the market are summarized as follows:

- Demand is high, regional supply is low, and Maple Ridge has a large share of it. Demand for industrial land in Maple Ridge is expected to grow even compared to historical trends.
- It is expected that the Study Area will appeal to industrial users more than office users who are drawn more to the Town Centre, where there is better transportation access, off-site amenities, and proximity to other existing office uses.
- Relative to other municipalities in Metro Vancouver, Maple Ridge has the highest volume of new industrial development proposed, proving the City's industrial opportunity.
- Industrial development in the Metro Vancouver has been focused south of the Fraser River, in Surrey, Langley, and Delta. However, growth in these areas is anticipated to decrease going

forward due to a diminishing supply of vacant industrial land. Conversely, Maple Ridge has more than 1,000 acres of available industrial land, mostly located in northern Maple Ridge, although it would require roads, servicing, and City approvals.

- Recognizing these trends, it is estimated that over the next twenty years, demand for industrial land in Maple Ridge could be some 370 acres or 19 acres per year on average. Assuming 0.5 Floor Space Ratio (FSR), this would represent about 8 million square feet of new useable industrial floor space.
- Most short-term demand (to 2032) is anticipated to be met in the Kingston Business Park, Hammond Mills site, Kanaka Business Park, and Yennadon Lands. The Albion / KFN / Fraser River Study Area will be more important in the longer term.
- Preparing lands with necessary planning, roads, and services will be key to bringing them to market.

In mid/early 2024, Parcel Economics performed interviews and identified seven key themes:

1. The current supply of industrial land is insufficient to meet growing demand by industrial users.
2. Providing optionality and flexibility is key to meeting demand from a range of industrial for a range of building formats:
    a. Some promising industries include wood truss manufacturing, building supply manufacturing, truck and trailer storage, mobile trailer manufacturing, pipeline storage, and resource storage.
    b. Demand for small bay, single-level industrial by businesspeople and service-oriented tradespeople.
    c. Many suggest that stacked industrial is not a premium product and is not as desirable as traditional options. Not viable.
3. Incorporating green infrastructure is challenging due to added costs for tenants.
4. Built form is tied to location, land capacity, and industry type:
    a. 10,000 ft^2 units are optimal across most industries.
    b. Coverage typically ranges from 42% - 55% and can go as high as 65%.
    c. Maple Ridge should focus on creating lot patterns that allow for either large lots or subdivision into smaller lots, for flexibility to maximize potential range of users.
    d. Clear heights typically range from:
        - For small bay users: 24 – 26 ft.
        - For big bay users: 28 – 32 ft.
        - For logistics and distribution: 36 – 40 ft.
    e. Mezzanine space is typical, and usually ranges from 2,000 – 5,000 ft^2
5. Transportation and access are key to supporting industrial users: For the Study Area, an improved road network would be helpful and in particular the ability to turn left onto and off of Lougheed Highway.

6. Maple Ridge has many advantages that will help attract industries and employees.
7. Reducing costs and improving services is key to drawing industrial development to Maple Ridge.

In summary, Maple Ridge's main advantages include competitive land pricing, availability of vacant land, and access to skilled labour. Its disadvantage is the transportation network, including narrow roadways, limited turning radii, separation from major highways, and limited transit connectivity.

9.1.3. Study Area Market Research

Local experts interviewed by MPLE agree that these are challenging development sites due to the following barriers:

- Slopes.
- Poor highway, rail, and transit access.
- Right-only turns off of and onto Highway 7.
- Lack of infrastructure.
- High servicing costs and geotechnical and remediation issues.
- Lack of amenities.
- Environmental regulations reduce net usable space.
- Slow environmental studies and approvals.

Particularly for trade and transportation related uses, the further a site is from Highway 1, the lower its lease value or price will be, and these sites are at a considerable distance from Highway 1 compared to competing sites in Surrey, Langley, and even Pitt Meadows or elsewhere in Maple Ridge. Given their high costs, only strata industrial – rather than rental – would have the upfront cash flow to consider developing these sites. In general, land values are not where they would need to be to support the development of such sites given their associated risk profile; developers want a degree of certainty that is impossible to find in today's market.

Water access is a strength of the Study Area.

We received the following site-specific comments from interview subjects:

- Site 1: much of Site 1's available land is classified as wetland (23295 River Road) and has therefore struggled to develop.
- Sites 1 and 2:
    - This area is already developed with a mix of wood processing and outdoor-oriented light industrial users. There is very little logistics
    - This area is convenient for users who need more yard space.
    - Many owner-occupants
    - One challenge this area faces is that the City blocked off the second access to Highway 7 at River Road and Tamarack Lane

    - McKay Avenue gets blocked when the rail spur to Stella Jones is in use. This imposes periodic 5 – 10 minute delays
    - Fisherman Road is narrow and its business require street parking, resulting in traffic greater than the road's capacity.
    - Overhead power lines can be knocked down by car collisions, resulting in hazard and power outages. Underground lines would be better.
- Site 3: this Site's main barrier is the lack of left turn access and egress to Highway 7
- Sites 3 through 5: Steep slopes are a big barrier to development
- Sites 3, 4, 6, and 7:
    - Sites have riparian silt, which is harder to build on and not stable.
    - Sites have floodplain issues. Heavy power of the kind industrial users would probably want would require complete site fill to elevate the powered components.
    - The floodplain also imposes insurance risk.
- Sites 3 through 7:
    - Insufficient water and sanitary services.
    - Schedule 2 earthworks is a big cost that will impact development potential.
- Site 5:
    - These sites contain blue clay soil, which is terrible for industrial use because it is unstable
    - Topography is also an issue; these sites are too steep and interrupted with many streams.
- Site 6: this is a promising site but the rail line that runs through it is a barrier. A rail spur would be very helpful to some industrial users, but it is likely cost prohibitive.

Interview subjects expressed that the following uses might be appropriate for development within the Study Area:

- General uses (applicable to all or most sites):
    - Manufacturing but not logistics:
        - Lower-intensity uses with greater outdoor / yard needs
        - 1 – 4 ac parcels with 25% site coverage
        - Similar to what already exists in Sites 1 & 2
    - HVAC repair.
    - Outside storage (1 – 2 ac parcels).
    - Heavy industry: processing of wood or aggregate.
    - Local, service-based industrial users such as recreation or craft brewing. Such uses would occupy small-bay industrial spaces.
- Sites 1 and 2:

  - Largely already developed and active. Expect infill to resemble existing built form and activities.
  - No potential for large-scale redevelopment, at least not in the short or medium term due to fragmented nature of sites, small parcel size, and until larger sites turnover.

- Sites 3 through 7:
  - Small-scale development similar to existing use of Sites 1 & 2:
    - 1 ac parcels
    - 25% site coverage
    - Needs power and water to lot line, drainage, and levelled and packed ground.
  - Off-dock logistics (although this would be challenged by the area's poor access)
  - Film studio:
    - Components:
      - Two to three studio buildings with 30,000 – 70,000 sf each. Buildings would have large internal space (limited internal beams that complicate filming) and need to be sturdy enough to support equipment rigging. Minimum height of 30 ft, and ideally 36 – 50 ft. Soundproofing and insulation
      - Some office space
      - 10,000 sf of mill space for carpenters
      - 5,000 – 10,000 sf wardrobe
    - Sufficient parking for workers and hair & makeup trucks, about 80 – 100 stalls
    - Three phase power, and water sufficient for office use.
    - The film industry recently received favourable tax conditions within the Province of BC. Demand for this use is high and industry experts interviewed by MPLE suggest that at least several years of market growth are expected.
    - This use may be negatively impacted by the presence of an active rail line in the site due to unwanted noise. Further investigation may be required to verify this land use's specific technical needs and whether Site 4 would in fact be an appropriate location.
  - Automotive uses
  - District energy systems
  - Future Sky Train rail yard
  - Lithium ion battery manufacture

- Sites 3, 4, 6, and 7 (foreshore sites): Short haul shipping. This use consists mostly of open space.
- Sites 6 and 7: Relatively better positioned for heavy industrial uses due to lack of residential adjacency.
- Site 6: In an interview, Sanscorp suggests a possible expansion which would include:
  - Addition of a rail spur for improved access
  - Site 6C:

        - Continuation of the current aggregate processing operation (9 ac)
        - A bagging plant (5 ac)
    - Sites 6A and 6B:
        - Concrete plant and/or asphalt plant (5 ac each)
        - Laydown yard.

Unfortunately, we were not able to acquire reliable local information regarding the economics of concrete, asphalt, or bagging plants, and so we could not financially model this scenario.

Interview subjects recommended the following policy interventions to facilitate development in the Study Area:

- **Easier approvals**: development approvals should be faster and more flexible. With that said, note that Maple Ridge is not particularly slow or challenging compared to regional norms, but improvement is still possible. Regulatory streamlining would also help with costs and risk, because over time rates go up, so the less time passes, the less likely a development is to experience a rate increase.
- **Fronting servicing**: servicing timelines are too slow to attract developer attention. Aim for turnkey sites with servicing in place. This would save time and ensure investor and developer confidence. This could be achieved through something like an area specific municipal DCC.
- **Area improvements to Sites 1 and 2**:
    - Underground pipe to replace ditch on Fisherman Road, which would also help with parking issues
    - Underground power would pose less risk of outage due to traffic accidents
    - Improved lighting and more police presence to improve security.
- **Better transit access (or shuttle service)**: to increase access to the labour pool.
- **Development incentives**: tax holidays for green industrial users, or lower DCC costs. For example, the City of Delta grants tax breaks to allow site remediation, which might be helpful here where we expect significant preload.
- **Parking**: do not set parking requirements too high. For example, Campbell Heights in Surrey has too much parking.
- **Streamline Port of Vancouver involvement**: Interview subjects report that working with the Port of Vancouver can be a challenge. Communication tends to include long waits and rejected proposals.

9.2. DEVELOPMENT FINANCIAL ANALYSIS

MPLE has developed a financial model analyzing the development economics of the Study Area's eight industrial sites (Sites 1A, 1B, 2, 3, 4, 5A, 6, and 7) under several land use scenarios. The purpose of this model is to determine each development scenario's residual land value and compare it to the site's 'current' land value (as reported by BC Assessment, as of July 1 2024) to determine which industrial development scenarios might be viable in the Study Area in the near future.

The residual value is the maximum supported land value a developer could reasonably pay for the site (under the density and conditions tested) while achieving an acceptable return for their project. This means that a developer could pay the indicated value for the land, develop and sell or lease the finished product, and achieve the target performance metric. If by chance the land were bought for less than the indicated value, this would result in an increased profit for the developer and conversely if bought for more than the value indicated there would be less profit for the developer.

9.2.1. Methodology

This analysis uses a standard develop pro forma wherein estimates of revenue, costs, and timing are inputs and the remaining variable is the desired output. In typical proformas, this output is usually profit, following a revenue minus costs equals profit formula. For a residual land valuation, however, an assumption of developer's return needs to be included in order to leave land value as the outstanding variable to solve for.

For these analyses, MPLE determines the residual land value based on the developer achieving acceptable project performance. The performance metric applied here is annual internal rate of return (IRR): the IRR is the interest rate of a hypothetical asset that produces interest at the same pace that the project in question produces revenue. A higher IRR represents faster profit or greater profit over the same timeframe. IRR is a better measure of project viability than simple profit-to-cost for projects that generate revenue over a longer timeframe because the former reflects the time value of money whereas the latter does not. In this model, land value is based on the developer achieving the following annual IRR:

- Generic industrial with strata tenure: 17.5%.
- Higher risk revenue-generating uses (short sea shipping and aggregate processing): 10%.
- Lower risk revenue-generating uses (all other uses): 7.5%.

Generic industrial is assumed to include a mix of strata and rental product. To assign a residual land value to these scenarios, we divide all costs and all revenues between the strata and rental components, and we assume that each component achieves its target IRR.

9.2.2. Scenarios

This financial analysis looks at the future use scenarios presented in *Section 7* of this report. For modelling purposes, we provide the following more precise parameters:

- Generic industrial with 25% site coverage (Sites 1A, AB, 2, 3, 5A, 6, & 7):
    - Tenure: 50% strata and 50% rental.
    - Density: 0.31 FSR.
- Generic industrial with 40% site coverage (Sites 1A, AB, 2, 3, 5A, 6, & 7):
    - Tenure: 50% strata and 50% rental.
    - Density: 0.50 FSR.
- Film studio (Site 4):
    - Tenure: fully rental.
    - Density: 0.60 FSR.

- Marine industry (Site 2):
    - Tenure: 50% strata and 50% rental.
    - Dock use produces annual revenue for developer-owner.
    - Density: 0.50 FSR.
- Short sea shipping (Sites 1B, 2, & 6) or aggregates processing (Sites 1B, 4, & 6):
    - Open space / yard except for 5,000 ft^2 of administrative office.
- Concrete plant (Sites 1B, 2, & 6): not analyzed due to lack of data.

We assume that all of Sites 1 and 2 are buildable (gross land area equals net land area) but Sites 3 through 7 will lose 15% of gross land area to roads.

Combining these assumptions with the land use scenarios presented in *Section 5* yields the following overall built space totals:

- Site 1A:
    - Generic industrial with 25% site coverage: 632,000 ft^2
    - Generic industrial with 40% site coverage: 1.01 million ft^2
- Site 1B:
    - Generic industrial with 25% site coverage: 706,000 ft^2
    - Short sea shipping: 5,000 ft^2
    - Aggregate processing: 5,000 ft^2
- Site 2:
    - Generic industrial with 25% site coverage: 246,000 ft^2
    - Generic industrial with 40% site coverage: 393,000 ft^2
    - Marine industrial: 393,000 ft^2
    - Short sea shipping: 5,000 ft^2
- Site 3:
    - Open storage: no built space
    - Generic industrial with 25% site coverage: 129,000 ft^2
    - Generic industrial with 40% site coverage: 206,000 ft^2
- Site 4:
    - Open storage: no built space
    - Film studio: 258,000 ft^2
    - Aggregate processing: 5,000 ft^2
- Site 5A:
    - Open storage: no built space
    - Generic industrial with 25% site coverage: 312,000 ft^2
    - Generic industrial with 40% site coverage: 499,000 ft^2

- Site 6:
    - Open storage: no built space
    - Short sea shipping: 5,000 ft^2
    - Aggregate processing: 5,000 ft^2
- Site 7:
    - Open storage: no built space
    - Generic industrial with 25% site coverage: 149,000 ft^2.

We assume that development of each scenario occurs according to the following timeline:

- Year 1: Land purchase, approvals acquired, research completed.
- Year 2: Site servicing and site preparation.
- Year 3: Construction.
- Year 4: Operation and/or sale.

Open storage has no construction so in those scenarios, operation begins in Year 3.

MPLE assumes that the market will absorb up to 100,000 ft^2 of generic industrial or marine industrial space per site per year comprised of 50,000 ft^2 of strata space and 50,000 ft^2 of rental space. It would be unlikely for the market to achieve this pace of absorption on all sites at the same time; in practice we would expect sites with similar uses to develop in sequence. This model looks at these sites independently, or as if each site is the first of its product type to development. In generic industrial or marine industrial scenarios, we therefore assume that construction occurs in annual phases of 100,000 ft^2. This produces the following timelines:

- Site 1A:
    - Generic industrial with 25% site coverage: 7 years of construction.
    - Generic industrial with 40% site coverage: 11 years of construction.
- Site 1B generic industrial: 8 years of construction.
- Site 2:
    - Generic industrial with 25% site coverage: 3 years of construction.
    - Generic industrial with 40% site coverage: 4 years of construction.
    - Marine industrial: 4 years of construction.
- Site 3:
    - Generic industrial with 25% site coverage: 2 years of construction.
    - Generic industrial with 40% site coverage: 3 years of construction.
- Site 5A:
    - Generic industrial with 25% site coverage: 4 years of construction.
    - Generic industrial with 40% site coverage: 5 years of construction.

- Site 7 generic industrial: 2 years of construction.

9.2.3. Cost Assumptions

For purposes of financial analysis, MPLE has made the following assumptions regarding project costs:

- Land costs:
    - Land price: calculated to achieve project performance targets defined in *Section 9.2.1*.
    - Property transfer tax: 1% of land value below $200,000, 2% of land value between $200,000 and $2 million, and 3% of land value above $2 million.
    - Additional closing costs of $50,000.
- Hard costs:
    - Site servicing costs as defined in *Table 6*.
    - Site servicing connection fee:
        - Outdoor storage: zero.
        - Short sea shipping or aggregate processing: $10,000 total.
        - All other scenarios: $10,000 per gross hectare of land area.
    - Fencing for outdoor storage, short sea shipping, and aggregate processing: $2,000 per hectare.
    - Building construction:
        - For film studio: $165 per ft^2
        - For all other scenarios: $150 per ft^2
        - Parking construction of $6,000 per stall (surface), with the following quantities:
    - Outdoor storage: 4 – 12 stalls depending on site size.
    - Short sea shipping or aggregate processing: 20 stalls.
    - Film studio: one stall per 2,000 ft^2 of built area.
    - All other scenarios: one stall per 1,000 ft^2 of built area.
    - Dock construction:
        - Marine industrial: $250,000.
        - Short sea shipping or aggregate processing: $1.75 million.
    - Tenant improvements, per ft^2 of built space:
        - Generic industrial with 40% site coverage, or marine industrial: $19.50.
        - All other scenarios: $21.
    - Hard cost contingency equal to 25% of site servicing costs, plus 10% of all other costs listed above.
- Soft costs:
    - Project management: 2% of project costs
    - Architect fee: 1% of building construction costs without contingency
    - Engineering fee: 5% of sanitary sewer, water, and site preparation costs including 25% contingency

- Other consultant fees: 1% of hard costs.
- Research & appraisal:
  - Outdoor storage: $20,000.
  - All other scenarios: $100,000.
- Surveying:
  - Outdoor storage: $20,000.
  - All other scenarios: $100,000.
- Accounting:
  - Outdoor storage: $20,000.
  - All other scenarios: $100,000.
- Legal costs:
  - Outdoor storage: $20,000.
  - All other scenarios: $100,000.
- Insurance: 0.5% of hard costs.
- Subdivision fees: $2,653 plus $106 per parcel created in the following scenarios:
  - Site 1A – 9 new parcels.
  - Site 1B generic industrial – 6 new parcels.
  - Site 7 generic industrial – 3 new parcels.
- Engineering inspection: 4% of sanitary sewer, water, and site preparation costs including 25% contingency.
- Development permit:
  - No development permit fees for Site 5 (KFN Lands).
  - In all other scenarios:
    - Environmental development permit: $3,184.
    - Landscape design review & inspection: $3,184.
    - Plus, in scenarios that include built space:
      - Development permit base: $3,184.
      - $106 per 100 m^2 of built space.
    - Plus, in phased scenarios (generic industrial and marine industrial):
      - Phased strata plan approval: $1,061.
      - Strata phase review: $531 per phase.
- Building permit:
  - No building permit fees in Site 5 (KFN Lands).
  - In other scenarios:
    - Building permit engineering service review: $53.
    - Yard inspection: $106.

  - For each phase of construction, $1,265 plus $9.75 per $1,000 of building construction and dock construction costs above $100,000, including 10% contingency.
  - Development cost charges (DCCs) of $21.10 per sq ft of building area consisting of:
    - Municipal DCCs: $4.52 per sq ft
    - Metro Vancouver DCCs: $16.91 per ft^{2T}
    - TransLink DCCs: $0.33 per $ft^{2.}$
    - DCCs are not charged to Site 5 (KFN Lands)
  - Utilities during construction: $10,000 per year of servicing or construction
  - Property taxes: $10.6565 per $1,000 of land value during construction period, plus taxes on component during sales period.
  - GST: 5% of project value, paid by purchasers in the case of strata products.
  - Advertising & promotion: 2% of project value, except for aggregate processing.
  - Lease commission: 20% of normalized annual rental revenue for rental portion of generic industrial and marine industrial scenarios.
  - Corporate overhead: 2% of project costs.
  - Miscellaneous development costs: 2% of all soft cost items above.
  - Soft cost contingency: 10% of all soft cost items above.

- Financing costs:
  - Amount of financing available:
    - For generic industrial and marine industrial: 50% of land value,
    - 75% of other project costs.
    - For all other scenarios: available financing limited to a mortgage with 25-year amortization and a debt cost ratio of 1.25. That is, mortgage payments equal 80% of normalized net operating income.
  - Financing fee: 1.25% of financed amount.
  - Interest rate: 7% annually.

- Cost escalation: MPLE assumes that project costs will increase by 2% per year.

9.2.4. Revenue Assumptions

For purposes of financial analysis, MPLE has made the following assumptions regarding project revenues, all based on local property sales and rental data as well as interviews with local experts:

- Generic industrial strata sales:
  - 25% site coverage: $475 per ft^2, minus 3% sales commission.
  - 40% site coverage: $445 per ft^2, minus 3% sales commission.

- Generic industrial rental and film studio:
  - Rental rate:
    - 40% site coverage: $19.50 per ft^2 per year.
    - 25% site coverage, or film studio: $21 per ft^2 per year.

  - Vacancy rate:
    - First year of operation: 10%
    - Second year of operation: 5%
    - Ongoing operation: 2%
  - Operating costs: $12 per ft^2 of vacant space.
  - Structural reserve fund: 1% of rental income net of operating costs.
  - Periodic structural maintenance: $1.5 per ft^2 of built area per year.
- Marine industrial is just like generic industrial with 40% site coverage, except:
  - The dock produces annual revenue of $55,000.
  - The dock produces annual costs of $16,500.
- Outdoor storage:
  - Rental rate: $2.75 per ft^2
  - Vacancy rate:
    - First year of operation: 20%.
    - Second year of operation: 10%.
    - Ongoing operation: 2%.
  - Operating costs: $110,000 per year for security, plus property taxes.
- Short sea shipping:
  - Rental rate:
    - Yard space: $4.00 per ft^2
    - Office space: $21 per ft^2
  - Vacancy rate:
    - First year of operation: 20%.
    - Second year of operation: 10%.
    - Ongoing operation: 2%.
  - Operating costs:
    - Yard space: $110,000 per year for security, plus property taxes.
    - Office space: $12 per ft^2 of vacant space.
  - Structural reserve fund: 1% of office rental income net of operating costs.
  - Periodic structural maintenance: $1.5 per ft^2 of office space per year.
- Aggregate processing:
  - Revenue: In this analysis, it is assumed that the aggregate processing use achieves the same degree of intensity on all sites (9 ac in use per 29 ac gross, and $5 million in net revenue per 9 ac in use) observed elsewhere in Maple Ridge. This produces a total of $16 per ft^2 of gross site area.
  - Vacancy rate:

        - First year of operation: 20%.
        - Second year of operation: 10%.
        - Ongoing operation: 2%.
    - Operating costs: about 74% of gross revenue.
- Revenue escalation: MPLE assumes that sales revenue, operating revenue, and operating costs will increase by 3% per year.

9.2.5. Results: Residual Land Value

Using the financial model defined above, MPLE has identified the residual land value of each site under each development scenario and compared these supported land values to each site's assessed land value as of July 2024 according to BC Assessment. In cases where land assembly would be required, this value is increased by 20% to reflect assembly costs.

Development scenarios that support positive residual land values are viable developments – they would be profitable if they occurred – but if they cannot afford the lands that comprise their sites, they are unlikely to proceed without major changes to the market. Such scenarios should not be anticipated in the foreseeable future. Scenarios that support negative land value would not be viable even if the developer already owned the land.

The supportable and current land values are as follows. Positive items that do not exceed assessed land values are in **black**, negative items are indicated in **red**, and scenarios that are viable under present market conditions including land prices are indicated in **green**:

- Site 1A:
    - Generic industrial @ 25% site coverage: **$11.2 million**
    - Generic industrial @ 40% site coverage: **$15.4 million**
    - Current assessment + 20% assembly cost: **$214 million**
- Site 1B:
    - Generic industrial @ 25% site coverage: **$23.6 million**
    - Short sea shipping: **$48.4 million**
    - Aggregate processing: **$65.8 million**
    - Current assessment + 20% assembly cost: **$239 million**
- Site 2:
    - Generic industrial @ 25% site coverage: **$11.8 million**
    - Generic industrial @ 40% site coverage: **$16.2 million**
    - Short sea shipping: **$14.6 million**
    - Marine industrial: **$19.4 million**
    - Current assessment + 20% assembly cost: **$125 million**
- Site 3:
    - Outdoor storage: **-$5.51 million**
    - Generic industrial @ 25% site coverage: **-$6.83 million**

  - Generic industrial @ 40% site coverage: **-$3.75 million**
  - Current assessment + 20% assembly cost: **$21.0 million**

- Site 4:
  - Outdoor storage: **-$5.56 million**
  - Film studio: **$0.90 million**
  - Aggregate processing: **-$1.55 million**
  - Current assessment + 20% assembly cost: **$5.8 million**

- Site 5A:
  - Outdoor storage: **$30.0 million**
  - Generic industrial @ 25% site coverage: **$27.9 million**
  - Generic industrial @ 40% site coverage: **$36.6 million**
  - Current assessment + 20% assembly cost: **Kwantlen Lands, so not applicable**

- Site 6:
  - Outdoor storage: **$3.80 million**
  - Short sea shipping: **$14.1 million**
  - Aggregate processing: **$35.5 million**
  - Current assessment: **$32.9 million + KFN portion**

- Site 7:
  - Outdoor storage: **-$6.70 million**
  - Generic industrial @ 25% site coverage: **-$8.51 million**
  - Current assessment: **$29.8 million**

Looking at the results above, we see the following trends and findings:

- Sites 1 and 2 would be developable if the developer had already assembled the property. Under such conditions, the highest and best uses identified would be generic industrial at 40% site coverage (Site 1A), aggregate processing (Site 1B), and marine industrial (Site 2). However, because these sites are already developed and each contains many small parcels, their current land values are far in excess of what new development could afford. They should not be considered developable in the foreseeable future. Their highest and best use is therefore their current use.
- Site 3 is not viable for development under current market conditions. This is mostly due to its very high site preparation costs ($13.5 million) which dwarf its sanitary sewer costs ($1.2 million).
- Site 4 has similar issues related to high site preparation costs ($12.0 million), but a film studio would still be a viable use on this site if the developer already possessed the land. This use shows promise and may be “almost viable”. This is investigated in greater detail in *Section 9.2.6* below.
- Site 5A’s significant site preparation costs are assumed to be zero from the perspective of our hypothetical developer because site preparation work is already underway. As such, development

of this site is considerably more viable than other sites. Site 5A's highest and best use is generic industrial at 40% site coverage.

- Site 6 is viable. If its current aggregate processing operation were expanded to Sites 6A and 6B, it would support $35.5 million in land value, which is greater than the assessed value of the site's municipal component. This is a promising use that should be pursued. Note that Sanscorp's current aggregate processing operation at Site 6C is threatened by the regulatory environment so in reality the site is moving *away* from the use modelled here.
- Site 7 is not viable under any investigated scenario even if its land were free. This is due to high site servicing costs ($15.6 million).

9.2.6. Results: Sensitivity Analysis

Except for Sites 5 and 6, industrial (re)development in the Study Area is not generally viable currently due to a combination of high land prices and high site preparation costs. To gain a better sense of which industrial uses may be viable in the next decade, we have calculated for each scenario how much revenues would need to increase (with costs staying the same) for the development scenario's residual land value to exceed its present land value, triggering (re)development potential. Lower numbers represent more development potential, with values less than 50% indicated in green:

- Site 1A:
    - Generic industrial @ 25% site coverage: **+142%**
    - Generic industrial @ 40% site coverage: **+108%**
- Site 1B:
    - Generic industrial @ 25% site coverage: **+139%**
    - Short sea shipping: **+138%**
    - Aggregate processing: **+182%**
- Site 2:
    - Generic industrial @ 25% site coverage: **+174%**
    - Generic industrial @ 40% site coverage: **+119%**
    - Short sea shipping: **+410%**
    - Marine industrial: **+111%**
- Site 3:
    - Outdoor storage: **+194%**
    - Generic industrial @ 25% site coverage: **+77%**
    - Generic industrial @ 40% site coverage: **+77%**
- Site 4:
    - Outdoor storage: **+94%**
    - Film studio: **+6%**
    - Aggregate processing: **+40%**
- Site 5A: Already viable.

- Site 6:
    - Outdoor storage: **+42%**
    - Short sea shipping: **+27%**
    - Aggregate processing: **+4%**
- Site 7:
    - Outdoor storage: **+228%**
    - Generic industrial @ 25% site coverage: **+93%**

We see that Sites 1, 2, and 7 are very challenging to (re)develop; revenues would need to more than double to create the conditions for these sites to support current land values. Site 3 is not much better.

Site 4 is nearly developable as a film studio site. A revenue increase of only 6% would yield residual land value in excess of its current assessed value. Further analysis is needed to mitigate the noise impacts of this site's proximity to the rail line, but this is otherwise a promising use. It is worth noting that existing film studios exist in Burnaby that are immediately adjacent to active rail lines, so mitigation seems very likely to be possible.

Site 5 will support industrial use as soon as it is finished land preparation. Outdoor storage is the site's highest and best use, but this may switch to generic industrial with site coverage of 40% within the next decade.

Site 6 would require revenue increases of only 4% to support the expansion of its aggregate processing operation from site 6C to all three sites. Notwithstanding its promising economics, Sanscorp's current operation is threatened by river use and environmental regulations.

10. Recommendations

This section provides a summary of recommendations that the City should consider in order to bring these underutilized industrial lands to market, or to achieve enhanced utilization and intensification. Detailed recommendations follow in *Section 10.2* below.

10.1. SUMMARY OF RECOMMENDATIONS

Below is a list of recommendations for advancing industrial development, redevelopment, and densification on the sites in this study:

- The City and Metro Vancouver further discuss the potential to extend regional sewer and water servicing that could enable industrial expansion. This could include amendments to the regional sewerage area boundary, and studies that would support these boundary changes.

- The City and Metro Vancouver explore aligning land use designations. Advance a single amendment application for Metro 2050 to change land use designations for the areas in the OCP currently identified as industrial. This could be supported through the preparation of a local area plan.

- The City introduce a new Dry Industrial Zone to allow development of sites in the study area, with interim or temporary uses, especially in regard to the uses explored in *Section 7* of this report and consult with property owners on the potential support for, or concerns with the application of a new Dry Industrial zoning on un-serviced industrial lots (Sites 5A, 6A, 6B, 6C and 7).

- KFN leads discussion with members about the potential for changes to their land use plan, shifting from commercial development to industrial development for Sites 5A and 6A.

- The City enter into discussion with CPKC on crossings improvements and options for Sites 1A, 1B, 2 and 6A, 6B, 6C, and 7.

- The City enter into discussion with TransLink about service improvements and with MOTT about Highway 7 access improvements for all sites in the study area and what studies they would require in order to consider improvements. Improvements of interest include the following:
    - Access improvements to Highway 7 / Lougheed Highway at River Road and Tamarack Lane and at 240 Street.
    - Highway access to KFN lands, specifically Site 5A
    - Highway access improvements to Sites 6A through C via a single consolidated access point and an internal local road.
    - Right in / out highway access improvements for other sites in the study area.

- The Client Group should determine what further investigations or studies should be actioned given gaps in study findings thus far. Potential studies include:
    - High-level geotechnical analysis of study area sites to determine the soil conditions and feasibility of sites for the uses recommended in this report
    - Appropriate studies to establish the Flood Construction Level (FCL) of sites in the study area
    - Geotechnical investigation and report to confirm the adequacy of the underlying soils for trenching and / or trenchless construction methods for water and sanitary servicing extensions and if any special construction techniques may be required on the project.
    - Archaeological investigations and/or Environmental Impact Assessments to inform design of water and sanitary servicing extensions and if any special construction techniques may be required on the project, and the buildability of sites in the study area.
    - Before committing to the idea of a centralized plant, more assessment is required and should start with the feasibility and cost for the outfall. Once it is determined that an outfall is feasible, site selection should commence with the intent of optimizing the collection system to the plant, while minimizing site development costs. From there technology selection would precede final detailed design and approvals.
    - Conduct additional studies and detailed designs for connecting sanitary and water infrastructure to the KFN Lands and Eastern Lands, and the interaction with the City's and MV's infrastructure. The Central Lands will need to be considered in the sanitary study.
    - Consider conducting additional technical studies for a centralized sewage treatment and disposal facility including assessments for the feasibility and detailed cost of a riverine outfall and diffuser.
    - Conduct a localized stormwater and flood management study and servicing strategy for KFN Lands and Eastern Lands, and associated watershed / sub-watershed and the Fraser River. Additional studies for stormwater and flood management will be required in the Albion Industrial Area.
    - Conduct additional studies and detailed designs for local sanitary and water servicing, including sanitary sewers, water distribution mains, water reservoirs, and drainage infrastructure.
    - Traffic studies to determine the feasibility of access improvements to sites along Lougheed Highway
- Review and consider the recommendations in *Section 10.3.1* below, for access improvements in the Albion Industrial area (Sites 1A, 1B and 2).
- The Client Group should consider identifying all potential grant and funding sources that could be leveraged to fund recommendations and future studies referenced in this report. This could include matching grants and stacking grants to attract funding and to cover costs.

- Facilitate faster development applications to reduce developer risk and increase developer confidence.
- Devise cost-sharing plan for allocating shared infrastructure costs within the Study Area, such as an area-specific municipal DCC

10.2. POLICY

10.2.1. Regional Growth Strategy (RGS)

An amendment to Metro 2050 is needed to permit the industrial development of Site 4, by applying a Metro 2050 regional industrial designation to the site. This Type II amendment to Metro 2050 can increase the area of land designated as “Industrial” by 10 acres. The purpose of the amendment application should aim to create alignment of the OCP with Metro 2050.

An amendment to Metro 2050 is also needed to change the Rural designation of Site 3 to Industrial. However, given Site 3 is currently developed for residential uses and the City’s OCP also designated the site Rural Residential, this is not an urgent action.

Explore opportunities to apply to GVS&DD and GVWD to allow servicing extensions into the study area for the explicit purpose of enabling industrial development.

10.2.2. City of Maple Ridge OCP Policy and Map Amendments

An OCP amendment would be needed to bring some study area sites, such as Site 3 into an industrial use designation and, as mentioned above, this is not an urgent action until some form of lot consolidation occurs or the adjacent fill site at 24548 Lougheed Highway is readied for development.

OCP policy could be introduced to elevate the importance of the bring to market industrial actions and clarify the long-term vision for the development of the study area in an integrated manner.

10.2.3. Kwantlen Land Use Plan

A review of the *Kwantlen First Nation Land Use Plan Summary Report* indicates that there are known remediation issues with Sites 4, 5A, and 6A. These will need to be resolved or managed into order to proceed with development. It is outside the scope of this study to provide further advice on the remediation of these sites.

The *Kwantlen First Nation Land Use Plan Summary Report* indicates that the long-term development program for Sites 5A and 6A is commercial development. A change to the land use plan would be up to the processes and procedures of the KFN.

10.3. PROJECTS

10.3.1. River Road Access Improvements

McElhanney recommends further consideration of the Lougheed Highway – 240 Street and Lougheed Highway and River Road signalization enhancements. These recommendations are highlighted given the feedback on River Road access improvements from discussion with representatives at Vista Railing and Jewel Welding and Fabrication.

10.3.1.1.240 Street Left Turn Signal Phase onto Lougheed Highway

Currently there is a left turn lane on 240 Street northbound allowing turns onto Lougheed Highway westbound. The recommendation is to add a protected left turn signal phase to replace the existing permissive left turn at this location. This would allow smoother and more convenient truck access onto Lougheed Highway given the time it takes loaded semi trucks to gear up and make the turn.

10.3.1.2.River Road / Tamarack Lane and Lougheed Highway Intersection Improvements

This intersection is not currently signaled; it allows right in, left in access from Lougheed Highway to River Road, and River Road only provides right out access to Lougheed Highway. The recommendation is signalizing the intersection, as shown in *Figure 14* below. This could allow left out access to Lougheed Highway and protected left turns from Lougheed Highway into Albion Industrial via River Road. These upgrades would need to be connected to the CPKC railway crossing gates to provide coordinated turning movements across the railway main line. These improvements could enhance the intersection as a viable secondary access to the Albion Industrial area making it a more convenient location for transportation and logistics industries.

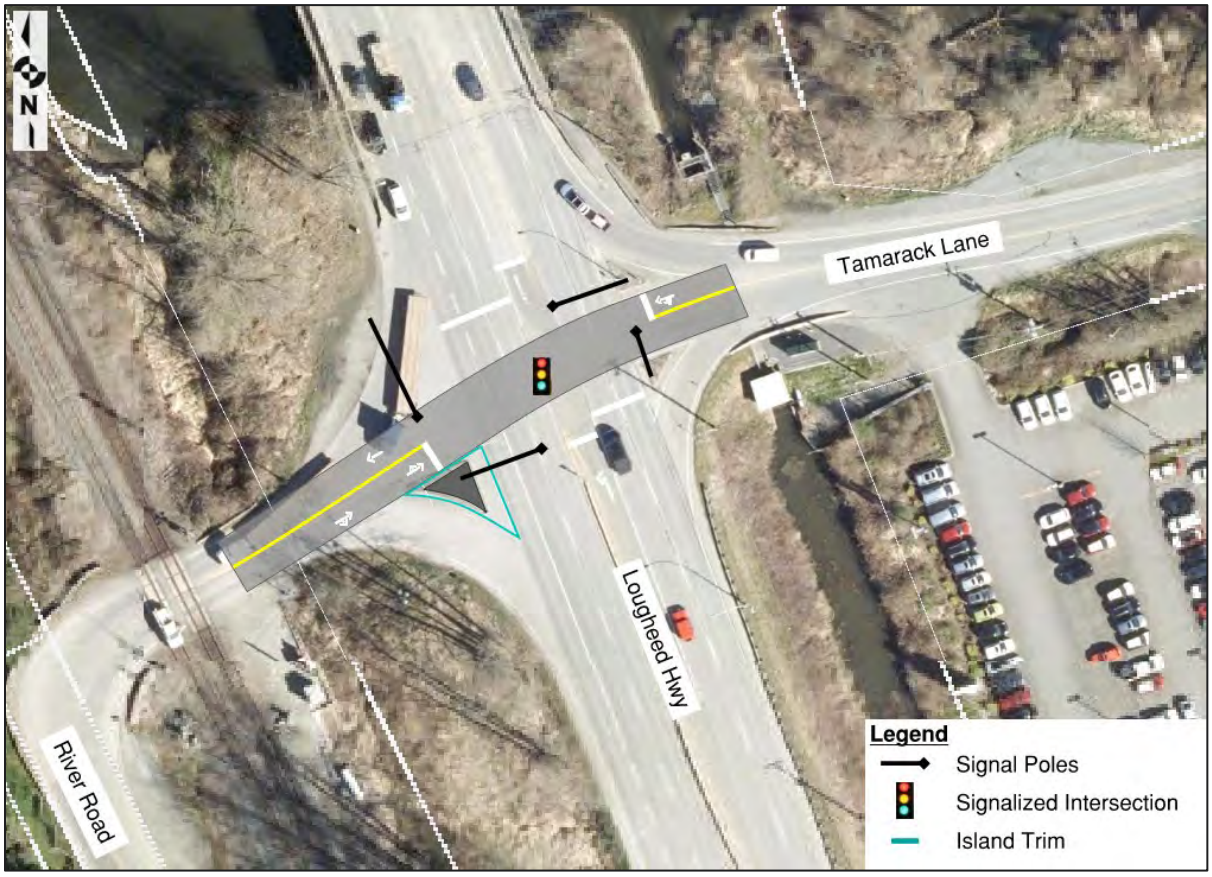


Figure 14: River Road / Tamarack Lane / Lougheed Highway Signalization

10.4. FUTURE STUDIES

10.4.1. Groundwater Investigations

A high-level desktop analysis of the potential for groundwater to serve Sites 4 through 7 indicated limited potential to meet projected demands in the area, which is also key to supporting a centralized sanitary treatment facility. Additional studies would be required to fully understand the potential for groundwater to support development and support a potential centralized sanitary treatment facility.

10.4.2. Traditional Water and Sanitary Servicing Extensions

Based on the infrastructure servicing analysis, servicing the Study Area sites will require a staged approach. Stages could include:

1. Conduct additional studies and detailed designs for connecting sanitary and water infrastructure to the KFN Lands and Central Lands area, and the interaction with the City's and region's infrastructure. The Area 3 Residential Area will need to be considered in the sanitary study.
    a. Consider conducting additional technical studies for a centralized sewage treatment and disposal facility including assessments for the feasibility and detailed cost of a riverine outfall and diffuser.
2. Conduct a localized stormwater and flood management study and servicing strategy for KFN Lands and Central Lands area, and associated watershed / sub-watershed and the Fraser River. Additional studies for stormwater and flood management will be required in the Albion Industrial Area.
3. Conduct additional studies and detailed designs for local sanitary and water servicing, including sanitary sewers, water distribution mains, water reservoirs, and drainage infrastructure.
4. Complete upgrades to the City's 158m Albion Zone booster pump station, 240 Street transmission feeder main, and connecting the City's water system to the KFN Lands.
5. Construct the KFN Lands' sanitary pump station and forcemain / gravity sewer along the Lougheed Highway / CPR ROW to 240 Street. Complete necessary upgrades to the City's sanitary sewer and 225 Street Pump Station to accommodate additional flows from the KFN Lands. Connect the Area 3 Residential Area to the proposed sanitary forcemain / gravity sewer.
6. Construct local infrastructure in the KFN Lands and Central Lands area to service sites.
7. Complete the W4 watermain upgrades in the Albion Industrial Lands described in *Section 8.3.2*.

10.5. INTERGOVERNMENTAL COLLABORATIONS

10.5.1. Kwantlen First Nation

Establishing agreements with the City and Metro Vancouver is key to connecting Sites 5B, 5C, and 5D to regional sanitary and city water systems that would enable the desired residential development as articulated in the *Kwantlen First Nation Land Use Plan Summary Report.* Addressing reconciliation and contamination of sites in the KFN lands could be leveraged to secure provincial or federal funding to advance for remediation of or management of contamination and the future servicing connections required to facilitate development.

10.5.2. Metro Vancouver

The regional Growth Strategy limits the extension of servicing to the sites west of 240 Street and south of 100 Avenue / 98 Avenue. The City and Metro Vancouver should discuss the advantages of policy approaches that could enable the industrial development of sites along the Fraser River, while continuing to limit urban forms of residential development. Metro Vancouver's industrial development ambitions are well articulated in its own strategic plans, including in both the Regional Growth Strategy as well as the Regional Industrial Lands Strategy; however, the expansion and development of industrial lands requires servicing and transportation improvements. Metro Vancouver could also share the findings of this study with other member municipalities to advance other local area industrial lands bring to market opportunities.

10.5.3. Provincial Ministry Engagement

There are a number of Provincial ministries that can be engaged to assist with the bring to market strategic initiative, such as:

1. Ministry of Transportation and Transit to explore opportunities for improved highway access to / from study area sites. Representatives from Kwantlen First Nation noted that Ministry of Transportation and Transit has expressed collaboration potential.
2. Ministry of Jobs, Economic Development and Innovation to explore incentives, programs, and initiatives that address economic development, trade corridors, investment in businesses, and the role of the Ministry in contributing to bring to market strategies.
3. Ministry of Indigenous Relations and Reconciliation to explore options for economic development incentives or supports for KFN land development and enterprises.

10.5.4. Port of Vancouver

Port of Vancouver should be engaged for use of the Fraser River regarding short sea shipping and off dock facilities, to establish and understanding of how these lands and specific sites could be leveraged for port functions and roles, and what specific issues, regulatory consideration need to be further clarified and investigated. A further recommendation is to expand the jurisdiction of the port authority further up the Fraser River to include all the subject lands (or even further, to the boundary of Mission).

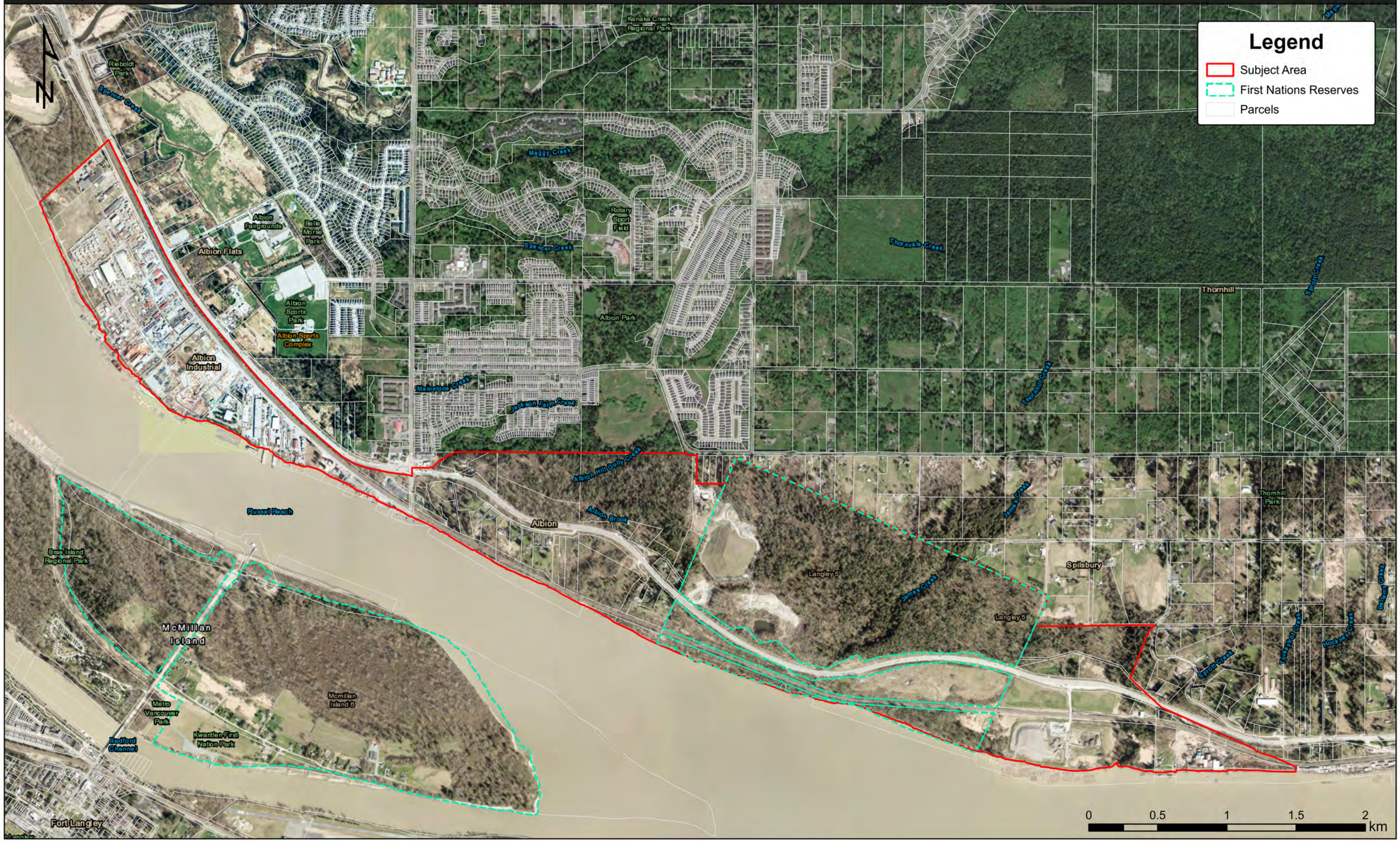
10.5.5. TransLink

TransLink provides limited daytime service to the Albion Industrial area. The opportunity to improve service levels has a direct link to the labour pool access for industries in the area. Explore what service enhancements could be made to service levels and what success factors look like for TransLink and for area businesses.

Appendix A
Maps

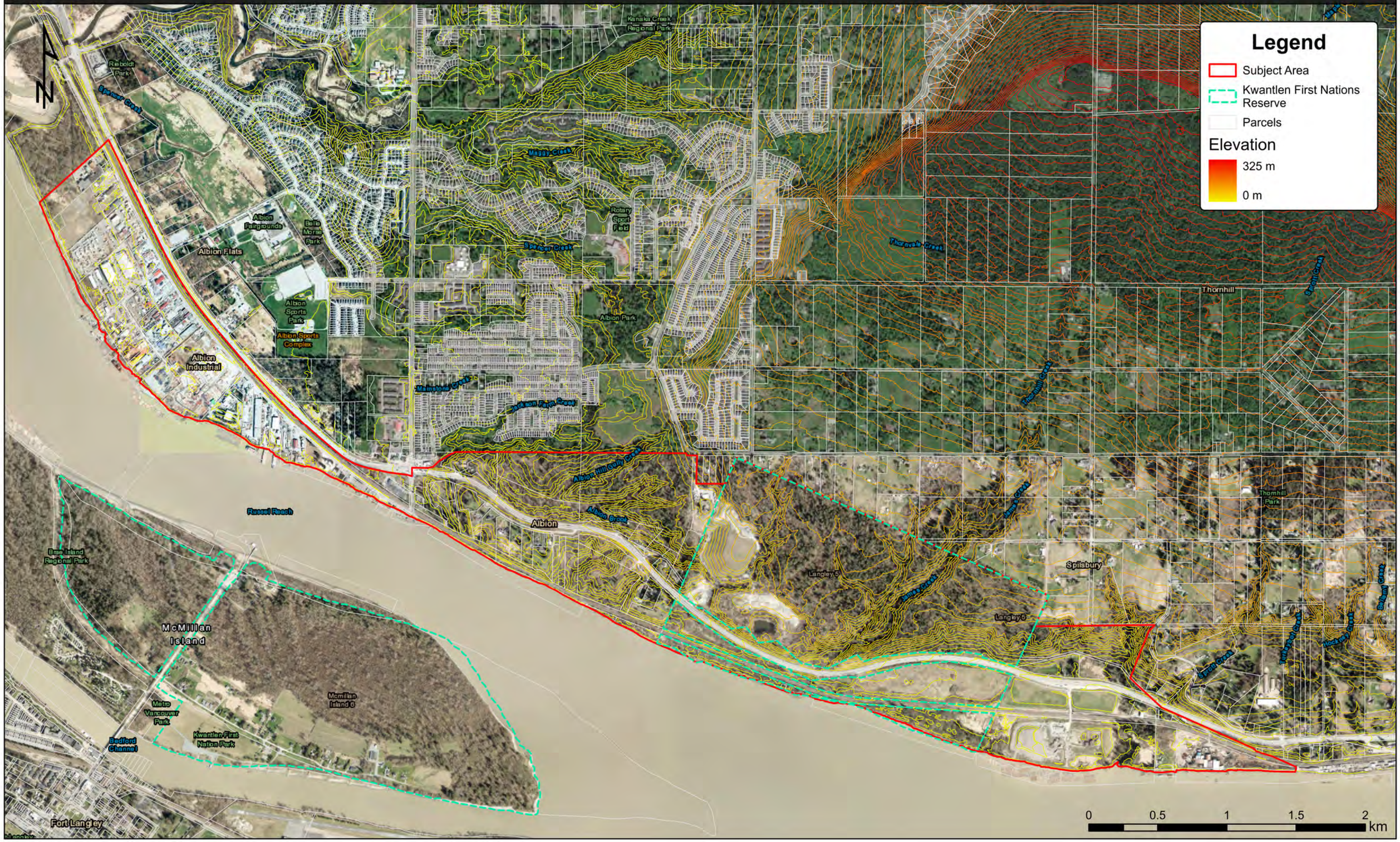
McElhanney

Bring to Market - Site Overview



McElhanney

Bring to Market - Site Overview



McElhanney

Bring to Market - Site Overview

Legend

- Sanitary Pump Station
- Drainage Pump Station
- Dike
- Stream
- Drainage Culvert

Water Main

Pipe Size

- 0 - 200
- 200 - 350
- 350 - 450
- 450 - 600

Conduit

Gravity and Overflow

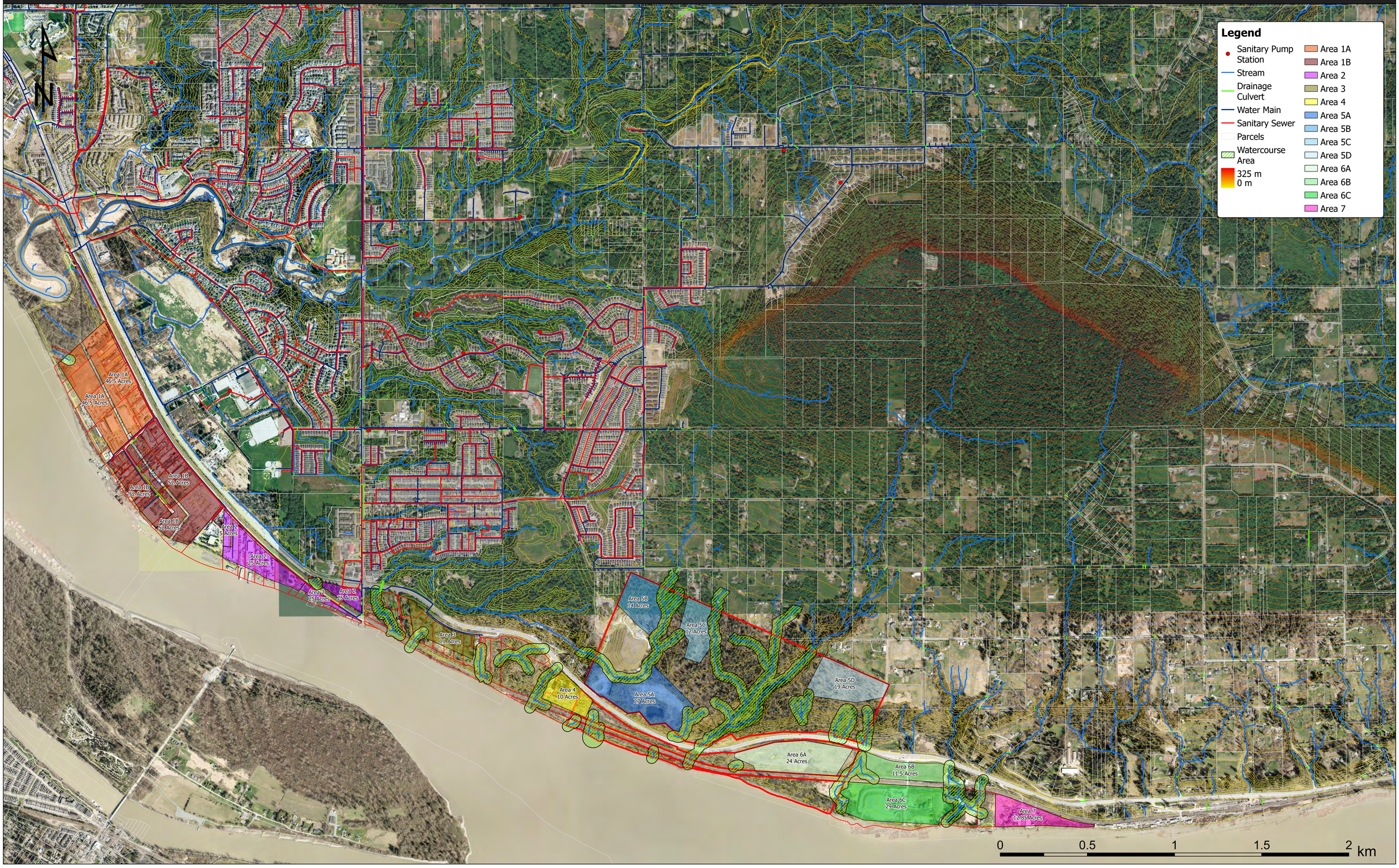
- <200
- 200 - 400
- 400 - 600
- 600 - 900
- 900 - 1800

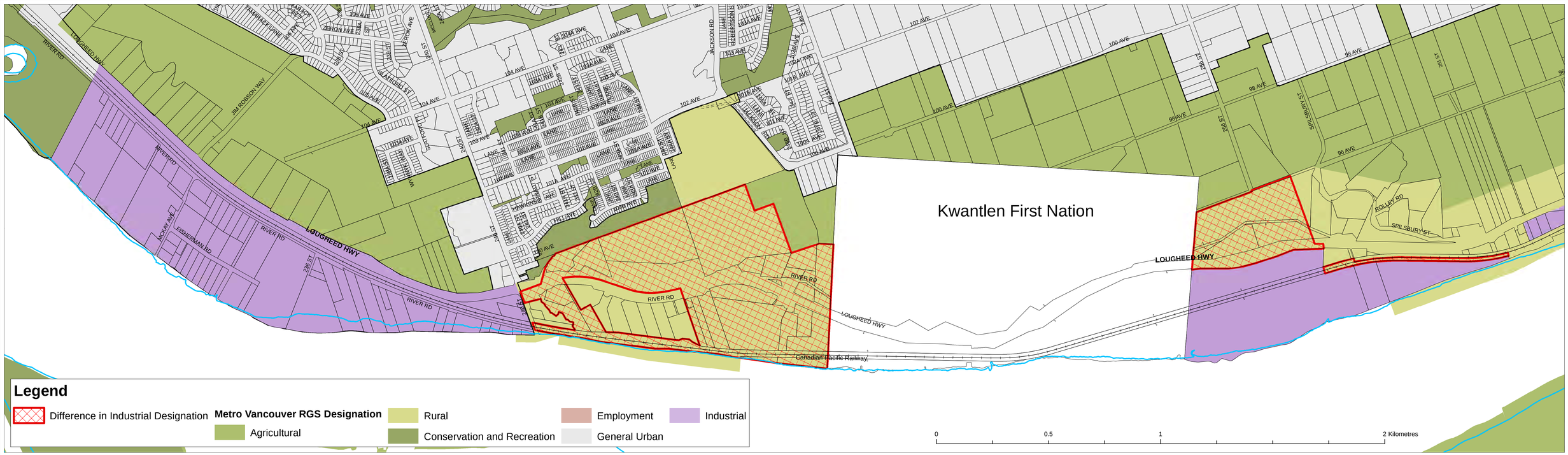
- Kwantlen First Nations Reserve
- Subject Area
- Parcels
- 200-year Climate Change Floodplain

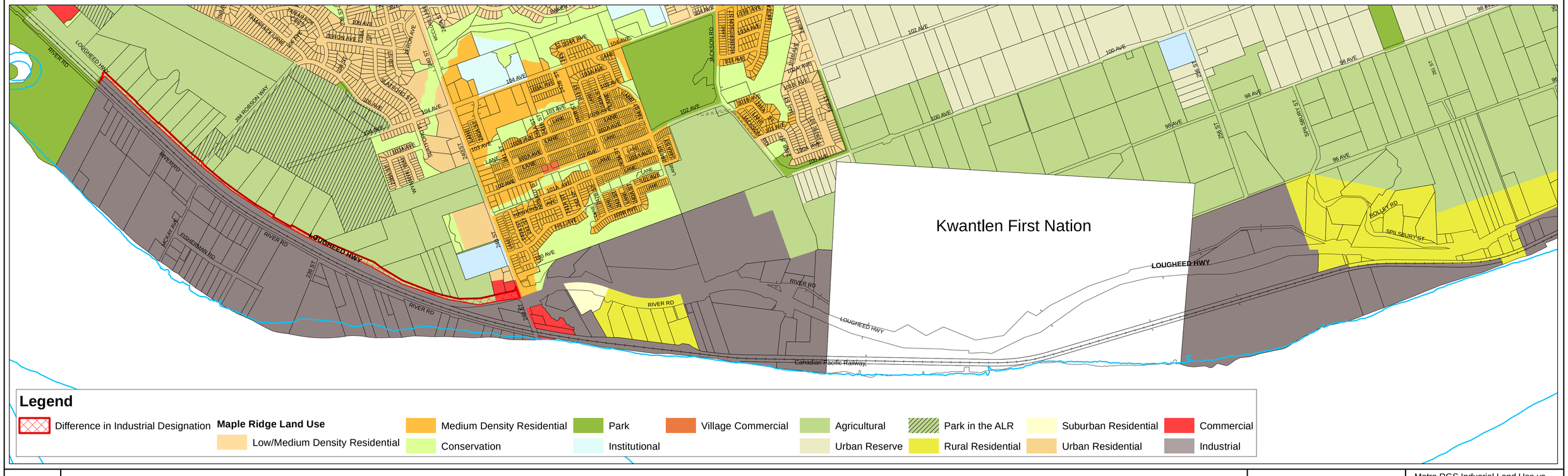
0 0.35 0.7 1.05 1.4 km

McElhanney

Bring to Market - Constraint Analysis







N

Scale: 1:8,000

Bring to Market Industrial Lands

Metro RGS Indusrial Land Use vs. Maple Ridge Industrial Land Use

PLANNING DEPARTMENT

Maple Ridge

FILE: MetroVan Industrial vs Maple Ridge Industrial2.mxd
DATE: Mar 31, 2025 BY: DT

Appendix B
Future Use Cases Table

Industrial Bring to Market – Near and Long Term Use Cases – Feedback Integrated

Subject Sites and Subareas:		1 West of McKay Ave (1A)	1 East of McKay Ave (1B)	2 Albion River Lots (2)	2 Residential (3)	3 KFN Lands Gravel Pit (5A)	3 KFN Lands Hillside (5B, 5C, 5D)	3 KFN Lands (4, 6A)	4 Sanscorp (6B, 6C)	4 Old Lumber Mill (7)
Size (acres):		**46.5 ac**	**52 ac**	**25 ac**	**11 ac**	**27 ac**	**5B: 14ac, 5C: 12ac, 5D: 19ac**	**4: 10 ac, 6A: 24 ac**	**6B: 11.5 ac, 6C: 29 ac**	**12.85 ac**
Current Use (As-Is) Now		• Open storage and manufacturing (Vista Railings, lumber mill, various open storage and enclosed industrial uses) • Van Der Wal equipment Sales • Partap Forest Products • Maple Ridge Towing • Mr. Nu Building Materials • Vacant lots (2-3)	• Open storage and enclosed industrial uses • Vacant lot (1) • Stella Jones Pole Yard • Gary's Auto Wrecking • Conteco Molds Plastic • Pacific Bending and Machine • Jewel Welding • Allied Crane • ProMix Concrete • Eagle Tech Salvage	• Open storage and manufacturing • Cedar products (Various outdoor uses) • Streifel Industries • Supreme Barge • Warehouse • Lafarge concrete	• Single Family Residential • Fill site	• Gravel/aggregates and fill site	• Undeveloped forest	• Vacant KFN lands and a portion outside KFN – RV park and residences (Sub-area 4)	• South of the railway gravel and landscape site (Sanscorp) • Vacant north of the railway	• Disused, timber mill and storage
Opportunities and Constraints		Maximize utilization of existing servicing (water, sewer, storm, power, Natural gas) Transit service Serviced Industrial Cut off from River by dike – opportunity for river access unclear. This area also has a public walkway / trail along the waterfront on the dike. Fortis pipeline ROW Coordination with CPKC and MoTT.	Maximize utilization of existing servicing (water, sewer, storm, power, Natural gas) Transit service Serviced Industrial CPKC Rail Spur for Stella Jones south of River Road River Access (for lots south of Fisherman Road) Fortis pipeline ROW Coordination with CPKC and MoTT.	Maximize utilization of existing servicing (water, sewer, storm, power, Natural gas) Transit service Serviced Industrial • Challenged by shallow site depth (Could extend east but in the floodplain. Could extend west, note easement on Title, would need to verify purpose) • River access	• Water service • No sewer • No transit Semi-Serviced Potential residential buyouts (land assembly by private or public entity) on an opportunity basis to change to industrial. Potential for civic amenities, such as a fire hall to help serve the business / industrial community. High cliff over CPKC and riverbank Limited short-term industrial prospects	• Un-serviced • No transit Candidate for Dry-Industrial Prepare lands by filling and grading the site Coordination with MoTT.	• Un-serviced • No transit Sub-areas 5B and 5C quick win candidate for Residential Sub-area 5D Candidate for short-term dry-industrial or storage use while awaiting feasibility testing, rezoning, development/building permit approval. Dry industrial as short-term use during rezoning/development application process. Prepare lands by filling and grading the site Coordination with MoTT.	• Un-serviced • No transit Candidate for Dry-Industrial Align KFN and CoMR and MV land use planning. Establish parallel approvals b/w KFN and CoMR to maximize permitting efficiency. Coordination with CPKC and MoTT for vehicle highway access. **Sub-area 4** – Has topography constraints **Sub-area 6A** – opportunity for rail line access via spur.	• Un-serviced • No transit Candidate for Dry-Industrial Prepare the site and consolidate as need be. Coordination with CPKC and MoTT for vehicle highway access. Opportunity for rail line access via spur.	• Un-serviced • No transit Candidate for Dry-Industrial Prepare the as need be. Coordination with CPKC.
Transitional Use Industrial (near term) 5-10 Years	Option 1	• Manufacturing, processing, assembly, storage, distribution industrial uses, and Forestry related uses, such as saw mill, value add wood work, etc. • Small bay industrial • Value-add industrial uses manufacturing, assembly, repair, custom fabrication. • Road and rail accessible employment hubs	• River access industries, fabricators, short sea shipping, plastic pellets and plastic molding, grain silos. • Utilize and improve access to and from the river for short sea shipping. • Metal recycling and milling **Typology:** Predominantly open storage with 25% building site coverage by warehouses or	• Light industrial uses, multi-bay warehouses, open storage, enclosed accessory storage **Typology:** Predominantly open storage with 25% site coverage by warehouses or multi-bay buildings, and site offices. • Heavy industrial uses, concrete mix batch plant, marine related industries	• Complete the filling in of the site, resolve contamination issue. • Small scale multi bay industrial buildings **Typology:** small bay industrial buildings.	• Consider industrial uses • Terrace the site for interim and future use • Open storage and distribution **Typology:** Open yards and storage areas with site offices (modular/temporary) and some simple enclosed workspaces for welding, fabrication and assembly	• Consider residential, such ground-oriented townhomes, and detached residential. This is probably higher revenue and easier to develop and market on sloped sites with river views. **Typology:** Residential housing in form of detached, attached, and ground oriented forms.	• Truck parks, container distribution and storage, other open / outdoor storage, transloading, if use/access to rail line. **Typology:** open yards with temporary site offices.	• Use as open storage of materials, trucks, containers, and logistics in the interim as sites are pre-loaded/prepared for heavier industrial uses **Typology:** open yards with temporary site offices.	• Remediate and prepare lands for longer term development. • Use as open storage and prepare for heavier industrial uses. **Typology:** open yards with temporary site offices.

Industrial Bring to Market – Near and Long Term Use Cases – Feedback Integrated

Subject Sites and Subareas:		1 West of McKay Ave (1A)	1 East of McKay Ave (1B)	2 Albion River Lots (2)	2 Residential (3)	3 KFN Lands Gravel Pit (5A)	3 KFN Lands Hillside (5B, 5C, 5D)	3 KFN Lands (4, 6A)	4 Sanscorp (6B, 6C)	4 Old Lumber Mill (7)
Size (acres):		**46.5 ac**	**52 ac**	**25 ac**	**11 ac**	**27 ac**	**5B: 14ac, 5C: 12ac, 5D: 19ac**	**4: 10 ac, 6A: 24 ac**	**6B: 11.5 ac, 6C: 29 ac**	**12.85 ac**
		Typology: Predominantly open storage with 25%building site coverage by warehouses or multi-bay buildings, and small accessory site offices.	multi-bay buildings, raw materials or silos, and accessory site offices. Shipping terminal development/expansion	**Typology:** Predominantly open storage with 25% site coverage by warehouses or multi-bay buildings, raw materials or silos, and temporary/ modular site offices						
	Option 2	• Intensifies on Option 1 to 40% site coverage with the addition of onsite sales/showrooms and administrative functions (business park style) • Small scale warehousing and contractor spaces for finishing products related to home building and construction with limited commercial functions such as onsite sales/showrooms. • Value-add industrial uses manufacturing, assembly, repair, custom fabrication, small bay industrial spaces with outdoor storage of raw materials and indoor storage of finished product. **Typology:** Warehouses and small unit multiple-bay industrial with 40% or greater site coverage and limited outdoor storage, company administration and showroom functions.	• Concrete, ready mix, aggregates, circular economy park (reuse, pelletizing, chipping of goods, packaging for bulk, etc.) **Typology:** Open sites with machinery and truck yards and material piles / outdoor storage. Temporary/modular site offices.	• Steel and metal fabrication • Ship/barge building and repair **Typology:** High ceiling warehousing with vertical racking storage to improve yield.	• Truck parking and maintenance facilities until permits get approved and services get installed **Typology:** open yards with site offices	• Warehousing and multi-bay contractor / tradesperson's shops **Typology:** Predominantly open storage with 25% site coverage by warehouses or multi-bay buildings, and site offices.		• **Sub-area 6A** – aggregates barging, trucking, and sorting and larger scale sales and distribution **Typology:** Leveled, aggregate yards, with industrial machinery, silos, site offices and conveyor belts.	• Expand on aggregates distribution with input received by barge and output by trucking, rail, or barge once trucked down 240 St / 256 St. • Rail spurs, yards or loop tracks to support the transloading of loose materials into hopper cards and gondolas. **Typology:** Leveled, aggregate yards, with industrial machinery, silos, site offices and conveyor belts.	• Storage and sale of wrecked vehicles and auto parts • Materials recycling and processing **Typology:** Leveled, aggregate yards, with industrial machinery, site offices and industrial machinery, limited covered/enclosed workspaces. .
Ultimate Industrial 10-20 Years	Option 1	• Heavy industrial uses include outdoor storage, onsite manufacturing, processing, assembly, storage, distribution industrial uses, and Forestry related uses, such as saw mill, value add wood work, etc. **Typology:** Predominantly open storage with 25% site coverage by warehouses or multi-bay buildings, and site offices.	• River access industries (short sea shipping), transloading, drayage,. • Fabricators, manufacturers, distributing, packaging **Typology:** Open sites with enclosed workspaces, machinery and truck bays and material piles. Temporary/ modular site offices (may require consolidation of lots or new traffic patterning/ roadway alignments to facilitate contagious parcels).	• River access industries (short sea shipping), transloading, drayage • Heavy machinery production which allows for manufacturing used in construction, mining, dredging, etc. • Utilize and improve access to and from the river for short sea shipping **Typology:** Warehousing with office/employment functions in a portion of the building or on second level. Shipping terminal development/ expansion	• Tilt up warehousing for light industrial • Multibay/multi-unit work spaces, similar to Blue Mountain Business Park on Liley Drive • Utilize the River Road service road to allow trucks to turn into and enter the sites (requires further improvements to Highway 7 intersection to accommodate larger vehicles/ commercial trucks.	• Warehousing and multi-bay contractor / tradesperson's shops • Light industrial/retail like uses. • Professional, scientific and technical services, • Similar to FiberTech in Surrey, where they manufacture plumbing goods and also allow the sale of them in a showroom. **Typology:** Predominantly open storage with 25% site coverage by warehouses or	• Residential housing in form of detached, attached, and ground oriented forms.	• Bulk commodities silo storage and distribution (grain, plastics, fertilizer etc.) **Typology:** Paved, drained and lit yards, with industrial machinery, silos, site offices and conveyor belts.	• Short sea shipping and transloading, drayage. • Bulk loading terminals (free-flowing commodities silos such as, plastic pellets, sand, liquids or gasses). • Cross-dock or co-packaging facility • Value add processing transload - more valuable product and higher margins, and logistics • Asphalt paving and concrete/aggregates • Ready mix plant **Typology:**	• Manufacturing, distribution, open storage of countertop materials. (Ie. TCE Stone, Richmond) • Window/Door manufacturing • Truck/machinery repair. **Typology:** Leveled, aggregate yards, with industrial machinery, site offices and industrial plant. Shipping terminal development/expansion

Industrial Bring to Market – Near and Long Term Use Cases – Feedback Integrated

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						multi-bay buildings, and site offices.			Leveled, aggregate yards, with industrial machinery, site offices and industrial plant. Shipping terminal development/expansion	
	Option 2	• Light industrial uses include business park-style development for industries that support home construction i.e. cabinetry, doors, windows, moldings, and stainless-steel fabricators/assembly, production, furniture, household appliances. Trades-related companies like MBS or Sunbelt rentals. Shops/ offices. Outdoor/yard storage. Food and Beverage Processing **Typology:** Warehouses and small unit multiple bay industrial with 40% max site coverage and limited outdoor storage and company administration and showroom functions.	• Concrete, ready mix, aggregates, circular economy park (reuse, pelletizing, chipping of goods, packaging for bulk, etc.) **Typology:** Open sites with machinery and truck yards and material piles / outdoor storage. Temporary/modular site offices. • Marine-oriented industry such as boat/small ship building and repair and support services, dry dock, welding, buoy and caisson maintenance and construction. (Would require crossing the dike, which may be a constraint) **Typology:** Predominantly open storage with 25% site coverage by warehouses or multi-bay buildings, and site offices.	• Contractor and construction support serving industries (specialty trade contractors) • Steel and metal fabrication • Ship/barge building and repair **Typology:** Warehouses and small unit multiple bay industrial with 50% or greater site coverage	• Low impact business such as high-tech industries, research and development companies. (Would require expansion of strong fiberoptic /telecom infrastructure to this area) **Typology:** Warehouses and small unit multi bay industrial with 50% or greater site coverage and limited outdoor storage and company administration and showroom functions.	• Small multibay/multi-unit workspaces, similar to Blue Mountain Business Park on Liley Drive **Typology:** Warehouses and small unit multiple bay industrial with 25 to 50% site coverage and outdoor storage areas.		• Film Studios **Typology:** Film studio / Media production facility buildings composed of 2-3 buildings (warehouses) with 30,000 to 70,000 sq ft GFA, high ceiling 36-50 ft, clear spans, spans to support rigging, accessory office space and 10,000 sf carpentry and SFX workshop, wardrobe and parking for 80-100 parking stalls for staff and hair and makeup trucks.	• Port expansion • Off dock loading, transloading, shot-sea shipping **Typology:** Leveled, aggregate yards, with industrial machinery, site offices and industrial plant.	• Fill and level site for open storage and materials sales. **Typology:** Leveled, aggregate yards, with industrial machinery, site offices and industrial plant.

Appendix C
Technical Memo – Groundwater Supply Feasibility

Our File: 2111-06526-00

TECHNICAL MEMO

To	From
Eric Aderneck, Industrial Lands Program Manager City of Maple Ridge	Jane Yetter, PEng Groundwater Resource Engineer
Re	**Date**
Groundwater Supply Feasibility (Preliminary) Maple Ridge Industrial Bring to Market Study	April 22, 2025

1. Introduction

The City of Maple Ridge has contracted McElhanney to develop a comprehensive Industrial Bring to Market Study for the areas shown in *Figure 1*. To support the consideration of options for water supply, McElhanney has conducted a preliminary desk-top level groundwater study. The goal of this study was to assess the potential feasibility of using groundwater as source water to supply a centralized water system for future industrial development (*Figure 1*).

McElhanney has estimated water demands for the proposed industrial development (*Table A)*. Details regarding the water demand calculations are presented in the draft *Industrial Servicing Analysis* technical memorandum[1].

Table A. Anticipated Water Flow Demands (m^3/day) by Land Ownership and Development Areas

	Kwantlen First Nation: Areas 4, 5(A-D), 6A			**Other Private Lands**: Areas 6B, 6C, Area 7			**Totals**		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Average Daily Demand (m^3/d)	572	595	602	781	827	884	1,353	1,421	1,486
Maximum Daily Demand (m^3/d)	1,144	1,189	1,204	1,561	1,653	1,768	2,705	2,842	2,972

Note: Areas are shown in Figure 1. Considerations for Low, Medium, & High water use estimates are provided in the Infrastructure Servicing Analysis technical memorandum.

[1] McElhanney, 2025. 'Industrial Bring to Market – Infrastructure Servicing Analysis. DRAFT Technical memorandum prepared for Eric Aderneck, Industrial Lands Program Manager, City of Maple Ridge.

Figure 1. Subject Areas 4 through 7 for proposed development with consideration to service by centralized water system (Yellow striped areas around watercourses are riparian setbacks).

2. Approach & Scope of Work

Assessing the feasibility of groundwater (wells) as a new source of water supply typically includes:

- technical assessment of available groundwater resources and their potential to meet the community water needs with water wells, and
- a preliminary analysis of unknowns, risks, and relative costs to develop and license groundwater sources for a potable water supply.

Groundwater resource assessment typically occurs in phases, starting with a technical desktop assessment. The scope for this limited desktop assessment included:

- a high level review of publicly available information on local hydrogeology, provincially delineated aquifers, water well records, and existing groundwater licenses to understand aquifers in the area, potential well yields, and existing water users;
- provision of a professional opinion regarding the technical feasibility and practicality of groundwater as the source for the centralized water supply.

The scope for this feasibility assessment did not include site visits or field work for any purpose, such as geologic mapping or study, selection of well locations, or water well drilling and testing.

This assessment of groundwater supply feasibility from a desktop study alone is limited. Further work is required to verify whether groundwater wells can provide adequate water supply and that the groundwater resources can be exploited without unreasonable negative effects to other existing users and to environmental flows (i.e., groundwater contributions to surface water). If there is adequate information available on local aquifers and water well yields, a desktop assessment can inform a decision

about whether to proceed with drilling exploratory wells and can provide a general understanding of the number of wells that might be required to meet the water demand.

To help with planning, approximate costs and schedules are provided for potential next steps in groundwater feasibility assessment; the results of which would be used to inform the design of the required production wells and the water system.

The Study Area was limited to the lands proposed for development in consideration of conveyance costs. Regardless of well locations, it has been assumed that water will need to be transported from all wells to a centralized water treatment facility before distribution to points of use. The location of a treatment facility was yet to be determined at the time of this assessment.

3. Groundwater Feasibility

3.1. LOCAL AQUIFERS

The Province of BC has designated two aquifers in the Study Area: sand and gravel Aquifer No. 970 and fractured bedrock Aquifer No. 19. Fact sheets with details on these two aquifers are attached as *Appendix A*. A summary of information for these aquifers is presented below in Table B. Average and maximum well yields are provided by the Province are based on available water well records.

Most water wells are drilled for private, domestic supply where small yields (i.e., 2 m^3/day) are suitable, and available funds are modest. Therefore, drilling contractors typically complete a well at the shallowest depth where adequate supply was reached. Screens may not be installed in wells completed in sand and gravel, for cost savings, which limits the pumping rate to prevent sand from entering the well casing and installed pump. Therefore, well records are skewed toward shallow, low-yield water wells and average yields may not reflect true aquifer potential.

Table B. Summary of Local Aquifers

Parameter	Aquifer 970	Aquifer 19
Lithology	Sand and gravel interbedded with low permeability material	Fractured sedimentary rock
Median Well Yield	0.63 L/s (54 m^3/d; 10 US gpm)	0.16 L/s (14 m^3/d; 3 US gpm)
Maximum Well Yield (fr. records)	1.6 L/s (**138 m^3/d**; 25 US gpm)	3.7 L/s (**320 m^3/d**; 60 US gpm)
Median Depth to Groundwater	1.83 m	19.5 m
Median Well Depth	5.5 m	93 m
Maximum Well Depth	**83 m**	**~ 280 m**
Number of Current GW Licenses	0	4

3.1.1. Aquifer 970 (Sand and Gravel)

Aquifer 970 is located along the north bank of the Fraser River in Maple Ridge, roughly between 232 Street and 285 Street. It extends approximately 1-1.5 km inland from the riverbank and is comprised of sand and gravel deposits interbedded with low-permeability geologic materials. The thickness and extent of the sand and gravel may be limited in some areas, and not all of the permeable deposits may be interconnected. Thus, potential groundwater production rates may be variable with location and depth. The average and maximum well yields reported for Aquifer 970 are still relatively low as compared to the project water demands. We found no records of groundwater licenses for extraction from Aquifer 970, which suggests it has not been a target for commercial, industrial, or community water supplies that tend to need higher yields than the average private, domestic (household) well.

3.1.2. Aquifer 19 (Fractured Bedrock)

Aquifer 19 is hosted in fractured sedimentary rock of the Kitsilano Formation. The aquifer was delineated by the Province of BC along the north bank of the Fraser River and extends west to east from 224 Street to the Stave River, and north roughly 2-4 km from the riverbank. Rock types consist of conglomerate (cemented sand, gravel and cobble), sandstone, and shale with lesser amounts of volcanic rock (basalt flows, sills, and pyroclasts). Conglomerate and sandstone can host water within the rock matrix (primary porosity) if the rock is loosely cemented, as well as within fractures (secondary porosity). Typically, high-well yields are associated with large-aperture fractures in rock or with densely fractured rock. Large fracture apertures and densely fractured rock can be associated with faults; however, there are no faults mapped within the proposed development area.

There are two Provincial Observation Wells completed within Aquifer 19 (OW462 and 479), and three active groundwater licenses (with licensed withdrawal ranging from 1 to 20 m^3/day). A summary of information from the two observation wells is provided below in *Table C*. Well completion records and graphs of groundwater levels recorded over the last 5-6 years are attached as *Appendix B*. Groundwater level data for both OW462 and OW479 show impacts from local groundwater extraction. Data from OW479 show a decrease of roughly 3 m in groundwater levels from winter 2019 to winter 2025.

Table C. Provincial Observation Wells Summary

Parameter	OW 462	OW479
Depth to Bedrock (m below surface)	2.5 m	28 m
Total Well Depth	151.5 m	121.0 m
Recorded Fracture Depths (m)	44.2 | 78.6 | 125 | 128.6 m	*None recorded*
Well Yield (driller estimate)	5 m^3/day (1 US gpm)	27 m^3/day (5 US gpm)
Static Groundwater Level (2018)	45.7 m below ground surface	19.5 m below ground surface

3.2. PRELIMINARY ASSESSMENT OF TECHNICAL FEASIBILITY

Based on the limited desktop assessment, the technical feasibility of sourcing groundwater for a centralized water system appears unlikely to challenging. The required water demand is high, as compared to both average and maximum groundwater yields available from existing wells in this area.

Based on average well yields, an unreasonably large number of water wells would be required to meet the project water demands (*Table C*), even in a low water demand scenario (*Table A*). Logistically, it becomes challenging to manage and operate a water system with more than 3-5 water wells.

Further desktop hydrogeological assessment and exploration well drilling would be needed to properly assess the possibility of developing a suitable number of high-yielding wells for the proposed development.

Table D. Estimated Number of Wells Required to Meet Project Water Demand Based on Limited Assessment

Parameter	Aquifer 970	Aquifer 19
Lithology	Sand and gravel interbedded with low permeability material	Fractured sedimentary rock
Maximum Well Yield (from records)	**138 m^3/d**	**320 m^3/d**
Median Well Yield (from records)	54 m^3/d	14 m^3/d
Number of wells required to meet Combined Water Demand assuming **MAXIMUM** recorded well yield obtainable from all wells	20-22	9-10
Number of wells required to meet Combined Water Demand assuming **average (median)** recorded well yield from all wells	50-56	194-213

3.3. POTENTIAL NEXT STEPS & ASSOCIATED COSTS

Table D below outlines the next steps and associated costs to progress assessment, exploration, and development of a groundwater source for the project, based on the assumption that nine wells could meet the water demand. Note that based on the ***maximum*** reported well yield, at least 9 wells would be required.

As per the ACEC-BC's Budget Guidelines for Consulting Engineering Services (2009), a Class D estimate is within ±50%. Basic engineering fees for the design portion only on complex municipal infrastructure projects could be expected to be approximately 15% of the construction costs. This would include required studies and detailed design. For the purposes of this report, a 35% contingency was added to construction cost estimates to account for unknown conditions, plus an additional 15% to cover total engineering and project management costs.

Table E. Estimate of costs for next steps in groundwater source development

Task Description	Estimated Cost
Additional desktop study: to better understand aquifer lithology (Aquifer 970) and fracture potential (Aquifer 19), assess potential well yields, and prepare preliminary well designs for contractor estimates (including total drilling depth)	$ 8,000 to $ 15,000
Well Drilling: exploration and production wells (***cost per well***)	$ 30,000 to $ 75,000
Pumping Tests: are recommended to determine the long-term capacity of each production well. They are required in support of a water license for groundwater extraction. (***Cost per test)***	$ 28,000 to $ 65,000
Data analysis in support of water license application (depends on number of production wells, potential for mutual well interference, and potential impacts on other users and environmental surface water flows)	$ 10,000 to $ 50,000
Total Estimated Cost assuming NINE production wells	$ 540,000 to $ 1,325,000

Note that the estimated costs in Table D are for development of the water source wells only. **The costs presented in Table D do not include costs for well pump, well pump installation, electrical connection, pump and water system controls, water conveyance, pressurization, water storage, water treatment (if necessary), or other costs associated with design and construction of a water utility.**

3.4. FURTHER CONSIDERATIONS

To further explore groundwater as a potential water source for a centralized water system, the following considerations are recommended:

- Groundwater chemistry was not considered for this assessment. While groundwater does not typically require the same level of filtration as surface water, it tends to have higher mineralization due to residence time in the geological materials in the host aquifer. Groundwater can require treatment for metals if concentrations exceed Health Canada's drinking water guidelines.

- The local health authority mandates treatment for drinking water systems and requires an assessment of the risk of pathogens and other contaminants for groundwater based water systems. The risks are a function of aquifer vulnerability, well construction & depth, and well location in proximity to surface water and to other potential sources of surface contamination (e.g. industrial land uses). These risks have not been considered at this early stage of assessment and would need to be considered when selecting locations and design characteristics for wells.

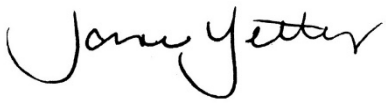
- An aquifer water balance was not conducted for this assessment. The capacity of each aquifer separately, or if combined, to support the water demand for the project has not been determined. Consideration of how the project demands will impact existing users and environmental flow to sustain groundwater and surface water interaction should be assessed if groundwater is further considered as a water source.

CLOSING

If there are any questions or concerns regarding the information within this technical memo, please contact the author, or your project manager, Colton Kirsop (ckirsop@mcelhanney.com). This document is subject to limitations (*Appendix C*) further to what has been mentioned above.

Sincerely,
McElhanney Ltd.

Prepared by:



Jane Yetter, MSc, PEng
Groundwater Resources Engineer
jyetter@mcelhanney.com
778-746-7406

Reviewed by:

Remi Allard, MEng, PEng
Senior Hydrogeologist
rallard@mcelhanney.com

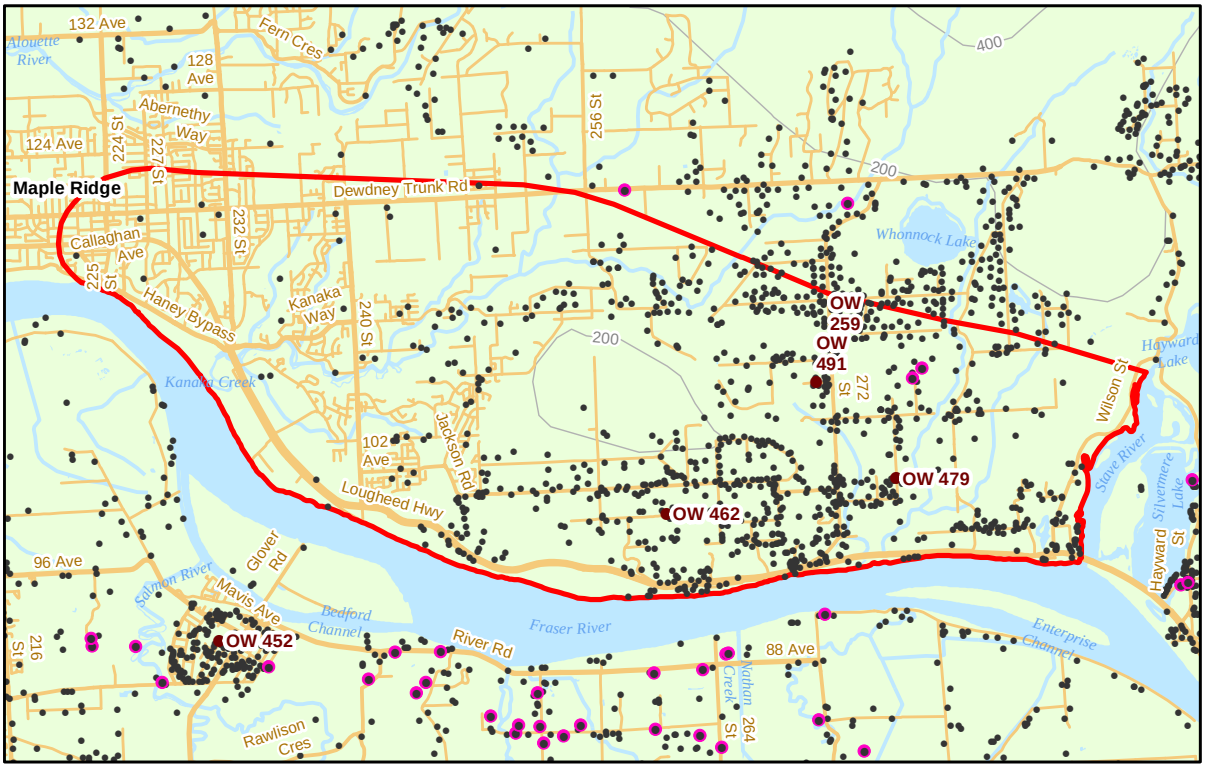
Enclosed:

1. Appendix C-1: Aquifer Fact Sheets
2. Appendix C-2: Provincial Observation Wells 462 and 479 – Well Records and Groundwater Level Graphs
3. Appendix C-3: Statement of Limitations

APPENDIX C-1

Aquifer Fact Sheets

Aquifer #19
Grant Hill



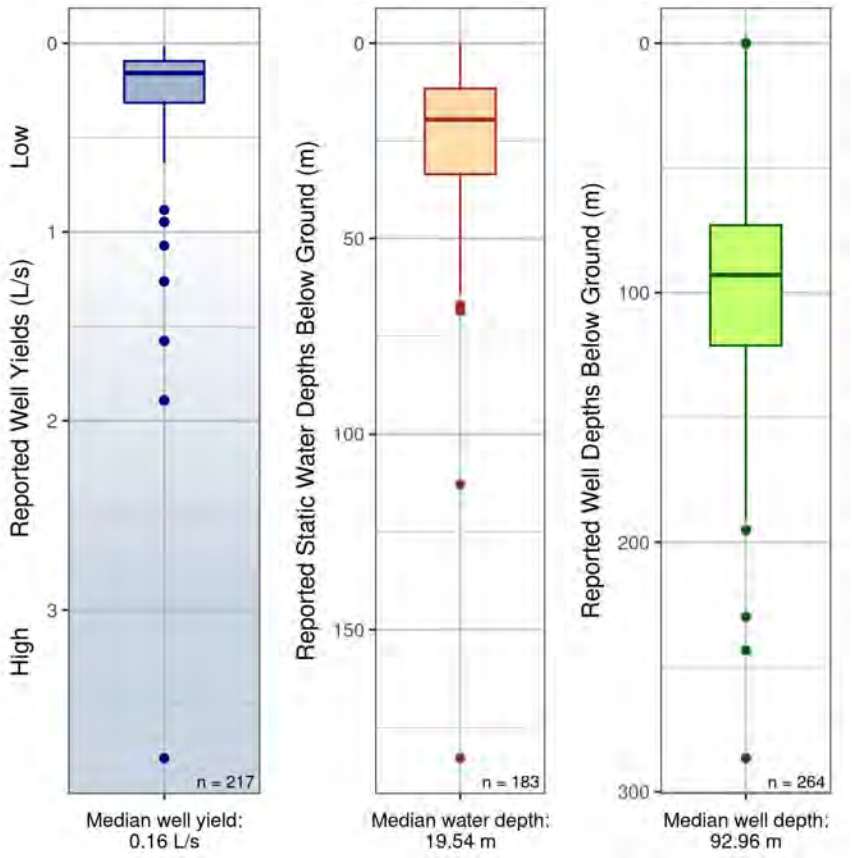
Legend

- Registered Water Well - Artesian
- Registered Water Well
- Active Observation Well
- Aquifer Boundary

Aquifer Description (Mapping Report - 2016): Fractured sedimentary rock aquifers primarily found in association with old sedimentary basins (subtype = 5a).

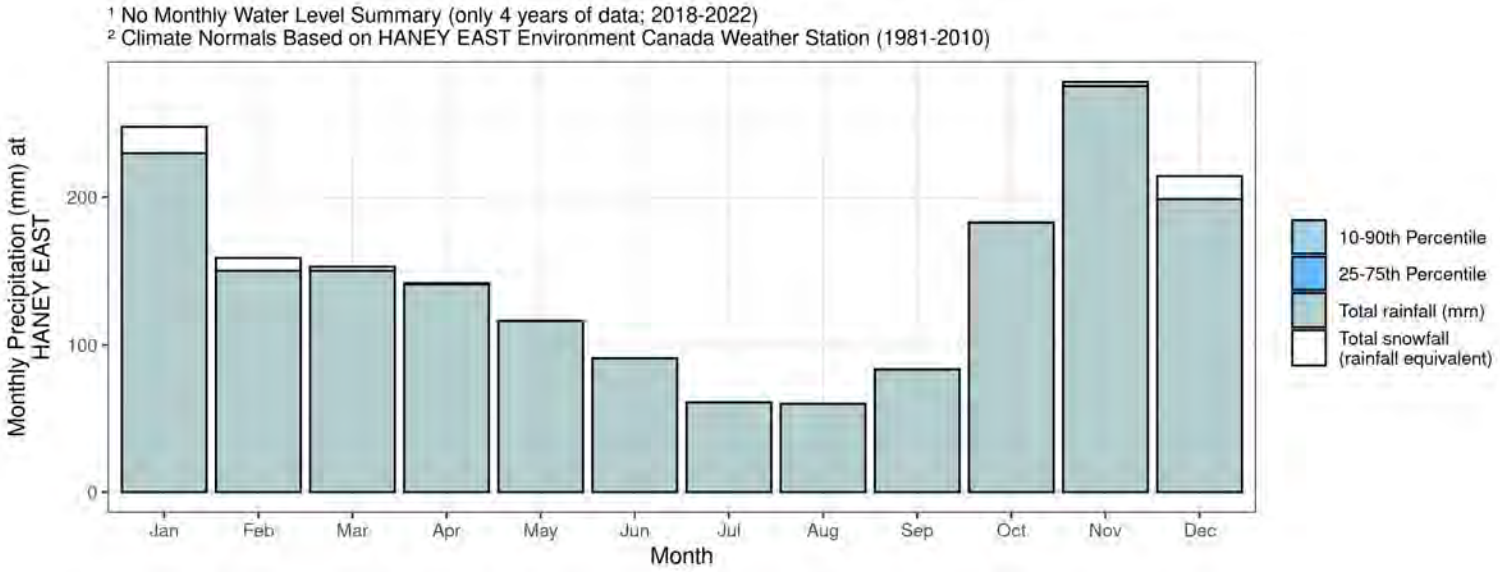
Aquifer Details	
Region	South Coast
Water District	New Westminster
Aquifer Area	55.3 km^2
No. Wells Correlated	271
Vulnerability to Contamination	Moderate
Productivity	Low
Aquifer Classification	IIB
Hydraulic Conductivity *	Unknown
Transmissivity *	Unknown
Storativity *	Unknown
No. Water Licences Issued to Wells	3
Observation Wells (**Active**, Inactive)	**462**, **479**

* min - max
For Hydraulic Connection see guidance document



Detailed methods for all figures are described in the companion document (Aquifer Factsheet - Companion Document.pdf).
Factsheet generated: 2022-07-27. Aquifers online: https://apps.nrs.gov.bc.ca/gwells/aquifers.

Monthly Groundwater Level[1] with Precipitation from Climate Normals[2]

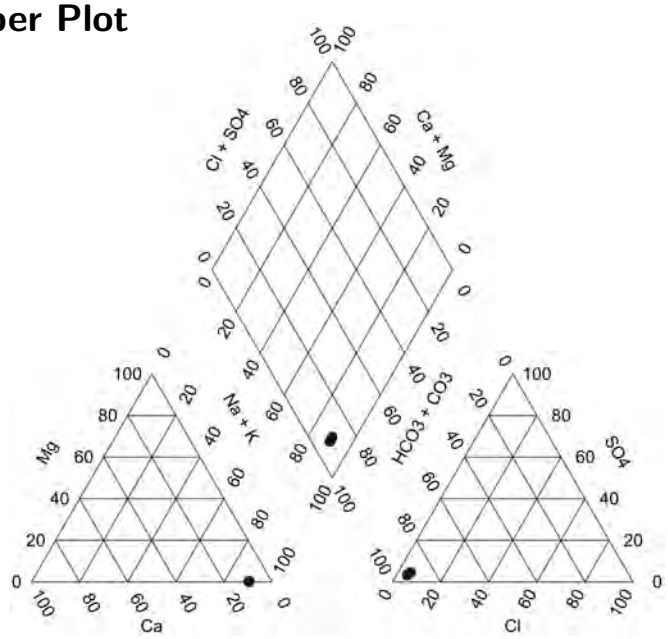


Groundwater Levels and Long-term Trend

Graph not available
(Not enough data)

For more information regarding trends in groundwater levels see Environmental Reporting BC

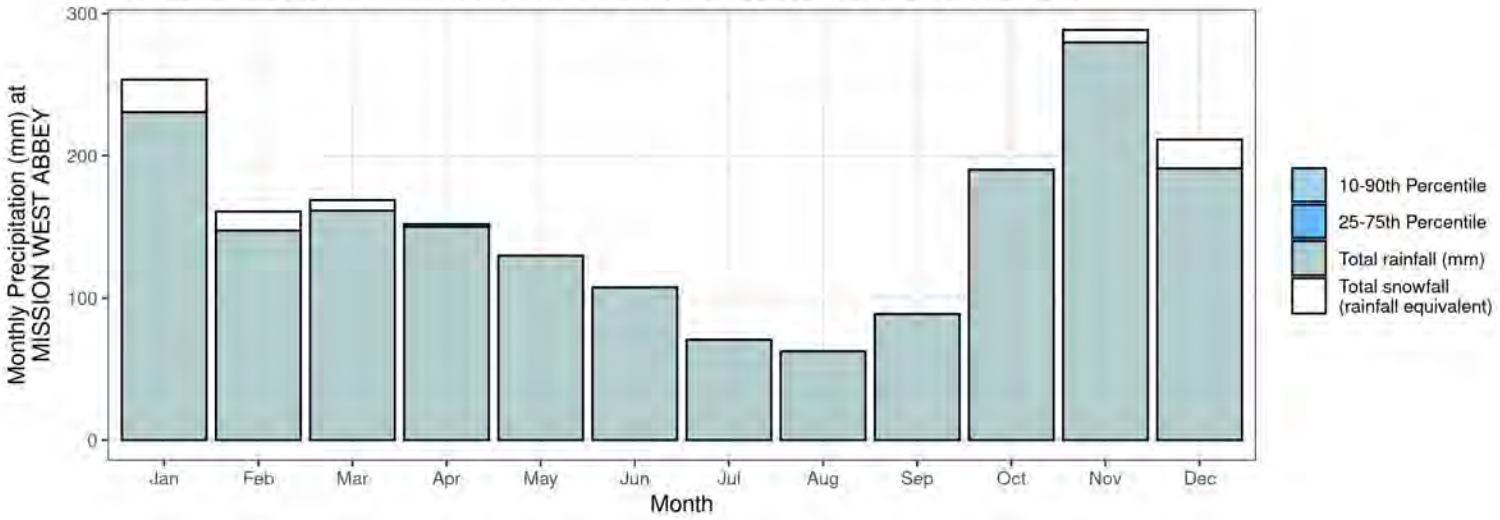
Piper Plot



The groundwater samples are typically of the Na-HCO3 type. Na is the dominant cation, which could be attributed to evolved/high rock-water interaction and or ion-exchange reaction. The fact that HCO3 is the dominant anion shows the source is primarily recent precipitation in the bedrock aquifer #19. For EMS water chemistry data, see EMS ID E311428.

Monthly Groundwater Level[1] with Precipitation from Climate Normals[2]

[1] No Monthly Water Level Summary (only 4 years of data; 2018-2022)
[2] Climate Normals Based on MISSION WEST ABBEY Environment Canada Weather Station (1981-2010)

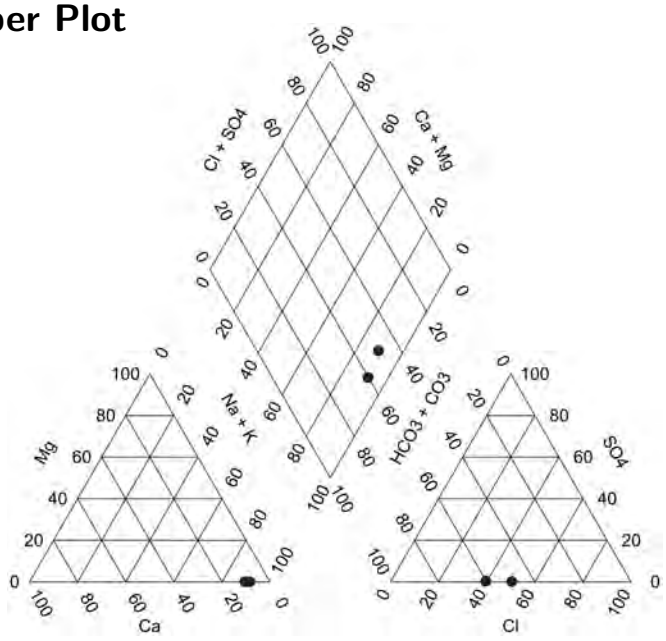


Groundwater Levels and Long-term Trend

Graph not available
(Not enough data)

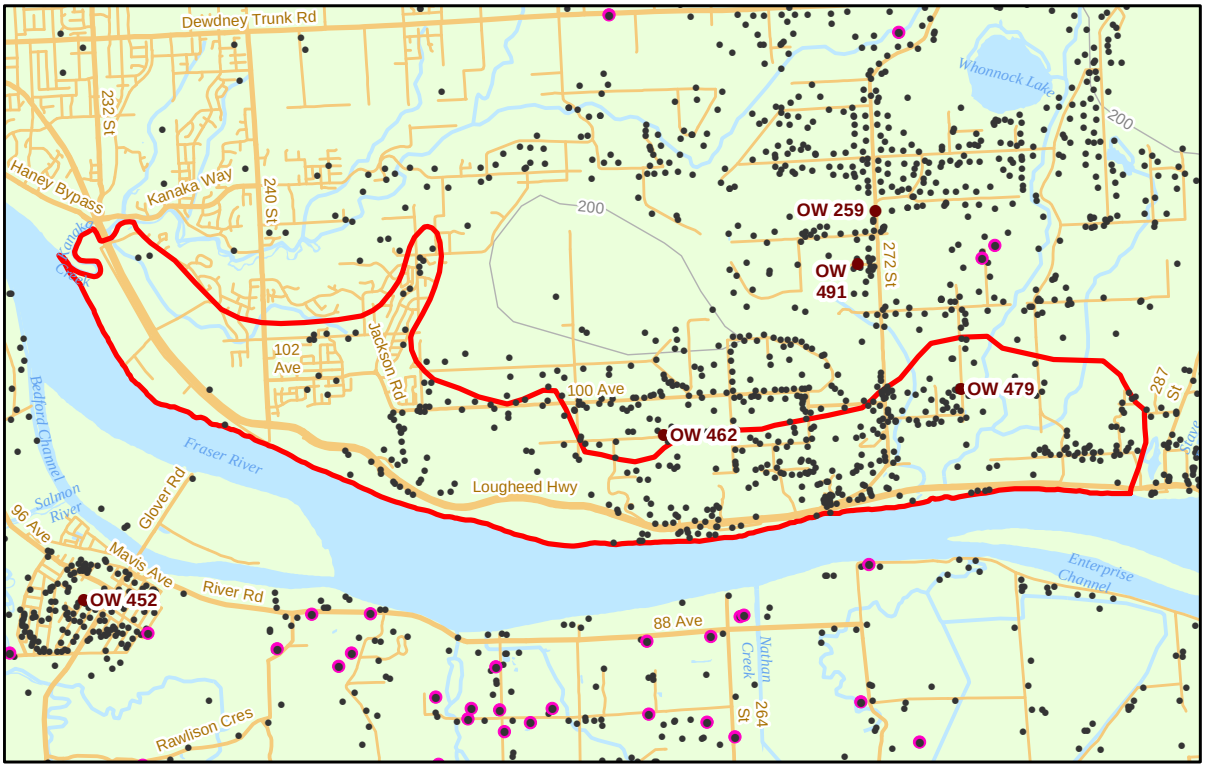
For more information regarding trends in groundwater levels see Environmental Reporting BC

Piper Plot



The groundwater samples are typically of the Na-Cl-HCO3 and Na-HCO3-Cl type. Na is the dominant cation, which could be attributed to evolved/high rock-water interaction and or ion-exchange reaction . The fact that HCO3 is the dominant anion shows the source is primarily recent precipitation in the bedrock aquifer #19. For EMS water chemistry data, see EMS ID E316130.

Aquifer #970



Legend

- Registered Water Well - Artesian
- Registered Water Well
- Active Observation Well
- Aquifer Boundary

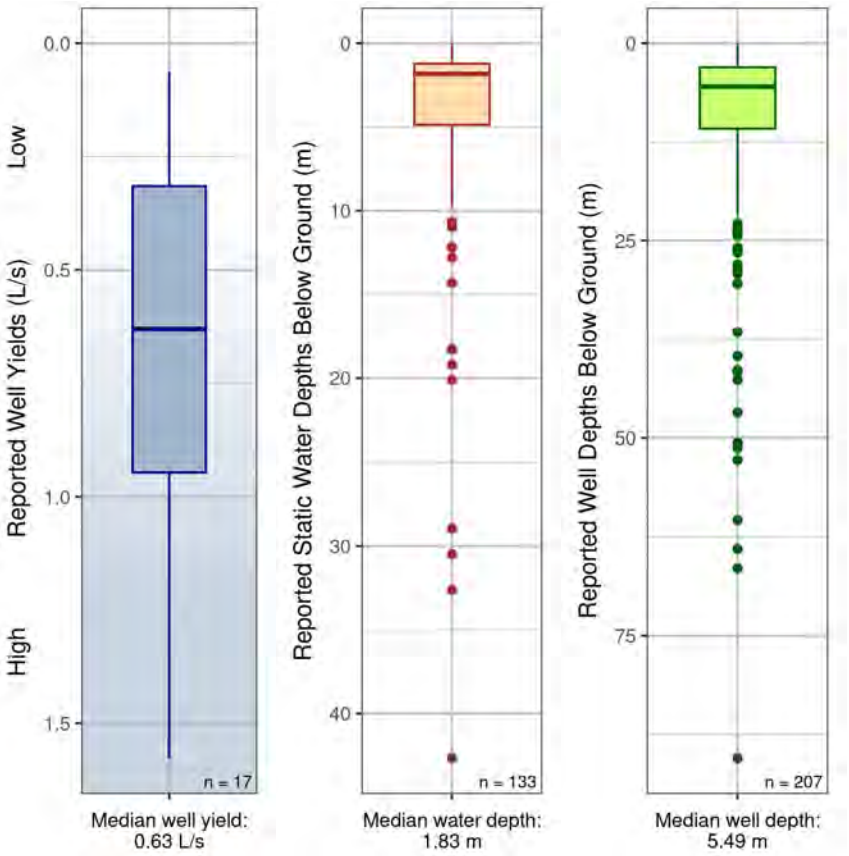
N

0 1 2 km

Aquifer Description (Mapping Report - 2016): Confined Glacio-fluvial sand and gravel aquifers underneath till, in between till layers, or underlying glacio-lacustrine deposits (subtype = 4b).

Aquifer Details	
Region	South Coast
Water District	New Westminster
Aquifer Area	15 km^2
No. Wells Correlated	209
Vulnerability to Contamination	Moderate
Productivity	Moderate
Aquifer Classification	IIB
Hydraulic Conductivity *	Unknown
Transmissivity *	Unknown
Storativity *	Unknown
No. Water Licences Issued to Wells	Unknown
Observation Wells (**Active**, Inactive)	None

* min - max
For Hydraulic Connection see guidance document



Detailed methods for all figures are described in the companion document (Aquifer Factsheet - Companion Document.pdf).
Factsheet generated: 2022-07-27. Aquifers online: https://apps.nrs.gov.bc.ca/gwells/aquifers.

APPENDIX C-2

Provincial Observation Wells 462 and 479
Water Well Records and Groundwater Level Graphs

Well Summary

Well Tag Number: 115015
Well Status: New
Observation Well Number: 462
Well Identification Plate Number: 44952
Well Class: Monitoring
Observation Well Status: Active
Owner Name: Ministry of Forests, Lands, Natural Resource Operations & Rural Development
Well Subclass: Permanent
Environmental Monitoring System (EMS) ID: E311428
Intended Water Use: Observation Well
Aquifer Number: 19
Alternative specs submitted: No
Artesian Condition: No
Technical Report: N/A
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

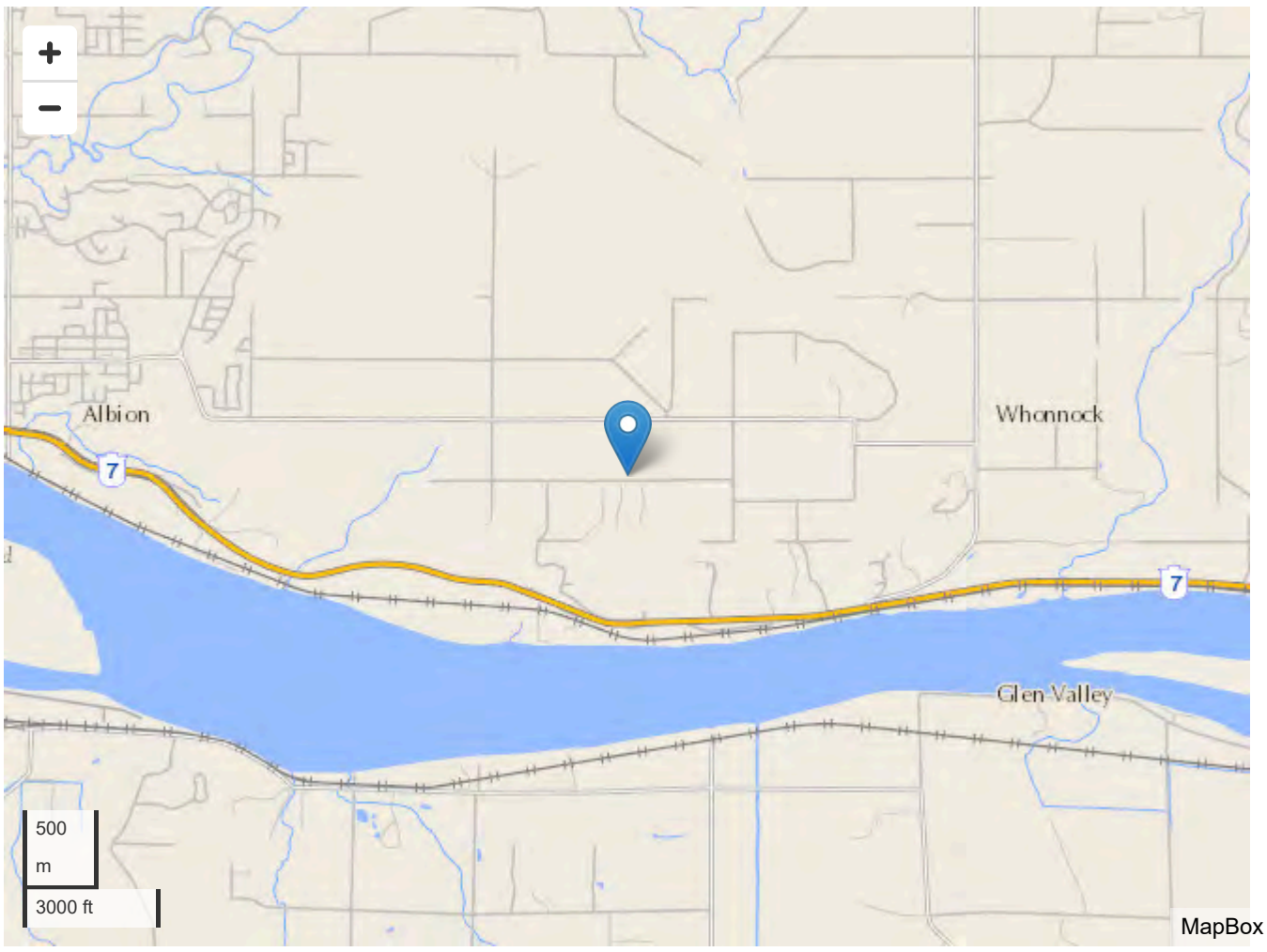
Location Information

Street Address: 26007 98th Avenue
Town/City: Maple Ridge

Legal Description:

Lot	
Plan	
District Lot	
Block	
Section	
Township	
Range	
Land District	
Property Identification Description (PID)	

Description of Well Location: 26007 98th Avenue, Maple Ridge (Thornhill Park)



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 49.18054
Longitude: -122.50041
UTM Easting: 536409
UTM Northing: 5447646
Zone: 10
Coordinate Acquisition Code: (1 m accuracy) CDGPS

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	2018-03-02	2018-03-02	A. & H. Drilling Ltd.	April 30th 2018 at 7:15 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2018-03-02	2018-03-02				

Well Completion Data

Total Depth Drilled: 497 ft bgl
Estimated Well Yield: 1 USgpm
Static Water Level (BTOC): 150 feet btoc
Finished Well Depth: 497 ft bgl
Well Cap: Locked Cabinet
Artesian Flow:
Final Casing Stick Up: 12 inches
Well Disinfected Status: Not Disinfected
Artesian Pressure (head):
Depth to Bedrock:
Drilling Method: Dual Rotary
Artesian Pressure (PSI):
Ground elevation: 417.7 feet
Method of determining elevation: Differential GPS
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	8	Brown Sandy Till						
8	200	Granite Bedrock -Hard, Gray & Greenish					Fractures at 145 ft.	
200	244	Granite - Greenish, Gray, White & Black						
244	258	Granite - Darker Greenish, Gray, White & Black					Fractures at 258 ft.	
258	264	Light Green, Gray- White - Soft						
264	296	Sandstone - Gray - Soft Shale						
296	301	Granite - Dark Green						
308	362	Shale & Sandstone - Gray						
362	370	Sandstone - Gray, Light Gray & White						
370	384	Sandstone - Light Gray, Gray & White						
384	411	Granite - Dark Green & White, Hard					Fractures at 410 ft.	
411	422	Shale - Gray - Soft						
422	468	Sandstone & Shale - Gray - Soft					Fractures at 422 ft.	
468	474	Sandstone - Light Gray - Soft						
474	497	Sandstone - Light Gray - Soft						

Casing Details

From	To	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0	20		Steel	6	0.25	Not Installed
20	497		Open hole	6		Not Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Backfill Material Above Surface Seal:
Surface Seal Installation Method: Poured
Backfill Depth:
Surface Seal Thickness: 2 inches
Surface Seal Depth: 18 feet

Liner Details

Liner Material:
Liner Diameter:
Liner Thickness:
Liner from:
Liner to:
Liner perforations

From	To
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:
Installed Screens

From	To	Diameter	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by: Pumping
Development Total Duration: 1 hours

Well Yield

Estimation Method: Pumping
Estimation Rate: 1 USgpm
Estimation Duration: 0.5 hours
Static Water Level Before Test:
Drawdown:
Hydrofracturing Performed: No
Increase in Yield Due to Hydrofracturing:

Well Decommission Information

Reason for Decommission:
Method of Decommission:
Sealant Material:
Backfill Material:
Decommission Details:

Pumping Test Information and Aquifer Parameters

Start Date	Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

No comments submitted

Documents

Well Number	Document Type	Date Of Upload	Document Status	Uploaded Document

Disclaimer

OBS WELL 462

Water Level Snapshot

Note: True data are marked with a dot, the thin line connecting points is a visual aid only and does not represent true observations.
The full data set can be downloaded via the BC Data Catalogue or the BC Real−time Water Data tool.

BRITISH COLUMBIA

Well Summary

Well Tag Number: 116533
Well Status: New
Observation Well Number: 479
Well Identification Plate Number: 51856
Well Class: Monitoring
Observation Well Status: Active
Owner Name: Ministry of Environment
Well Subclass: Permanent
Environmental Monitoring System (EMS) ID: E316130
Intended Water Use: Not Applicable
Aquifer Number: 19
Alternative specs submitted: No
Artesian Condition: No
Technical Report: N/A
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

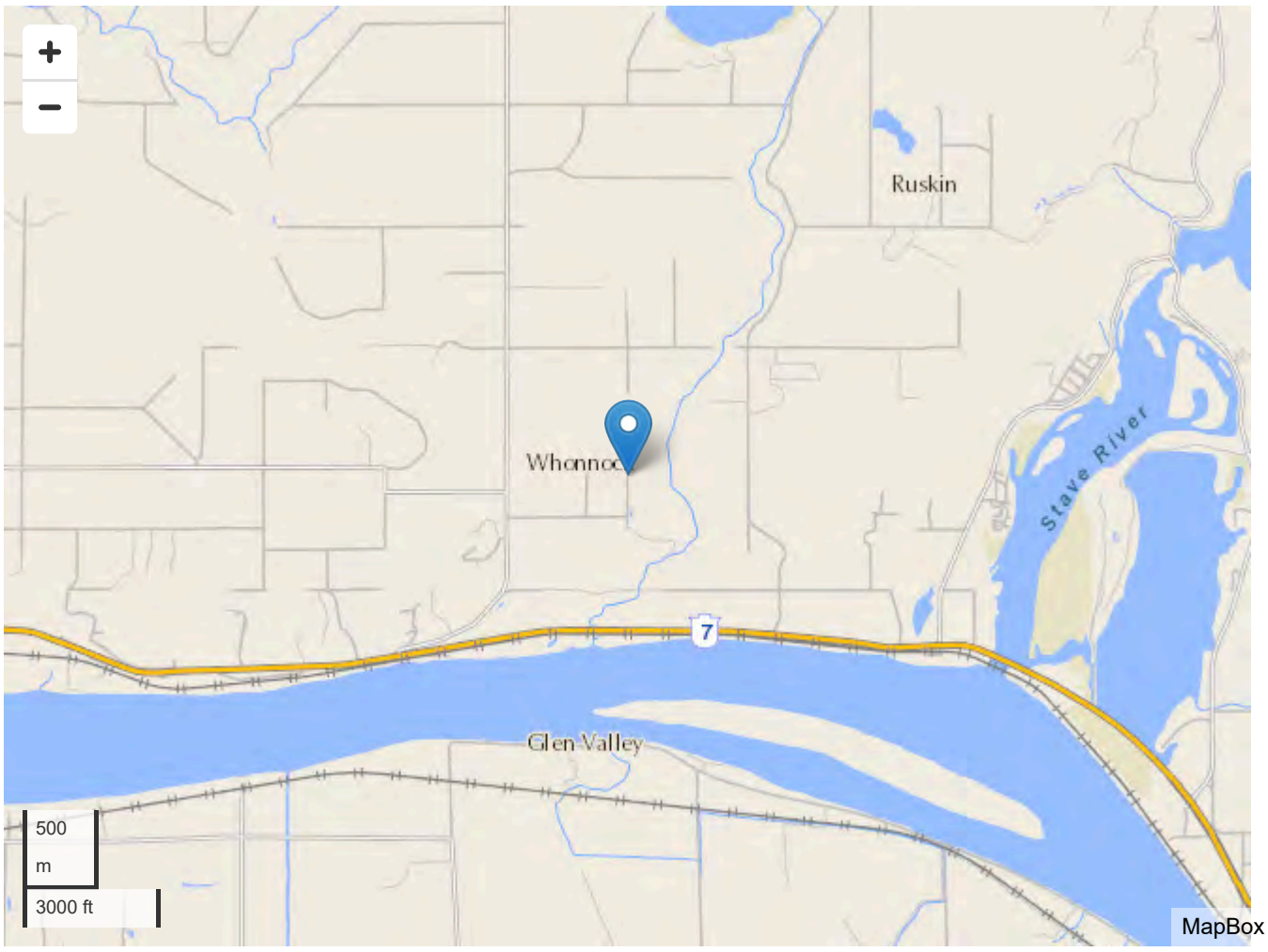
Location Information

Street Address: 276th Street
Town/City: Maple Ridge

Legal Description:

Lot	
Plan	
District Lot	
Block	
Section	
Township	
Range	
Land District	
Property Identification Description (PID)	

Description of Well Location: Located on west side of 276 Street, north of Bell Avenue, in Maple Ridge.



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 49.18354
Longitude: -122.45753
UTM Easting: 539532
UTM Northing: 5448001
Zone: 10
Coordinate Acquisition Code: (1 m accuracy) CDGPS

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	2018-11-06	2018-11-08	A. & H. Drilling Ltd.	February 22nd 2019 at 12:24 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2018-11-06	2018-11-08				

Well Completion Data

Total Depth Drilled: 397 ft bgl
Estimated Well Yield: 5 USgpm
Static Water Level (BTOC): 64.1 feet btoc
Finished Well Depth: 397 ft bgl
Well Cap: Metal cap
Artesian Flow:
Final Casing Stick Up: 53 inches
Well Disinfected Status: Not Disinfected
Artesian Pressure (head):
Depth to Bedrock: 92 feet bgl
Drilling Method: Dual Rotary
Artesian Pressure (PSI):
Ground elevation: 229.36 feet
Method of determining elevation: Level
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	2	Top soil						
2	4	Gravelly till						
4	26	Hard brown clay						
26	34	Grey gravelly till						
34	39	Coarse gravel						
39	57	Gravelly till						
57	64	Sand with some gravel						
64	68	Brown till						
68	73	Brown clay						
73	92	Silty gravelly till						
92	250	Brown and grey bedrock - Sandstone						
250	265	Black and white sandstone						
265	335	Black, white and grey sandstone						
335	397	Black, brown and white sandstone						

Casing Details

From	To	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0	17	Steel Removed		10		Installed
0	95.75		Steel	6	0.219	Not Installed
95.75	397		Open hole	6		Not Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Backfill Material Above Surface Seal:
Surface Seal Installation Method: Poured
Backfill Depth:
Surface Seal Thickness: 2 inches
Surface Seal Depth: 17 feet

Liner Details

Liner Material:
Liner Diameter:
Liner Thickness:
Liner from:
Liner to:
Liner perforations

From	To
There are no records to show	

Screen Details

Intake Method: Open Bottom
Type:
Material:
Opening:
Bottom:
Installed Screens

From	To	Diameter	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by: Pumping
Development Total Duration: 1 hours

Well Yield

Estimation Method:
Estimation Rate:
Estimation Duration:
Static Water Level Before Test:
Drawdown:
Hydrofracturing Performed: No
Increase in Yield Due to Hydrofracturing:

Well Decommission Information

Reason for Decommission:
Method of Decommission:
Sealant Material:
Backfill Material:
Decommission Details:

Pumping Test Information and Aquifer Parameters

Start Date	Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

Drilled in 2018 to monitor Grant Hill Aquifer (#19) as part of Provincial observation well network, OW479.

Documents

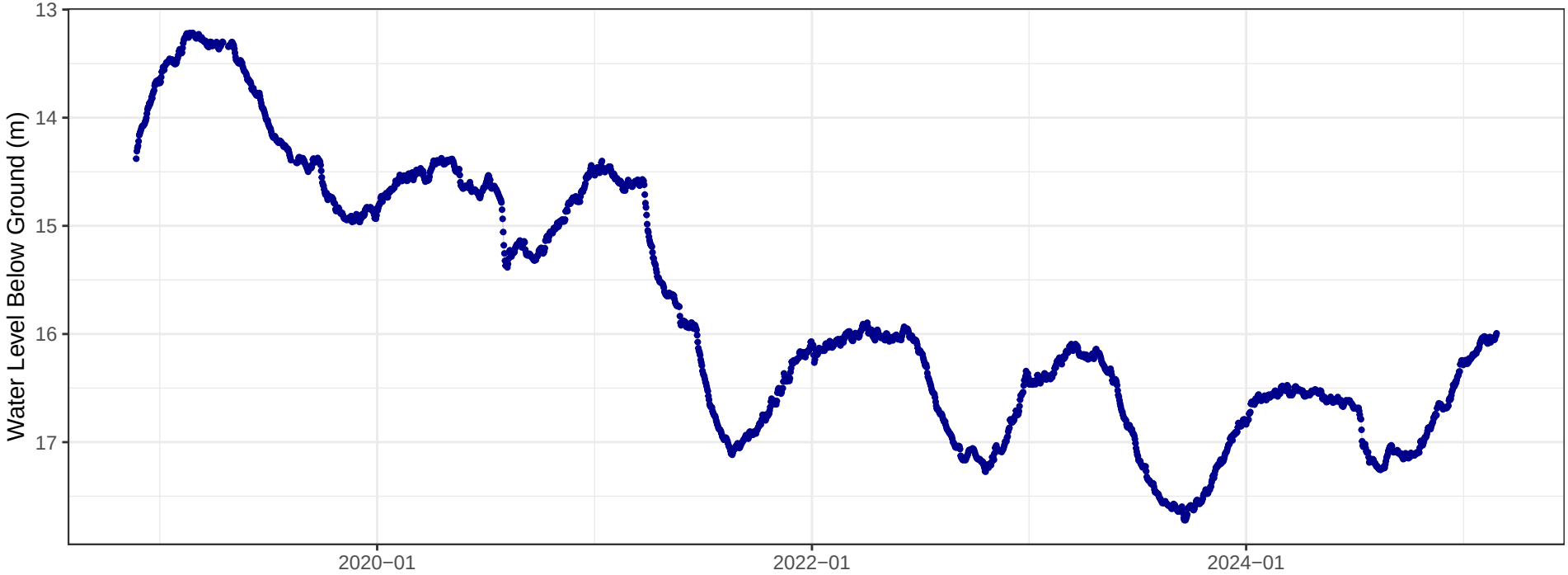
Well Number	Document Type	Date Of Upload	Document Status	Uploaded Document

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

OBS WELL 479

Water Level Snapshot



Note: True data are marked with a dot, the thin line connecting points is a visual aid only and does not represent true observations.
The full data set can be downloaded via the BC Data Catalogue or the BC Real−time Water Data tool.

BRITISH COLUMBIA

APPENDIX C-3

Statement of Limitations

Use of this Report. This report was prepared by McElhanney Ltd. ("**McElhanney**") for the particular site, design objective, development and purpose (the "**Project**") described in this report and for the exclusive use of the client identified in this report (the "**Client**"). The data, interpretations and recommendations pertain to the Project and are not applicable to any other project or site location and this report may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client, without the prior written consent of McElhanney. The Client may provide copies of this report to its affiliates, contractors, subcontractors and regulatory authorities for use in relation to and in connection with the Project provided that any reliance, unauthorized use, and/or decisions made based on the information contained within this report are at the sole risk of such parties. McElhanney will not be responsible for the use of this report on projects other than the Project, where this report or the contents hereof have been modified without McElhanney's consent, to the extent that the content is in the nature of an opinion, and if the report is preliminary or draft. This is a technical report and is not a legal representation or interpretation of laws, rules, regulations, or policies of governmental agencies.

Standard of Care and Disclaimer of Warranties. This report was prepared with the degree of care, skill, and diligence as would reasonably be expected from a qualified member of the same profession, providing a similar report for similar projects, and under similar circumstances, and in accordance with generally accepted engineering and scientific judgments, principles and practices. McElhanney expressly disclaims any and all warranties in connection with this report.

Information from Client and Third Parties. McElhanney has relied in good faith on information provided by the Client and third parties noted in this report and has assumed such information to be accurate, complete, reliable, non-fringing, and fit for the intended purpose without independent verification. McElhanney accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions or errors in information provided by third parties or for omissions, misstatements or fraudulent acts of persons interviewed.

Effect of Changes. All evaluations and conclusions stated in this report are based on facts, observations, site-specific details, legislation and regulations as they existed at the time of the assessment and report preparation. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or possible changes) as to the site, purpose, or development plans upon which this report was based, b) any changes to applicable laws subsequent to the issuance of the report, c) new information is discovered in the future during site excavations, construction, building demolition or other activities, or d) additional subsurface assessments or testing conducted by others.

Independent Judgments. McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land or with respect to public offerings for the sale of securities.

Construction Cost Estimates. This construction cost estimate has been prepared using the design and technical information currently available, that could be gathered within the scope of work and project budget, and without the benefit of well designs or numbers on which to base the estimate. Furthermore, McElhanney cannot predict the competitive environment, weather or other unforeseen conditions that will prevail at the time that contractors will prepare their bids. The cost estimate is therefore subject to factors over which McElhanney has no control, and McElhanney does not guarantee or warranty the accuracy of such estimate.

Appendix D
Technical Memo – Servicing Analysis

Our File: 2111-06526-00

TECHNICAL MEMO

To	From
Eric Aderneck, Industrial Lands Program Manager City of Maple Ridge	Carter Stelter, P.Eng. Nav Sandhu, P.Eng.
Re	**Date**
Industrial Bring to Market – Infrastructure Servicing Analysis R1	April 23, 2025

1. Introduction

McElhanney Ltd (McElhanney) was retained by the City of Maple Ridge (the City) to develop a comprehensive industrial development strategy addressing both current conditions and future development potential. As part of the industrial development strategy, McElhanney is collaborating with Kwantlen First Nation (KFN), the City, and Metro Vancouver (MV) to seek ways to accommodate dry industrial uses with a plan for achieving fully serviced uses.

The follow technical memorandum focuses on traditional servicing strategies for extending infrastructure services to the Kwantlen First Nation Reserve Lands and surrounding lands.

1.1. STUDY AREA

McElhanney conducted discussions with KFN, the City, and MV to identify near- and long-term use cases within the KFN IR5 (KFN Lands) and surrounding lands along Lougheed Highway and Fraser River (Study Area). Potential land uses for the Study Area sites based on these discuses are summarized in ***Table 1***. Site names have been grouped under Study Areas for analysis purposes. The Study Area and sites for potential industrial and residential land use area illustrated on ***Figure 1*** and ***Figure 2***.

Table 1: Potential Land Uses base on Near- and Long-Term Use Cases discussions

Study Area Name	Site Name	Potential Land Use
Albion Industrial Lands	Area 1A, Area 1B, Area 2	Serviced Industrial
Central Lands	Area 3	Semi-Serviced Residential
	Area 4	Dry-Industrial or Serviced Industrial
KFN Lands	Area 5B, 5C, 5D	Semi-Serviced or Serviced Residential
	Area 5A & 6A	Dry-Industrial or Serviced Industrial
Eastern Lands	Area 6B & 6C	Dry-Industrial or Serviced Industrial
	Area 7	Dry-Industrial or Serviced Industrial

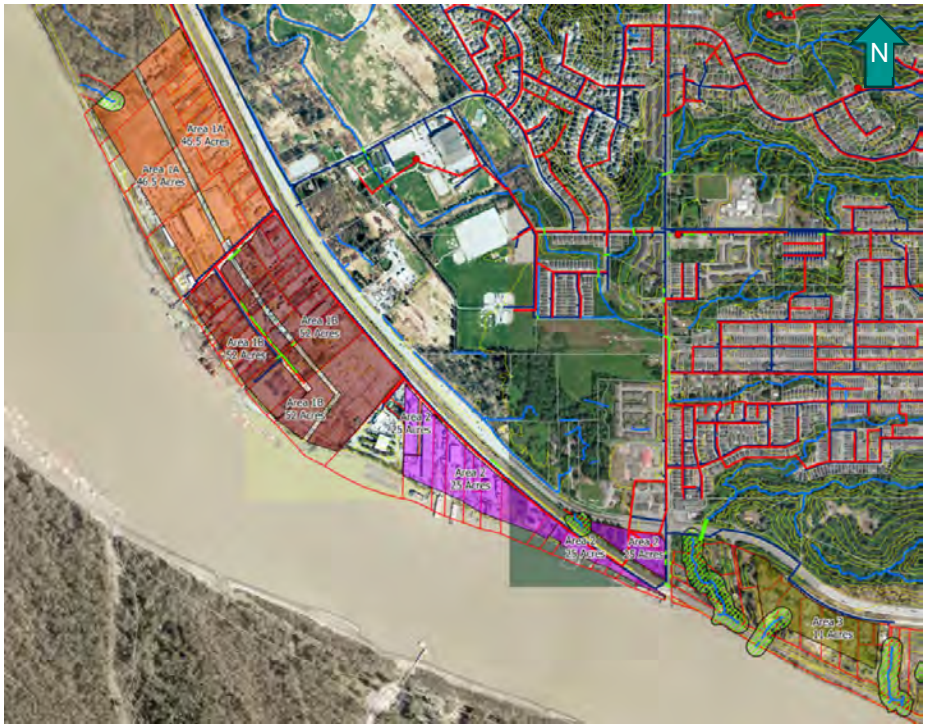


Figure 1: Western Study Area and Sub-areas based on Near- and Long-Term Use Cases discussions.

Figure 2: Eastern Study Area and Sites based on Near- and Long-Term Use Cases discussions.

1.2. SCOPE OF WORK

The following scope of work has been identified for the infrastructure servicing analysis:

- Collect and review all relevant background information including previous studies, Master Plans, design guidelines and criteria, and municipal, regional, and provincial GIS data and maps.
- Identify existing utility infrastructure, associated known capacity, and planned upgrades required to service the study area. The analysis is limited to a qualitative assessment of previous study findings.
- Estimate equivalent populations in the Study Area and conceptual sanitary flow generation and water flow demands.
- Evaluate servicing strategies and generate cost estimates for servicing. The evaluation will also determine additional information and studies required to support future design and construction servicing.
- Develop an implementation plan for extending infrastructure services to the study area, including transitioning from dry industrial uses to semi-serviced or partially serviced conditions, and ultimately to fully serviced conditions.

1.3. DESIGN GUIDELINES AND STANDARDS

The infrastructure servicing analysis referenced the following guidelines and standards as part of the study:

- Design and Construction Documents Part 1 Design Criteria Manual (City of Maple Ridge, June 2023)
- Water and Sewer Network Analysis Criteria (City of Maple Ridge, June 2023)
- Geotechnical and Floodplain Report Guidelines (City of Maple Ridge, July 2013)
- Master Municipal Construction Documents Association (MMCD) Design Guidelines (2022)
- Legislated Flood Assessment in a Changing Climate in BC (EGBC, August 2018)

2. Background Data

The following background documents and data were reviewed as part of the infrastructure servicing analysis:

- Industrial Impact Analysis – Servicing Analysis (McElhanney, June 2024)
- Sanitary Master Plan (AECOM, November 2016)
- Sanitary Sewer Model Updates & Infrastructure Planning (ARCADIS, March 2024)
- Water Distribution Master Plan (KWL, November 2016)
- Water Distribution System Model Update (Water Street Engineering, January 2023)
- South Alouette & Kanaka Creek Integrated Stormwater Management Plan (Urban Systems, September 2021)
- Fraser River Hydraulic Model Update (NHC, March 2008)
- Hydraulic Modelling and Mapping in BC's Lower Mainland – A Lower Mainland Flood Management Strategy Project (NHC, May 2019)
- Lower Mainland Dike Assessment (NHC, Thurber, July 2015)
- Albion and Maple Ridge Road 13 Dike Assessment 2012 (BGC, March 2016)

3. Existing Utilities & Identified Upgrades

The following section identifies existing utility infrastructure and planned upgrades identified in Master Plans and previous studies.

3.1. SANITARY SYSTEM

The Albion Industrial Lands are serviced by a gravity sanitary sewer along River Road which conveys flows west, under Kanaka Creek via an inverted siphon, then northwest to the 225 Street Pump Station. The 225 Street Pump Station then sends flows via a forcemain to River Road and Best Street. From there, a gravity trunk conveys flows to the MV Katzie Pump Station. A local sanitary sewer along McKay Avenue and Fisherman Road collects flows from the western sites of the Albion Industrial Lands (Areas 1A, 1B and 2). The existing sanitary system is shown in ***Figure 3***.

There are no local municipal sanitary systems servicing the Central Lands, KFN Lands, and Eastern Lands. The nearest sanitary system is a gravity sanitary sewer at 240th Street which conveys flows west along River Road towards the Albion Industrial Lands.

The Central Lands, KFN Lands, and Eastern Lands were not considered in the Sanitary Master Plan (AECOM, November 2016), which identified sewer system upgrades to support industrial and residential growth and densification in the Albion Industrial Lands and Albion areas. In addition, the 225 Street Pump Station, forcemain, and downstream gravity sewer are currently in the process of being upgraded. The Sanitary Master Plan (AECOM, November 2016) recommended the option of twinning the existing sanitary sewer along River Road to the 225 Street Pump Station should connection and densification in the Thornhill Urban Reserve proceed. Planned upgrades are further discussed in ***Section 4***.

3.2. WATER DISTRIBUTION SYSTEM

The Albion Industrial Lands and Area 3 of the Central Lands are located in the 84 m Pressure Zone, which is supplied by a MV transmission main on Dewdney Trunk Road. The Water Distribution Master Plan (KWL, November 2016) noted during high demand in the 84 m Pressure Zone, balancing storage is supplied by MV's Maple Ridge Reservoir. There is a 350mm watermain on River Road which feeds local 200mm watermains on McKay Avenue, Fisherman Road, and 236 Street servicing the Albion Industrial Lands. The River Road watermain connects with a watermain on 240 Avenue where a 200mm watermain branches off at the Lougheed Highway to feed the Area 3 Residential Area.

There are no local municipal water systems servicing the KFN Lands and Eastern Lands. The nearest water distribution system pressure zones are the 84 m Pressure Zone and 158 m Albion pressure zone. The Water Distribution Master Plan (KWL, November 2016) reported that the 158 m Albion zone is serviced by the Albion Pump Station and two-celled Albion Reservoir. The Albion Pump Station supplies the 158 m Albion zone via a 400mm / 500mm diameter transmission watermain along 240 Street and 104 Avenue. The Albion Reservoir has a total capacity of 1,290 m^3 and provides balancing, fire protection, and emergency storage for the 158 m Albion zone. The existing water distribution system is shown in ***Figure 3***.

The Water Distribution Master Plan (KWL, November 2016) considered potential servicing of the KFN Lands through a proposed connection to the 158 m Albion zone. Additional demands from the KFN Lands, and potentially the Eastern Lands, would require upgrades to the Albion Pump Station and feeder transmission watermain along 240 Street and 104 Avenue. The Water Distribution Master Plan assumed a feeder pipe would be installed on 248 Street between 100 Avenue and the KFN Lands, and a new reservoir would be installed to provide balancing, fire protection, and emergency storage for KFN Lands and other sites connected to this proposed water distribution system. Planned upgrades are further discussed in ***Section 4***.

3.3. DRAINAGE & FLOOD MANAGEMENT

There is limited to no drainage infrastructure in the Study Area. The only dike system in the Study Area is the Albion Dike. The Albion Dike surrounds a portion of the Albion Industrial Lands which consists of a network of culverts, ditches, flood box and pump station to manage drainage in the Albion Industrial Lands. Various options have been assessed for upgrading the Albion Dike, however none have been selected at the time of preparing this report.

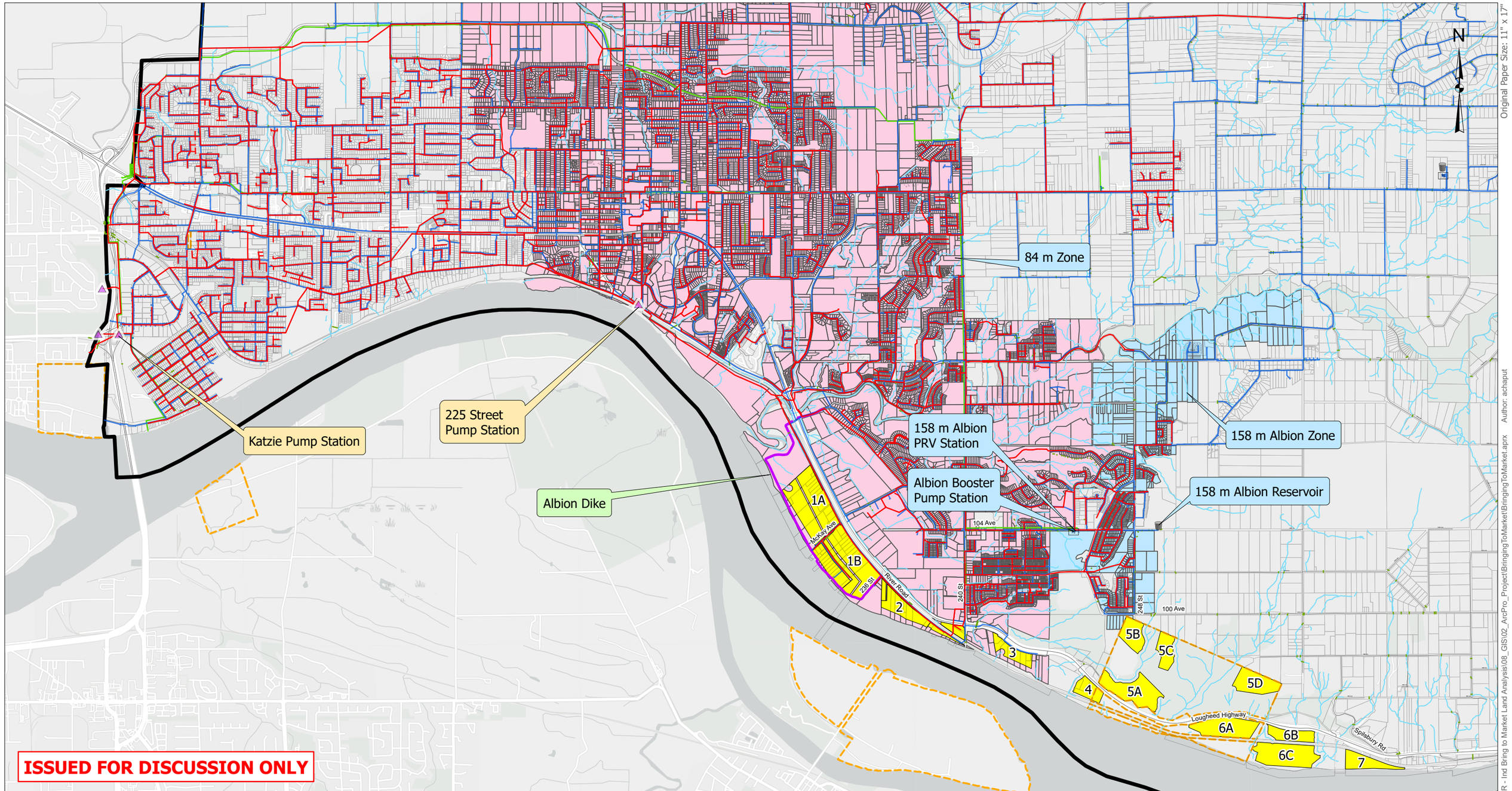
For the remaining study area, there are several watercourses which drain upslope City lands through the KFN Lands and Eastern Lands, then through Lougheed Highway and Canadian Pacific Railway (CPR) crossings. The watercourses ultimately outlet to the Fraser River.

There are no set Flood Construction Levels (FCL), but assessments have been complete to determine 200-year flooding levels and extents. Historic and future 200-year flooding levels and extents were estimated using a hydraulic modelling of the Fraser River (*Hydraulic Modelling and Mapping in BC's Lower Mainland – A Lower Mainland Flood Management Strategy Project,* NHC, May 2019). Flood results, including the historic 200-year return period flow with current sea levels during freshet and the future 2100 horizon 200-year return period flow under climate change and sea level rise of 1m are summarized in ***Table 2*** and shown in ***Figure 4***.

Table 2: 200-year Historic and Future Flood Results for the Study Area from the Flood Management Strategy Project (NHC, 2019)

Approximate Lower Fraser River Chainage (km)	Approximate City Road / Adjacent Feature	200-year Historical Water Level (Base Freshet) (m)	200-year Climate Change Water Level with 1m Sea Level Rise (Base Freshet)	Approximate Ground Contour Elevations (m)
63.5	240th Street	6.49	7.83	2.5 – 10.0
65.0	Spilsbury Street	6.61	7.96	2.5 – 10.0

The Albion Industrial Lands and Eastern Lands are inundated by the historic and future 200-year flood event. The Central Lands and the KFN Lands are not directly impacted by flooding, however development along the Fraser River and local watercourses should consider the need for a FCL.



ISSUED FOR DISCUSSION ONLY

McElhanney

Maple Ridge

Projection:
NAD 1983 UTM Zone 10N

TITLE

Maple Ridge Bring to Market Analysis
Figure 3 Existing Utilities

Project: Industrial Servicing Impact Analysis

Location: Maple Ridge, BC

Scale 1:34,000

0 2,000 Meters

LEGEND

- Sanitary Overflow Outfall
- Existing PRV
- Existing Reservoir
- Existing Pump Stations
- Sanitary Sewer
- Drainage Culvert
- MV Transmission Watermain
- Water Main
- Dike
- Roads
- Stream
- Kwantlen First Nations Reserve
- Parcels
- 158m Albion Zone
- 84m Zone
- Sites
- Maple Ridge Boundary

Original Paper Size: 11" x 17"

Author: achaput

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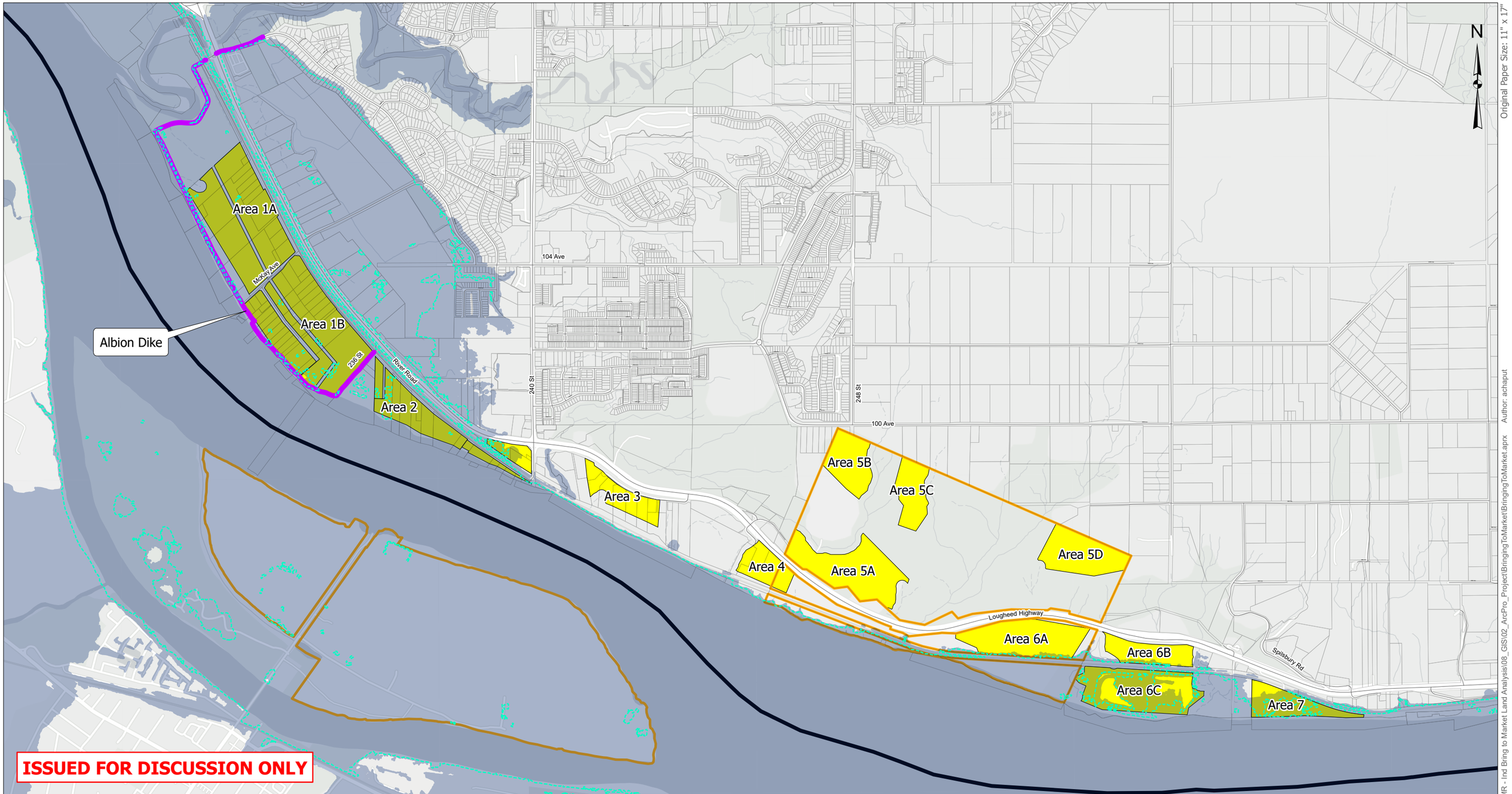


McElhanney

Maple Ridge

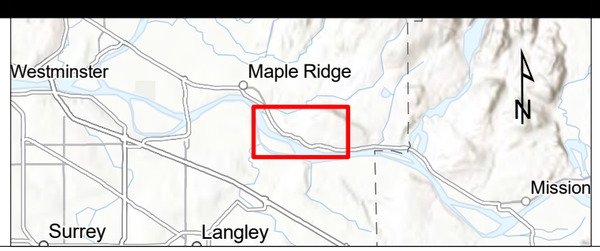
Projection:
NAD 1983 UTM Zone 10N

TITLE

Maple Ridge Bring to Market Analysis
Figure 4 Floodplain

Project: Industrial Servicing Impact Analysis
Location: Maple Ridge, BC

Scale 1:18,000
0 1,000 Meters



LEGEND

- Dike
- Roads
- Parcels
- 200-year Historic Floodplain
- 200-year Climate Change Floodplain
- Kwantlen First Nations Reserve
- Sites
- Maple Ridge Boundary

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4. Population Analysis

A population analysis was conducted to understand the magnitude of sanitary flow generation and water flow demands for different sites in the Study Area. The population equivalents were not estimated for the Albion Industrial Lands as this work was completed as part of the Sanitary and Water Master Plans. The population analysis focused on undeveloped lands not connected to sanitary and water services (KFN Lands and Eastern Lands).

Population equivalents were estimated using the City's Design Criteria Manual (June 2023), Master Municipal Construction Documents Association (MMCD) Design Guidelines (2022), calibrated existing model parameters, and aerial imagery of similar industrial and residential land use.

A sensitivity analysis was conducted to develop a range of equivalent populations. For industrial land use, equivalent populations were calculated using **90, 105, and 110 *capita per gross hectare***. A gross area factor of **0.4** (i.e. Industrial Building Area per Lot Area ratio) was developed using similar industrial build out (e.g. Katonien and 256 Street Industrial yards). The residential equivalent population was estimated using three different *dwelling per hectare* densities (**17, 21, and 26 *dwellings per hectare***) based on similar residential build out north of the KFN Lands between Hill Avenue and 102 Avenue. A *persons per dwelling* rate of **3.5** was used for each dwelling density based on a Single Family / Duplex Dwelling Unit Type from the City's Design Criteria Manual. Site details and equivalent populations are summarized in ***Table 3***.

Table 3: KFN Lands Equivalent Populations

Study Area / Site Name	Area (ha)	Assumed Land Use	Equivalent Population		
			Low	Medium	High
Central Lands					
Area 3	4.5	Residential	265	327	405
Area 4	4.0	Light Industrial	139	162	170
KFN Lands					
Area 5B	5.7	Residential	337	416	516
Area 5C	4.9	Residential	289	357	442
Area 5D	7.7	Residential	458	565	700
Area 5A	10.9	Light Industrial	375	437	458
Area 6A	9.7	Light Industrial	333	388	407
Eastern Lands					
Area 6B	4.7	Light Industrial	160	186	195
Area 6C	11.7	Light Industrial	402	469	492
Area 7	5.2	Light Industrial	178	208	218
Total	**68.9**		**2,935**	**3,517**	**4,001**

5. Proposed Infrastructure Servicing

This section discusses proposed infrastructure servicing, including high-level sanitary flow generation and water flow demands, investigation of servicing strategies, and summary of associated costs for upgrades or additional studies.

Cost estimates for servicing strategies use “Class D” planning-level unit rates which are based on recent similar projects in the City of Maple Ridge and Lower Mainland. To determine other likely costs, certain assumptions were made as summarized below.

- As per the ACEC-BC’s Budget Guidelines for Consulting Engineering Services (2009), Class D estimates are preliminary estimates which, due to little or no site information, indicate the approximate magnitude of cost of the proposed project, based on the client’s broad requirements. The overall cost estimate may be derived from lump sum or unit costs for similar projects. Class D estimates may be used in developing long term capital plans and for preliminary discussion of proposed capital projects.

- Cost estimates are assumed to be in 2024 dollars (exclusive of any Value Added Taxes, such as GST) and include allowance for supply and install of infrastructure, trenching and backfilling, and pavement and other surface restoration.

- Allowances were not included for contractor mobilization and demobilisation, traffic management, construction timeline constraints which may alter production rates (i.e. road closure times, noise window, etc.), environmental permitting requirements, land acquisition costs, and internal administration costs.

- As per the ACEC-BC’s Budget Guidelines for Consulting Engineering Services (2009), a Class D estimate is within ±50%. Basic engineering fees for the design portion only on complex municipal infrastructure projects could be expected to be approximately 15% of the construction costs. This would include required studies and detailed design. For the purposes of this report, a 35% contingency was added to construction cost estimates to account for unknown conditions, plus an additional 15% to cover total engineering and project management costs.

Several limitations at this stage will have an impact on the costs of the servicing strategies. The known limitations are discussed below.

- No geotechnical reporting has been completed as of yet. Prior to design, a thorough geotechnical investigation will need to be completed. The geotechnical investigation and report will confirm the adequacy of the underlying soils for trenching and / or trenchless construction methods and if any special construction techniques may be required on the project. If any soft underlying soils are encountered that require special construction techniques, the project costs would increase.

- No archaeological investigations or Environmental Impact Assessments have been completed during the development of the concept designs and management procedures, therefore, have not been accounted for in the construction / project cost estimate. Both will be required prior to construction.

5.1. SANITARY SYSTEM

Sanitary flow generation was estimated using equivalent populations and an Average Dry Weather Flow (ADWF) of **300 L/capita/day**. Note that industrial land uses may produce different flows depending on final building typology and required facility processing. ***Table 4*** summarizes the estimated sanitary flow generation based on low to high equivalent population projections.

Table 4: KFN Lands Sanitary Flow Generation Estimates

Study Area / Site Name	Area (ha)	Assumed Land Use	ADWF (L/s)		
			Low	Medium	High
Central Lands					
Area 3	4.5	Residential	0.9	1.1	1.4
Area 4	4.0	Light Industrial	0.5	0.6	0.6
KFN Lands					
Area 5B	5.7	Residential	1.2	1.4	1.8
Area 5C	4.9	Residential	1.0	1.3	1.5
Area 5D	7.7	Residential	1.6	2.0	2.4
Area 5A	10.9	Light Industrial	1.3	1.5	1.6
Area 6A	9.7	Light Industrial	1.2	1.4	1.4
Eastern Lands					
Area 6B	4.7	Light Industrial	0.6	0.6	0.7
Area 6C	11.7	Light Industrial	1.4	1.6	1.7
Area 7	5.2	Light Industrial	0.6	0.7	0.8
Total	**68.9**		**6.7**	**8.1**	**9.4**
ADWF for Study Area (m^3/day)			**885**	**1,060**	**1,205**
ADWF for KFN and Eastern Lands Only (m^3/day)			**763**	**912**	**1,032**

It is understood that existing industrial sites along the Lougheed Highway east of 240th Street manage sanitary flows onsite since there are no municipal utilities servicing these areas. Existing constraints for servicing the Central Lands, KFN Lands, and Eastern Lands include the Lougheed Highway and CPR right-of-way (ROW) which obstruct proposed utility ROWs to KFN Lands. There may be opportunities to connect the Central Lands, KFN Lands, and Eastern Lands to the gravity sanitary sewer at 240th Street and River Road with a pump station on the KFN Lands and approximately 1.5 km of forcemain and gravity sewer adjacent to the Lougheed Highway / CPR ROWs to 240th Street and River Road. An analysis of downstream infrastructure impacts would be required for the gravity sewers between 240th Street and the 225 street

Pump Station, and the 225 Street Pump Station and forcemain / gravity sewer to the Metro Vancouver Katzie Pump Station. In addition, the Study Area east of 240th Street is also outside of the Metro Vancouver Urban Containment Boundary and regional sewerage area and would require additional coordination with Greater Vancouver Sewerage & Drainage District to understand wastewater treatment capacity. Class D cost estimates have been generated for the sanitary pump station and sewer system to connect the KFN lands to the 240th Street gravity sewer.

The Sanitary Master Plan (AECOM, November 2016) recommended upgrades for the sanitary sewer along River Road, which services the Albion Industrial Lands. These upgrades have been completed and the sanitary sewer currently has capacity to service the Albion Industrial Lands. Additional identified upgrades which could service the Central Lands, KFN Lands, and Eastern Lands include the option for twinning the existing gravity sanitary sewer along River Road from 240th Street to the 225 Street Pump Station. This upgrade was identified to service possible future densification of the Thornhill Urban Reserve development. The Sanitary Master Plan (AECOM, November 2016) estimated an approximate cost of $6.2M (2016 dollars) for offsite works only, and did not include purchase of land / ROW, or additional pump station requirements. The engineering and contingency contributions for this cost estimate were not reported in the Sanitary Master Plan (AECOM, November 2016). For the purposes of this study, 5.5 km of sewer twinning was considered for the Class D cost estimate. The cost of sewer twinning could potentially be shared between the proposed industrial lands and Thornhill Urban Reserve.

Following serving the KFN Lands and Eastern Lands, local collection system to direct flows from sites to a centralized pump station system would be required.

Table 5 summarizes sanitary servicing strategies and associated high-level, class D cost estimates.

Table 5: Summary of Sanitary Services Strategies

Strategy Name	Description	Class D Costs (2024 Dollars)
S1	KFN Lands Sanitary Pump Station	$2,000,000 to $3,000,000
S2	1.5 km of Forcemain / Gravity Sewer from KFN Lands to 240 Street with the option to connect Area 3	$4,200,000
S3	5.5 km of Gravity Sanitary Sewer Twinning from 240 Street to 225 Street Pump Station	$12,900,000*
Total		**$19,100,000 to $20,100,000**

*Cost could be shared with Thornhill Urban Reserve

5.1.1. Options for Sewerage Treatment and Disposal

Given the costs for upgrading and connecting to the sewer system, and the fact that the Study Area is outside the Metro Vancouver Urban Containment Boundary, options for a centralized sewage treatment and disposal facility for the proposed development are to be considered. With average dry weather flows estimated at 763 to 1,032 cubic metres per day, the plant must be sized for 1,526 to 2,064 cubic metres

per day minimum, and must conform to both the Municipal Waste Regulation (MWR), administered by the BC Ministry of the Environment (MoE), and the Wastewater System Effluent Regulation (WSER), which is federally regulated under the Fisheries Act. The regulatory mechanism for permitting is through the MWR, where proposed plants must meet the regulation and acquire a registration under the corresponding act. The requirements for the MWR and WSER are similar and once registration is achieved reporting to MoE and federally are required based on the allowable effluent water quality objectives

At this size of plant, ground disposal is not a practical option, therefore a riverine outfall must be considered in the assessment of the scope of the project. All registrations under the MWR follow a strict protocol for submission, review and approval, which is based on a comprehensive environmental impact study of both the land and receiving environment, and includes a cumulative impact assessment based on the background assessment of existing environmental constraints. Applications must also include complete detailed designs, operating plans and other documents to ensure a complete and thorough plan has been conceptualized and meets all the requirements for environmental protection.

It is likely that the chosen treatment technology will be in the form of an advanced biological process such as a moving bed bio-reactor (MBBR), membrane bioreactor (MBR) or other such technologies where the plant footprint can be optimized within the given space. The plant will require a sludge management plan for disposal of process solids that need to be disposed of within the regulatory framework.

Considering the need for site preparation, plant servicing, civil, structural, geotechnical, as well as mechanical and electrical system, plus a riverine outfall and diffuser, the possible central plant is likely to be in the order of **$16M-$20M**. This cost does not include individual site servicing, collection or conveyance to the plant site, which at this time has been identified as to be located on Site 5A, which is the most central in the study area.

Before committing to the idea of a centralized plant. More assessment is required and should start with the feasibility and cost for the outfall. Once it is determined that an outfall is feasible, site selection should commence with the intent of optimizing the collection system to the plant, while minimizing site development costs. From there technology selection would precede final detailed design and approvals.

5.2. WATER DISTRIBUTION SYSTEM

Water flow demands were estimated using equivalent populations and a base maximum daily demand (MDD) of **0.084 L/s/ha** for non-residential land use and **361 L/capita/day** for residential land use from the Master Water Distribution Plan (KWL, 2016). Non-residential and residential seasonal demands were also included and utilized a unit demand of **0.47 L/s/ha** with a 25% irrigation area reduction factor for non-residential areas. The combined base and seasonal MDD flow rates are summarized in ***Table 6***. Approximate average daily demand (ADD) rates were estimated by halving the MDD rates. Note that industrial land uses may have different water demands depending on final building typology and required facility processing. Water flow demands for Area 3 of the Central Lands were not estimated as this area is already serviced by the 84 m Zone.

Table 6: KFN Lands Water Flow Demand Estimates

Study Area / Site Name	Area (ha)	Assumed Land Use	MDD (L/s)		
			Low	Medium	High
Central Lands					
Area 4	4.0	Light Industrial	0.8	0.8	0.8
KFN Lands					
Area 5B	5.7	Residential	4.1	4.4	4.8
Area 5C	4.9	Residential	3.5	3.8	4.1
Area 5D	7.7	Residential	5.5	6.0	6.5
Area 5A	10.9	Light Industrial	2.2	2.2	2.2
Area 6A	9.7	Light Industrial	2.0	2.0	2.0
Eastern Lands					
Area 6B	4.7	Light Industrial	2.9	3.0	3.0
Area 6C	11.7	Light Industrial	7.2	7.5	7.6
Area 7	5.2	Light Industrial	3.2	3.3	3.4
Total	**64.5**		**31.3**	**32.9**	**34.4**
MDD for KFN and Eastern Lands (m^3/day)			**2,705**	**2,842**	**2,972**

Similar to the sanitary system, there are no local municipal water distribution systems servicing the KFN Lands and Eastern Lands. The Master Water Distribution Plan (KWL, 2016) assessed the option of servicing the KFN Lands through the 158 m Albion zone. This option would avoid the Lougheed Highway and CPR ROWs, but requires upgrades to the Albion Booster Pump Station and feeder transmission watermain along 240th Street and 104th Avenue. A feeder pipe would be installed on 248th Street between 100th Avenue and the KFN Lands. In addition, a local distribution system including reservoir sizing for system balancing, fire protection, and emergency storage, and potential pressure reducing values, pumps, etc. would be required to service each site. The Eastern Lands could be serviced by the water distribution system in the KFN Lands.

Based on findings in Master Water Distribution Plan (KWL, 2016), the Albion Booster Pump Station upgrade would involve increasing the firm pumping capacity to provide the addition MDD from the KFN Lands and Eastern Lands (e.g. increase firm capacity by an additional 31 to 34 L/s) and be used to refill a new reservoir on the KFN Lands. Proposed upgrades to the 240th Street and 104th Avenue transmission main would likely require upsizing segments of 400mm to 450mm or 500mm, however this upgrade will need to be re-assessed if development in the Thornhill Urban Reserve or densification in the Albion area proceed. The feeder transmission main has approximately 320 metres of 400mm pipe along 240th Street which is considered as a required upgrade as part of this study. The feeder main to connect the 158 m Albion zone to the KFN Lands is assumed to be a 75-metre-long feeder main, as per the Master Water Distribution Plan (KWL, 2016).

For the Albion Industrial Lands, the Master Water Distribution Plan (KWL, 2016) recommended upsizing local watermains along McKay Avenue and Fisherman Road to 250mm pipe and adding looping the local watermain system with the River Road watermain for redundancy.

Water distribution system servicing strategies are summarized in ***Table 7***.

Table 7: Summary of Water Distribution System Servicing Strategies

Strategy Name	Description	Class D Costs
W1	Increase firm capacity of the Albion Booster Pump Station	$1,500,000 to $2,000,000
W2	320m of Feeder Transmission Main Upgrades along 240 Street	$600,000
W3	75m of Feeder Main from 248 Street to KFN Lands boundary	$120,000
W4	450m of 250mm Watermain Upsizing and Looping	$700,000
Totals		**$2,920,000 to $3,420,000**

5.3. DRAINAGE & FLOOD MANAGEMENT

A potion of the Study Area (Albion Industrial Lands and Area 3 of the Central Lands) is located in the *South Alouette & Kanaka Creek Integrated Stormwater Management Plan* (Urban Systems, September 2021). For the KFN Lands and Central Lands, a local stormwater servicing strategy study or local integrated stormwater management plan would be required to develop an approach to implementing stormwater management and flood management strategies.

For the purposes of this study, drainage and stormwater management in the Study Area could adopt the City's three tier approach for rate and volume control. Additional considerations for climate change should be used for design purposes based on the design life and consequence of infrastructure failure. Stringent stormwater quality guidelines should also be adopted given the proximity to the Fraser River and local watercourses. The *South Alouette & Kanaka Creek Integrated Stormwater Management Plan* (Urban Systems, September 2021) recommends the use of proprietary treatment systems (i.e. oil grit separators, swirl concentrators, membrane filtration, etc.) and / or green infrastructure / low impact development with enhanced stormwater treatment focused on the removal of metals and nutrients. Stormwater treatment should also be provided before infiltrating urban runoff.

Drainage in the Study Area consists of ditches and culverts which convey upslope drainage and watercourses between the Lougheed Highway and CPR ROWs to the Fraser River. Discharge into these systems will require coordination with the Ministry of Transportation and Transit (MoTT) and CPR. Due to the proximity of the highway and CPR, there may be limited opportunities to construct storm sewers and centralized stormwater management facilities, thus on-lot stormwater management may be required to service Study Areas.

Based on the available provincial soil surveys, the eastern sites of the Study Area are generally underlain with moderate to well drained soils. Soils under the Albion Industrial Lands vary. It should be noted that, due to the proximity to the Fraser River and the downslope location of the Study Area, infiltration may be limited for areas in close proximity to the Fraser River to specific times of the year because of high groundwater levels.

The Albion Industrial Lands are partially surrounded by the Albion Dike and are predicted to be inundated during the historic and future 200-year flood event in the Fraser River. Should re-development of the Albion Industrial Lands occur, stormwater management within the Albion Dike will need to consider the capacity of the dike system's pump station, floodbox, and dike drains. Upgrades to the Albion Dike System were investigated in the *Albion and Maple Ridge Road 13 Dike Assessment 2012* (BGC, March 2016) which identified substantial work to meet modern flood dike protection standards. The BGC report (March 2016) found that the "Status Quo" option provided the best option from a purely economic perspective, however long-term strategic planning would be required to manage development and associated flooding risk. Other options indicated a very minor to little benefit in the cost benefit analysis (BGC, March 2016).

The Eastern Lands are located in the Fraser River floodplain, and the majority of the sites in the KFN Lands are located outside of the historic and future Fraser River floodplain. For the sites in the Fraser River floodplain, or fronting the Fraser River, a FCL will need to be established corresponding to the 200-year flood water surface elevations with climate change, sea level rise, and a freeboard of 0.6m for habitable building levels.

6. Implementation Planning

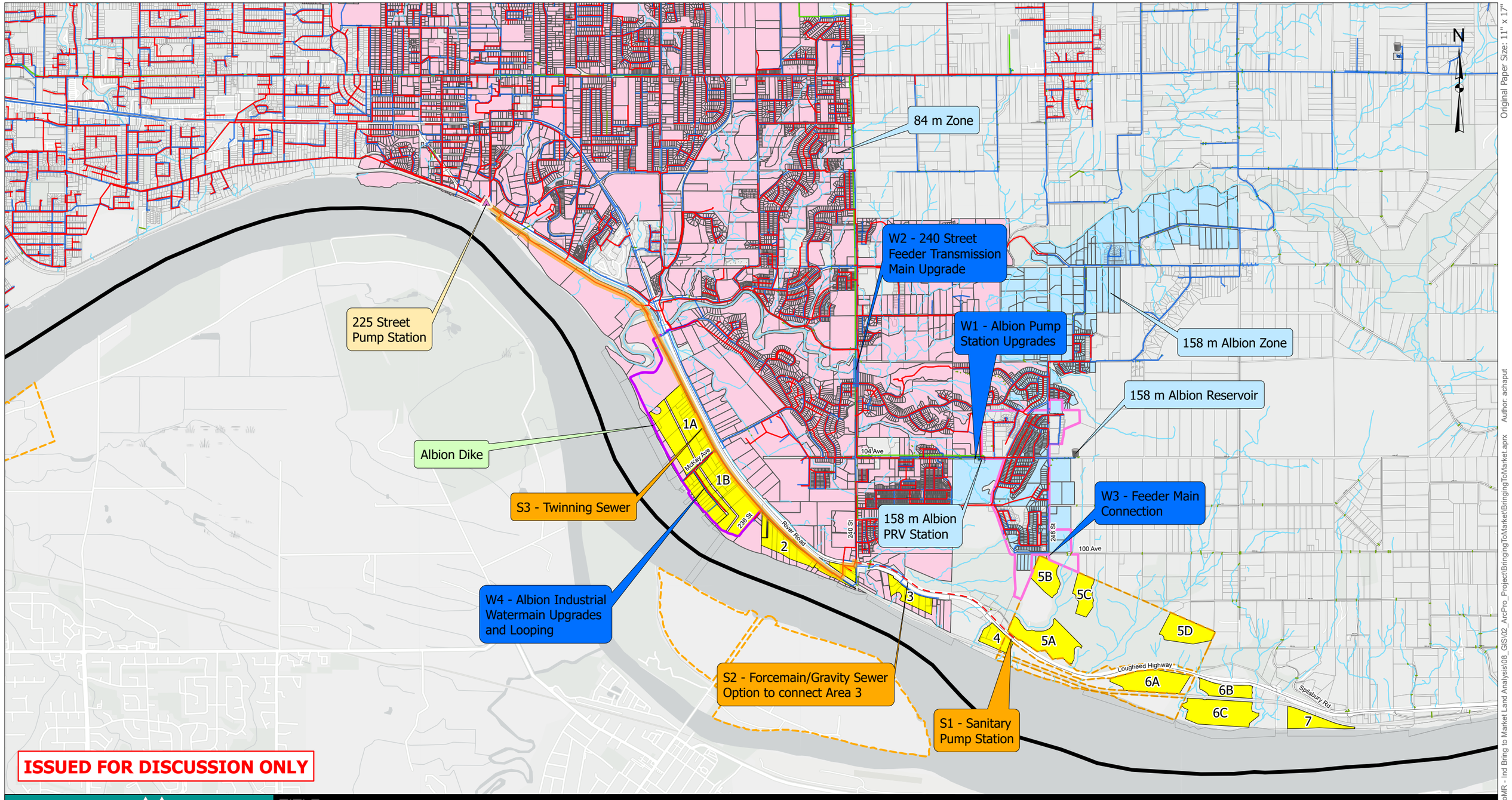
This section provides implementation planning considerations for extending infrastructure services to the Study Area, with a focus on the KFN Lands and Eastern Lands. Based on the infrastructure servicing analysis, servicing the Study Area sites will require a staged approach. Stages could include:

1. Conduct additional studies and detailed designs for connecting sanitary and water infrastructure to the KFN Lands and Eastern Lands, and the interaction with the City's and MV's infrastructure. The Central Lands will need to be considered in the sanitary study.
    a. Consider conducting additional technical studies for a centralized sewage treatment and disposal facility including assessments for the feasibility and detailed cost of a riverine outfall and diffuser.
2. Conduct a localized stormwater and flood management study and servicing strategy for KFN Lands and Eastern Lands, and associated watershed / sub-watershed and the Fraser River. Additional studies for stormwater and flood management will be required in the Albion Industrial Area.
3. Conduct additional studies and detailed designs for local sanitary and water servicing, including sanitary sewers, water distribution mains, water reservoirs, and drainage infrastructure.
4. Complete upgrades to the City's 158 m Albion Zone booster pump station, 240th Street transmission feeder main, and connecting the City's water system to the KFN Lands.
5. Construct the KFN Lands' sanitary pump station and forcemain / gravity sewer along the Lougheed Highway / CPR ROW to 240th Street. Complete necessary upgrades to the City's sanitary sewer and 225 Street Pump Station to accommodate additional flows from the KFN Lands. Connect the Central Lands to the proposed sanitary forcemain / gravity sewer.
6. Construct local infrastructure in the KFN Lands and Eastern Lands to service sites.
7. Complete watermain upgrades in the Albion Industrial Lands.

Figure 5 illustrates the servicing strategies for each utility. A summary of strategies and estimated costs for are summarized in ***Table 8***.

Table 8: Summary of Proposed Infrastructure Servicing for Implementation Planning

Strategy Name	Description	Class D Costs (2024 Dollars)
S0, W0, D0	Conduct detailed studies for sanitary, water, and stormwater / flood management servicing.	To be determined at a later stage.
S1	KFN Lands Sanitary Pump Station	$2 M to $3 M
S2	1.5 km of Forcemain / Gravity Sewer from KFN Lands to 240th Street with the option to connect Area 3	$4.2 M
S3	5.5 km of Gravity Sanitary Sewer Twinning from 240th Street to 225 Street Pump Station	$12.9 M (Cost could be shared with Thornhill Urban Reserve)
S4	Centralized sewage treatment and disposal facility. (Strategy S4 would be implemented instead of S1-S3)	$16 M to $20 M
W1	Increase firm capacity of the Albion Booster Pump Station	$1.5 M to $2 M
W2	320m of Feeder Transmission Main Upgrades along 240th Street	$600,000
W3	75m of Feeder Main from 248th Street to KFN Lands boundary	$120,000
W4	450m of 250mm Watermain Upsizing and Looping	$700,000



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McElhanney

Maple Ridge

Projection: NAD 1983 UTM Zone 10N

TITLE

Maple Ridge Bring to Market Analysis

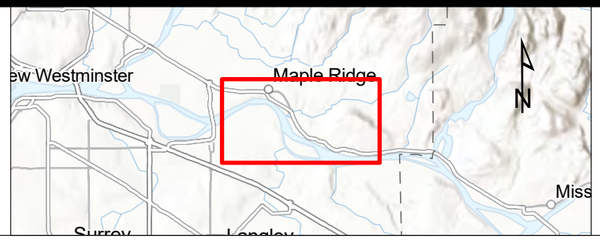
Figure 5 Proposed Infrastructure Servicing Strategies

Project: Industrial Servicing Impact Analysis

Location: Maple Ridge, BC

Scale 1:30,000

0 2,000 Meters



LEGEND

- Sanitary Overflow Outfall
- Existing PRV
- Existing Reservoir
- Existing Pump Stations
- Sanitary Upgrades
- Water Upgrades
- Proposed Sanitary Sewer
- Sanitary Sewer
- MV Transmission Watermain
- Water Main
- Drainage Culvert
- Dike
- Roads
- Stream
- Kwantlen First Nations Reserve
- 158 m Albion Pressure Zone
- Parcels
- Sites
- 84m Zone
- 158m Albion Zone
- Maple Ridge Boundary

Original Paper Size: 11" x 17"

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7. Closing

We hope this infrastructure servicing analysis meets the project expectations. Please do not hesitate to contact the undersigned below with any questions.

Sincerely,
The McElhanney Team

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Appendix E
Statement of Limitations

Statement of Limitations

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Effect of Changes. All evaluations and conclusions stated in this report are based on facts, observations, site-specific details, legislation and regulations as they existed at the time of the site assessment / report preparation. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. Construction activities can significantly alter soil, rock and other geologic conditions on the site. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or possible changes) as to the site, purpose, or development plans upon which this report was based, b) any changes to applicable laws subsequent to the issuance of the report, c) new information is discovered in the future during site excavations, construction, building demolition or other activities, or d) additional subsurface assessments or testing conducted by others.

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Cost Estimates. This cost estimate has been prepared using the design and technical information currently available, and without the benefit of site surveys, geotechnical and environmental investigations and information. Furthermore, McElhanney cannot predict the competitive environment, weather or other unforeseen conditions that will prevail at the time that contractors will prepare their bids. The cost estimates are therefore subject to factors over which McElhanney has no control, and McElhanney does not guarantee or warrant the accuracy of such estimate.

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