Lower Nicola Indian Band Subdivision Feasibility Study

Opportunities and Constraints Summary

December 2022 | Final

1.0 Introduction

The following document presents a summary of LNIB policies and laws that need to be considered as part of the process. This summary is based on a review of the following documents and data:

1. LNIB Land Use Plan (Draft, July 2021)
2. LNIB Cultural Heritage Policy (Revised, July 2017)
3. LNIB Land Use and Zoning Law (Draft, May 2021)
4. LNIB Environmental Management Plan (Draft #8, March 2021)
5. LNIB Subdivision Development and Servicing Law (June 2020)
6. Lightship

Additionally, based on the information gathered through the background review and from feedback collected as part of the first phase of engagement, a preliminary summary of key opportunities and constraints for each of the six proposed sites located within the Nicola Mameet IR #1 is provided to narrow down the focus to three sites for further review and consideration.

2.0 Background Document and Data Review

2.1 Existing Conditions

1. **Existing residential development:** 209 dwellings
2. **Existing non-residential development:** Industrial park, Johnny's on the Rez, gravel pit, agricultural uses (hay production)
3. **Infrastructure:** the current draft Land Use Plan (LUP) identifies infrastructure upgrade needs in the Nicola Mameet IR #1. The water system needs significant upgrades and repairs, the sewer system needs upgrades to enable more connections, and the roads (Highway 8 and Highway 97C) and bridge also require some form of improvements.
4. **Existing community services and facilities:** LNIB school, LNIB administrative and health offices, Shulus Community Hall, Arena, Shulus Arbour, Rocky Pines Community Centre, Cook Shack, Fire Department.
5. **Community Profile[1] (based on Land Use Plan Draft, July 2021):**
    a. LNIB has 1290 members, 38% of which reside on-reserve. The growth of members living off-reserve is faster than that of members living on-reserve. There has been little to no growth of Band members living on-reserve in the past 20 years (1.1% total growth rate).
    b. Male-female split is almost 50/50; most of the population is between 43 and 64 years, followed by 25 to 44, 0-14 years; and only 14% of the on-reserve population is over the

[1] Information for the Community Profile is based on the Land Use Plan Draft, July 2021. This information is currently being updated as part of the completion of the Housing Needs Assessment.

age of 65, but this number will grow as the 45 to 64 cohort ages; and the average household size in 2.23.

Table 2.3: Age Demographics

Age	TOTAL			On LNIB Reserve, Other Reserve or Crown Land (Total)			Off-Reserve		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
All Ages	1,270	603	667	550	282	268	720	321	399
0-14 Years	230	119	111	103	62	41	127	57	70
15-24 Years	183	77	106	77	36	41	106	41	65
25-44 Years	358	162	196	142	66	76	216	96	120
45-64 Years	351	171	180	151	76	75	200	95	105
65 Years or Older	148	74	74	77	42	35	71	32	39

Source: INSTAT (2018)

6. **Rental housing:** currently (based on Land Use Draft Plan, July 2021) there are 111 rental units, and the waitlist includes demand for 48 new units with the following breakdown:
    a. 1 bedroom: 9 people/couples
    b. 2 bedroom: 17 families
    c. 3 bedroom: 12 families
    d. 4 bedroom: 10 families
7. **Projected housing needs (by 2039):** 143 new dwellings under a low-growth scenario and 340 new dwellings under a high-growth scenario, excluding any units that need replacing due to deterioration.

2.2 LNIB Policy and Law Directions

Land Use Planning

- Take every opportunity to imprint upon the land the vision of LNIB people
- Support and enhance economic development opportunities for LNIB members

Heritage/Cultural

- In all cases, the overarching heritage principles (respect, responsibility, and relationship) must be employed
- LNIB Management Objective requires archaeological assessments prior to development activities to identify the potential for any archaeological resources and to determine if development should be prohibited or if mitigation measures should be implemented
- Incorporating and building upon the thirteen (13) existing registered cultural values on Mameet IR #1, located within 900m of reserve boundaries
- Lands Management Advisory Committee may approve a variance application that will not adversely affect the natural environment, heritage sites or culturally sensitive areas
- Lands Management Advisory Committee must consider the protection and enhancement of cultural and heritage sites while reviewing zoning amendment application
- The Cultural Heritage Policy provides a specific process for conducting cultural heritage work, which provides a framework for the protection, preservation, promotion, respect, and revival of cultural heritage

- Any development on a known heritage site, as designated in LNIB's LUP, must obtain Community Approval
- Province may enter into a formal agreement with LNIB with respect to the conservation and protection of heritage sites and heritage objects that represent cultural heritage
- LNIB's heritage concept extends to both tangible and intangible aspects of their culture-LNIB's heritage belongs to those who made and used them
- LNIB Cultural Heritage Policy applies to any and all proposed and ongoing land development including research and resource management projects within asserted traditional territory
- Measures above and beyond the current Provincial Heritage Conservation Act are requested to fulfill LNIB obligations to the land
- All developments must be planned with consideration to the environment, cultural heritage, and human health impacts
- Several documented and unrecorded cultural values throughout the Reserve, including archaeological sites, which some have been mapped while other locations require further work
- LNIB heritage interests should be conflicted with as little as possible
- LNIB believes that sites that post-date 1846 and are not protected by Heritage conservation legislation are still important to LNIB and should be protected
- LNIB owes a responsibility to protect any archaeological site within LNIB territory
- Environmental assessments must evaluate impacts on all elements of the environment including heritage
- The use of heritage impact assessments and heritage related research will be required for all projects and decision-making processes as per the Cultural Heritage Policy and within a development permitting process defined by LNIB

Transportation/Active Modes

- Minimum number and dimensions for parking spaces to comply with City of Merritt Zoning Bylaw
- Estimated volume of traffic in trips per day based on the Institute of Transportation Engineers Trip Generation Rate Manual
- Maximum road design grade must be in compliance with Transportation Association of Canada (TAC) guidelines for rural local and collector roads
- Non-through roads over 500 m long, identify emergency access/egress routes
- Limit length of any non-through road to 1 km

Flooding

- Developed areas are protected from hazards including floodplains, wildlife…etc.
- Develop maps illustrating the 20- and 200-year floodplain based on the latest available data and incorporating the impacts of climate change
- Prepare for the potential impacts of climate change including increased risk of flooding, wildfire, drought, and extreme heat and cold, as well as for changes in how food is grown in the local community
- Mitigate the risk of flooding and erosion on the Nicola River and Guichon Creek
- Development is out of floodplains and does not have adverse environmental impacts
- Ensure that infrastructure is protected from flooding
- Ensure drainage infrastructure have capacity to support future development
- Mitigation measures incorporating floodplain requirements, erosion control and sediment control

- Conceptual building habitable floor slab elevation is not less than 0.6 m above the 1:500 year flood level
- Provide a stormwater management plan showing how the post-development minor (1:2-year) and major (1:50-year) flows are to be managed
- Any developments constructed on reserve will require controls on storm water quality and volume
- Require all permanent buildings and structures that are built within the 200-year floodplain to have their habitable space above the 200-year floodplain
- Identify the proposed development's proximity to the 1:500 year flood elevation
- Stormwater disposal via drywells to be verified to permit disposal to ground for a minor (1:2-year) storm flow
- Stormwater disposal/discharge to an adjacent surface water body requires permission from DFO Canada
- Stormwater disposal/discharge to an adjacent roadside ditch requires permission from the owner of the roadside ditch (either the Band, municipal, regional, or provincial jurisdiction)
- Cabin or shelter may be installed or constructed if they are serviced by water and septic systems, are not located in a floodplain, and will not cause adverse environmental impacts

Environmental

- Conduct environmental assessments prior to approving future development to avoid or mitigate impacts to the environment
- Provide outdoor recreational opportunities for non-resident members and their families to reconnect with LNIB Land
- Institute a community-scale composting facility in partnership with Shulus Community Garden
- Protect wildlife habitat and wetlands
- Recognize trapping and hunting

Hydro-Geological

- For self-contained in-ground disposal system being utilized, provide a hydro-geological assessment to verify the viability of in-ground sewage disposal in respect to Contamination impact on groundwater and any adjacent water body. Systems to be developed in accordance with the BC Ministry of Health's Sewerage System Standard Practice Manual and First Nations Health Authority
- LNIB's management objectives are to ensure that commercial uses do not impact the groundwater aquifer and are adequately buffered from residential areas
- Management and protection of both irrigation and flood waters can improve sub-surface ground water quality

Servicing

- Clean, potable water for LNIB members
- Protect the existing drinking water supply and ensure that the aquifer(s) are protected from impacts of development and land use activity
- Consideration to reduce the amount of potable water from LNIB water systems that are used for irrigation purposes
- Existing potable water system infrastructure requires significant upgrades or maintenance
- Investment into the repair, maintenance, and upgrades to the existing water system
- Consideration for the implementation of water meters and applicable policies (i.e., sustainability) to manage water uses/demands

- Water main looping considerations to maintain water system pressure operation/balance
- Investigate domestic and fire flow requirements for the preferred subdivision size and layout
- Investigate new water supply (i.e., groundwater wells, surface water, Regional District, City of Merritt) opportunities to supplement existing Shulus Springs potable water system
- Verify water system supply and demands utilizing LNIB records and employing software to develop a hydraulic water model that can be relied upon following water system validation
- Address water quality issues that the community considers essential from the implementation and/or improvement/upgrade to existing water treatment processes and technology
- Recommendations noted in LUP and Infrastructure Map (v5) to develop a new reservoir for Shulus Springs potable water system prior to any new developments connect to this system
- High water system demands in the summer likely the result of irrigation activities creating additional strain on the existing Shulus Springs potable water system
- Water hardness is an issue in all areas
- Regulatory approvals (i.e., Health Authority, Ministry of Environment, LNIB) will be required for water supply improvements applicable to well development and surface water collection and use
- Insufficient existing capacity to maintain drinking water system

Other Considerations

- LNIB currently provides central garbage and recycling services to resident members
- LNIB decision whether to evaluate the business opportunity for composting

2.3 Site Selection Considerations

1. **Land tenure matters: (**e.g., Band-owned land, Certificate of Possession, Occupation without legally registered allotments, etc.). An Allotment Law is in the works, which would include criteria to issue land allotments, including custom family lands
2. **Subdivision and housing design:** should reflect the cultural preferences and needs of the community
3. **Accessibility considerations:** the chosen location must facilitate an accessible housing design (ground level entry, wide doorways, washroom, and meeting space on main floor) without adding too much extra cost
4. **Environmental:** need to evaluate impacts of development on aquifers
5. **Housing variety:** the LUP supports the development of tiny houses, which increase the subdivision density by reducing lot size requirements, and secondary suites
6. **Home-based businesses:** the LUP supports low-impact home-based businesses (consider opportunity and demand to do so and impacts on housing typology)
7. **Heritage resources:** ensure site selected is in compliance with the Heritage Site Management Policy (Section 15 of the Cultural Heritage Policy, page 34). These heritage resources include:
    a. Archeological heritage
    b. Burial sites and graveyards
    c. Material culture
    d. Petroglyphs and pictograms
    e. Sacred and spiritual sites
    f. Traditional Use Sites (TUS) refers to and is use(d) for battle, berry picking, camping, cedar harvesting, drying, fishing, food preparation, gaming, manufacturing, medicinal gathering, plant gathering, quarries, small-pox, trails and travel corridors, trap lines, villages, and others
    g. Culturally modified trees

2.4 Land Use and Zoning Law Residential Zones:

Low Density Residential Zone

Rural character, larger residential lots. Allows single detached dwellings and duplexes, secondary suites, mobile/modular homes, and home-based businesses subject to the following minimum requirements:

- Max. number of dwelling: 1 single detached plus 1 secondary suite, and an additional unit for every 2 ha in addition to min. area.
- Min. floor area: 55 sq. m.
- Min. lot size: 1 ha or 2.47 ac
- Min. lot frontage: 45 m

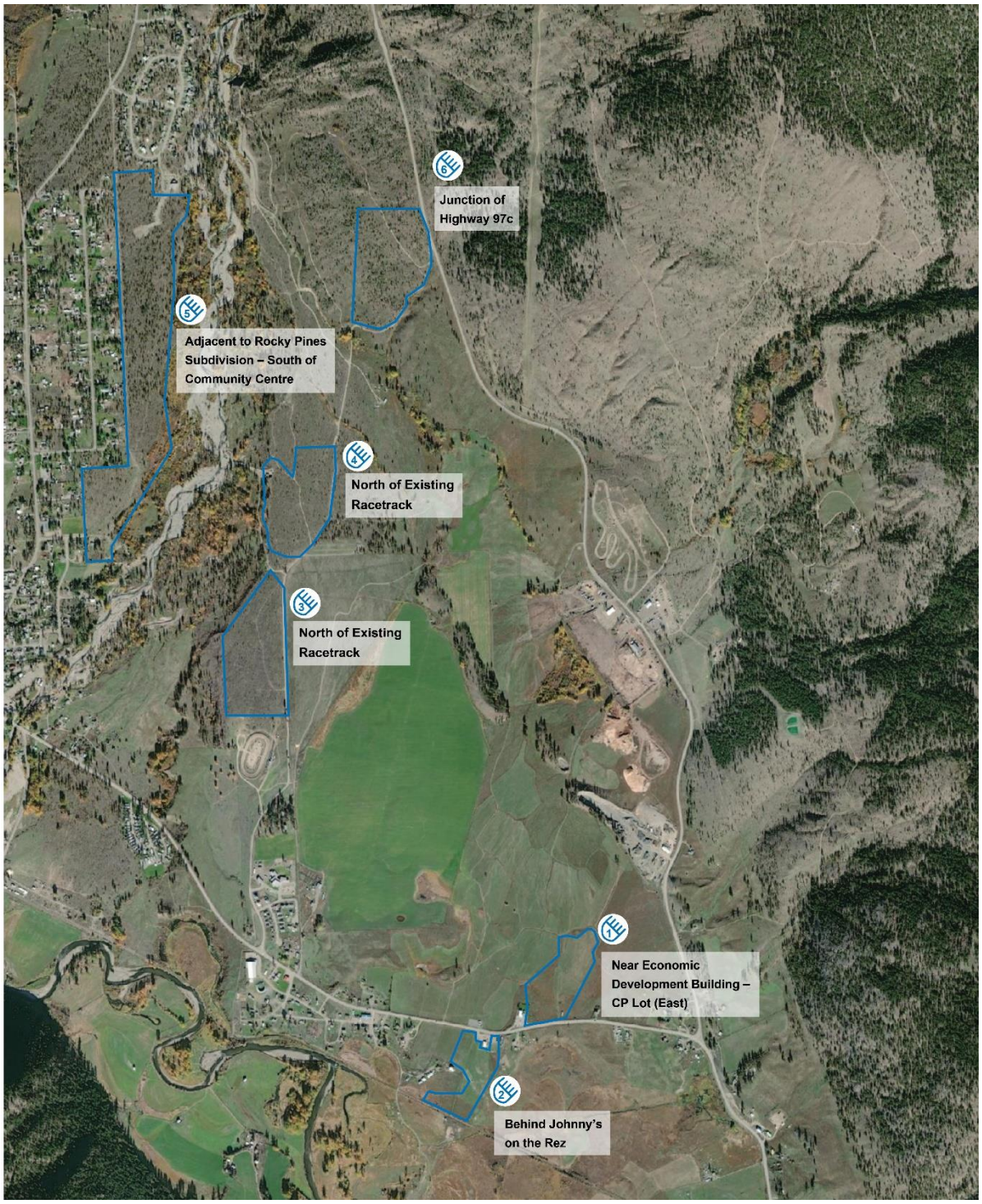
Medium Density Residential Zone

Meeting housing demand in proximity to neighbors, making efficient use of land, smaller lots. Allows single detached dwellings, multi family housing (duplex, triplex, fourplex, townhomes, low-rises), modular homes, secondary suites, and home-based businesses to conform with the following minimum requirements:

- Max. number of dwellings:
  - i. 1 single detached on lots less than 0.33 ac plus 1 secondary suite
  - ii. 40 dwellings/ha of usable site areas for multi-family
- Min. floor area: 55 sq. m (single-family) or 40 sq. m (multi-family)
- Max height: 10 m (principal); 7 m (mobile home); 35 m (accessory)
- Max. lot coverage: 40% of lot area
- Min lot size: 465 sq. m or 0.11 ac
- Min. lot frontage: 12 m

3.0 Identified Sites Review Summary

Six (6) sites, as shown below, were identified to be reviewed at a high level to better understand the opportunities and constraints of each site for future residential development.



The following section provides an overview of opportunities and constraints for each of the six (6) sites based on a review of land use, transportation, environmental, and servicing conditions.

Site Option 1 (Lot 91, 58927 CLSR BC, Nicola Mameet IR #1)

Summary of Opportunities/Constraints

- Agriculture Designation
- Site is relatively flat and has high development potential
- Close to community amenities and access off Highway 8, but would need to coordinate upgrades/access with MOTI
- An existing water main appears to bi-sect a small area of Lot 91 (south-west)
- No existing storm sewer infrastructure near the subject Lot
- Potentially costly existing wastewater system improvements to accommodate additional and also future development considerations
- Community concerns about being close to the Highway and site currently being used for agricultural purposes

Land Use

Opportunities

- Close to Johnny's on the Rez
- Adjacent to LNIB Economic Development Building and Shulus Hall
- Near community amenities (in Shulus Village)
- A location for multifamily residential development (i.e., apartments) and affordable housing ***(Community Feedback)***
- A sizeable development could be realized on this relatively flat 180m wide x 380m deep parcel

Constraints

- Noise/traffic from being close to highway
- Proximity to prime ranch and agricultural lands. For example, there is a hayfield close to this location. Development is not recommended. ***(Community Feedback)***
- This location would be best suited for non-residential purposes (i.e., community services) ***(Community Feedback)***

Heritage/Culture

Opportunities

- *Nothing of note emerged through the high-level review*

Constraints

- Potential site of traditional land holdings ***(Community Feedback)***

Transportation/Active Modes

Opportunities

Constraints

- Ministry of Transportation coordination, cooperation, and approvals will be required

• Highway 8 access is immediately adjacent to the southern property boundary and is likely the only available access point for the subject Lot • Convenient access to highway (Highway 8/Merritt-Spences Bridge HWY)	• Transportation Impact Assessment may be required by the Ministry of Transportation • No observed active modes of transportation (i.e., sidewalks, pathways, dedicated pedestrian corridors, etc.) around subject Lot
Flooding	
Opportunities • Review and investigate historical flood records and develop hydrologic stormwater model based on available information to understand and identify the flood levels derived from a variety of rainfall events or storms	**Constraints** • Dedicated overland flood route will need to be investigated and established • Ministry of Transportation does not usually support major overland flood routes, from private developments to their highway corridor, but could be investigated to confirm their position/appetite
Environmental	
Opportunities • *Nothing of note emerged through the high-level review*	**Constraints** • Coyote house east of this site ***(Community Feedback)*** • Water table is high ***(Community Feedback)***
Hydro-Geological	
Opportunities • *Nothing of note emerged through the high-level review*	**Constraints** • *Nothing of note emerged through the high-level review*
Servicing	
Opportunities • Close proximity to two (2) existing 150mm dia. PVC potable water mains present on the south boundary of the Lot 91 and also on the south boundary of Highway 8 • Extend the existing Shulus Springs potable water system following an assessment of existing water system infrastructure, resources, demand requirements related to capacity and availability • Consideration for water system infrastructure capacity to support future development(s) • Incorporate existing Highway 8 roadside ditch and LNIB's existing Main Irrigation channel to support and develop a stormwater management plan • No existing sanitary sewer infrastructure near subject Lot; however, the Shulus Village (located approx. 1,250 meters west) does have a community wastewater system that could be investigated as an alternative to servicing the subject Lot • Investigate and identify an appropriate sanitary sewer utility alignment for gravity sanitary sewer extension from the subject Lot to the Shulus Village's existing wastewater system	**Constraints** • An existing 150mm dia. PVC water main appears to bi-sect a small area of Lot 91 (south-west) • Ministry of Transportation will need to be involved to support approval(s) for any modification or alteration (i.e., water system tie-in) to the existing water main utility within Highway road dedication • Confirm and verify that fire flow requirements can be achieved without negative impacts to existing supply and distribution flow rates and residual pressures • No existing storm sewer infrastructure near the subject Lot • Ministry of Transportation approval will be required for surface water discharge directed towards their highway right-of-way • Potentially costly existing wastewater system improvements to accommodate additional and also future development considerations • Developable land will be reduced to allow for and accommodate on-site sanitary sewer disposal area including provision for backup field

• Alternatively, an on-site sanitary sewer collection and ground disposal system could be considered	
Other Considerations	
• Existing 3-phase power (above ground) is observed on the south side of Highway 8 and includes communication/tel on the same pole alignment • On the north side of Highway 8 is an existing communication/tel utility mounted to utility poles	• *Nothing of note emerged through the high-level review*

Site Option 2 (Lot 78-1, 81220 CLSR BC, Nicola Mameet IR #1)

Summary of Opportunities/Constraints

- Agriculture Designation
- Close to community amenities and access off Highway 8, but would need to coordinate upgrades/access with MOTI
- Need to investigate potential groundwater contamination in proximity to existing gas station
- LNIB currently provides central garbage and recycling services to resident members, which these facilities are in close proximity to subject Lot
- Existing water main is located immediately on the north side of Highway 8
- Potential to extend the existing gravity sanitary sewer collection system east from Lot 37 (community lift station) to afford service connections for an existing residential area including undeveloped land holdings, which may require another lift station depending on topography and servicing objectives
- An existing ditch along Highway 8 is located on the northwest side of the northern property boundary that could be considered as a discharge location to facilitate development of a stormwater management plan
- Three (3) existing Gas Pipeline rights-of-way are presently active or in operation, which reduces the buildable lot area and creates more challenges to construct roadway and utility crossings for these rights-of-way

Land Use

Opportunities

- Close to Johnny's on the Rez
- Close to LNIB Economic Development Building and Shulus Hall
- Near community amenities (in Shulus Village)
- Odd shaped parcel resembles the letter 'C' having the narrowest lot width (near mid-point of lot) of approx. 70m whereas, the widest length (i.e., width) is approx. 190m, and the depth (north-south) of this Lot is approx. 300m

Constraints

- Noise/traffic from being close to highway
- Proximity to prime ranch and agricultural land ***(Community Feedback)***

Heritage/Culture

Opportunities

- In the past, Powwows were organized near this site ***(Community Feedback)***

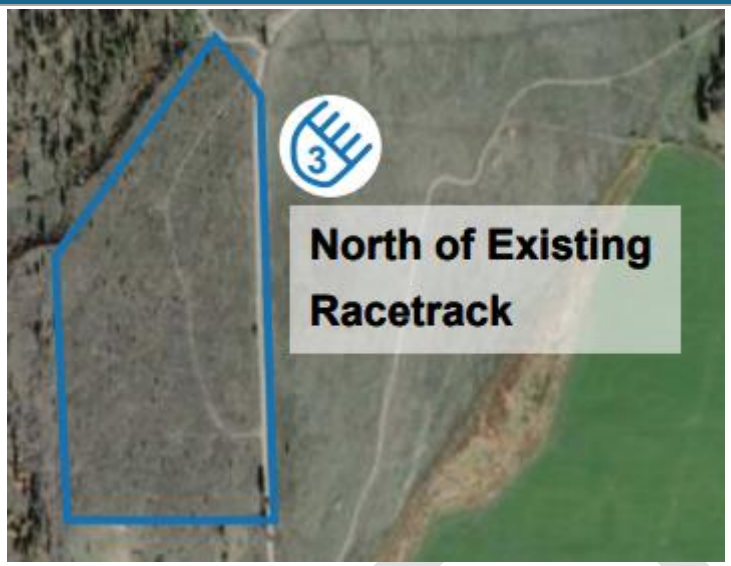
Constraints

- *Nothing of note emerged through the high-level review*

Transportation/Active Modes	
Opportunities • Highway 8 access is immediately adjacent to the northern property boundary and could serve as the primary access point to the subject Lot • A proposed internal local road could be extended from the subject Lot, along the existing railway right-of-way (south), and tie to Moses Bent Road • A central and convenient location for community members ***(Community Feedback)*** • An existing transportation corridor (i.e., former railway) is present along the southern property boundary. In long-term, potential for future active modes corridor. Conversations with railway owner would be required	**Constraints** • Ministry of Transportation coordination, cooperation, and approvals will be required • Transportation Impact Assessment may be required by the Ministry of Transportation • No observed active modes of transportation (i.e., sidewalks, pathways, dedicated pedestrian corridors, etc.) around subject Lot • Possible road dedication would be required on Lot 79 to enable proposed internal road extension from subject Lot to Moses Bent Road • Pedestrian traffic would excessively increase in this area ***(Community Feedback)***
Flooding	
Opportunities • *Nothing of note emerged through the high-level review*	**Constraints** • No flood information available. Historical flood records would need to be reviewed and hydrologic stormwater model developed based on available information to understand and identify the flood levels derived from a variety of rainfall events or storms • Dedicated overland flood route will need to be investigated and established • Ministry of Transportation does not usually support major overland flood routes, from private developments to their highway corridor, but could be investigated to confirm their position/appetite • Potentially extensive engineered fill requirements to create habitable spaces above flood elevation
Environmental	
Opportunities • *Nothing of note emerged through the high-level review*	**Constraints** • Water table is high ***(Community Feedback)*** • Marsh lands exist within this site ***(Community Feedback***
Hydro-Geological	
Opportunities • Investigate potential groundwater contamination in proximity to existing gas station; identify opportunity to conserve natural supplies; and confirm groundwater quality/age, etc. • Supplemental groundwater well(s) to accommodate increases in water system demands	**Constraints** • Over-use or -consumption of groundwater resources can impact surface water systems • Human activity can also threaten the integrity of the local aquifer system • Stratigraphy, lithology, and geological formation and deposits needs to be researched and investigated

Servicing	
Opportunities	**Constraints**
• Existing 150mm dia. PVC water mains are located immediately on the north side of Highway 8; and southwest where water system infrastructure resides within a local road (Moses Bent Road) and appears to terminate prior to Lot 79-1 • Proposed water main extension(s) and connections including consideration of water system looping could be a viable opportunity to supply potable water • Relocate existing sanitary sewage disposal system. Alternatively, establish/dedicate an easement or right-of-way in favour of Johnny's on the Rez to allow for necessary maintenance and operations of existing disposal system • Extend the existing gravity sanitary sewer collection system east from Lot 37 (community lift station) to afford service connections for an existing residential area including undeveloped land holdings, which may require another lift station depending on topography and servicing objectives • An existing ditch (Highway 8) is located on the northwest side of the northern property boundary that could be considered as a discharge location to facilitate development of stormwater management plan	• Water system joint protection to mitigate potential ingress of groundwater into potable water mains where installation is anticipated to be within the water table or floodplain • Confirmation of available domestic and emergency fire flows including servicing and residual pressures • Existing septic tanks (x2) and absorption bed is situated on the subject Lot, centrally positioned, adjacent and immediately south of northern property boundary. Sewage disposal system infrastructure is in-place for Johnny's on the Rez • Sanitary sewer disposal directed to absorption beds (i.e., ground disposal) can contribute to groundwater contamination/pollution for systems that are not effectively managed and maintained • The existing ground surface for the subject Lot 78-1 will require confirmation of floodplain elevation • Storm drainage disposal to the ground is likely unfavourable, but is subject to groundwater level, confirmation of floodplain, and consideration of proximity to existing watercourses
Other Considerations	
• LNIB currently provides central garbage and recycling services to resident members, which these facilities are near subject Lot • Existing 3-phase power (above ground) is observed on the south side of Highway 8 and includes communication/tel on the same pole alignment • On the north side of Highway 8 is an existing communication/tel utility mounted to utility poles	• Three (3) existing Gas Pipeline rights-of-way are presently active or in operation, which reduces the buildable lot area and creates more challenges to construct roadway and utility crossings on these rights-of-way

Site Option 3 (BC215 CLSR BC, Nicola Mameet IR #1)



Summary of Opportunities/Constraints

- Designated Residential
- Access point from Mamit Lake Branch Road
- Potential risk of exposure to storm/flood events (flood protection and or engineered fill solution may be required)
- Previous existing groundwater test samples indicate manganese exceeds Health Canada aesthetic objective
- No existing water main near site
- No existing storm sewer main near site
- Existing, operational sanitary sewer forcemain immediately adjacent to and southeast of the subject Lot including an existing, operational, sanitary sewer disposal field; however, may need expansion

Land Use

Opportunities

- Already designated as residential
- Near community amenities (Merritt Speedway, LNIB school)
- Additional available land to obtain a higher number of lots compared to other sites ***(Community Feedback)***
- Land is well suited for residential development ***(Community Feedback)***
- Development would border intact natural areas and may also encourage potential economic development initiatives such as passive agriculture and tourism

Constraints

- *Nothing of note emerged through the high-level review*

Heritage/Culture

Opportunities

- *Nothing of note emerged through the high-level review*

Constraints

- Traditional land holdings at this site and historical family significance. Recommendation to not develop ***(Community Feedback)***

Transportation/Active Modes	
Opportunities	**Constraints**
• Mamit Lake Branch Road access is immediately adjacent to the eastern property boundary and could serve as the primary access point to the subject Lot • Creation of pedestrian and cyclist corridors along internal development roadways, which may attract other LNIB members and tourists/visitors to expand upon and plan a community trail network plan • Consideration of both sidewalks and multi-use pathways to promote healthy lifestyles by means of walking, running, biking, and scooting • Several prospects exist to promote non-invasive active modes and recreation activities within the surrounding natural area • Highway is not close to this site ***(Community Feedback)***	• Limited to one (1) existing road access near the subject Lot • Level of service applicable to the existing Mamit Lake Branch Road may require lane widening and surface drainage improvements to accommodate development population as well provision for future community growth • An overall LNIB community trail network plan has not been developed to inform future connectivity to existing active transportation corridors
Flooding	
Opportunities	**Constraints**
• Consideration of dyke protection infrastructure along the westerly limits of the subject Lot	• Subject Lot may be exposed to re-occurring storm and/or flood events • Potential flood protection berms may be required to protect the development from major storm and/or flood events • Potentially extensive engineered fill requirements to create habitable spaces above flood elevation
Environmental	
Opportunities	**Constraints**
• Ground water was not investigated and is not suspected to be contaminated based on brief summary noted from APEC-7 (i.e., APEC-43 of Report 15 from Lightship) • Areas of Potential Environmental Concern (APEC) are observed at the northern limits (APEC-7) and beyond the southern limits (APEC-6) of the conceptual property boundary • With the exception of manganese (exceeds Health Canada aesthetic objective), all other laboratory test results completed at APEC-6 (i.e., APEC-60 in Lightship) indicate that concentrations are below the applicable guidelines • All soil samples, as part of APEC-7, had reported concentrations of hydrocarbons, volatile substances, and glycols less than the guidelines or standards	• From the Legacy Clean Up Report, elevated vanadium concentrations were found in one deep (> 1 meter below ground surface) soil sample; however, this was considered to be anomalous and not indicative of anthropogenic contamination • There is no indication of post-remedial test samples being completed further to the soil remediation work and reporting does not offer an insight as to the degree of contaminant exposure for potential receptors at this APEC

Hydro-Geological	
Opportunities	**Constraints**
• Two (2) existing ground water monitoring wells (W-10 and W-17) are observed at the northern limits of the conceptual property boundary, which are installed, as measured from the existing ground surface to a total depth of 12.5m and 10.7m, respectively • In addition, groundwater level measurements indicate subsurface water to be 11.9m and 9.5m below existing ground surface	• Previous existing groundwater test samples indicate manganese exceeds Health Canada aesthetic objective • Existing groundwater well installation details are unavailable or have not been documented
Servicing	
Opportunities	**Constraints**
• Interconnect and extend the existing Rocky Pines water system and create a proposed water system loop • Extend and expand upon the existing Shulus Springs water system to accommodate development of this Lot, but also consider other future developments that may require servicing • Development of a stormwater management plan that addresses and accommodates the collection, conveyance, and safe discharge of surface water, west, towards existing Guichon Creek or the existing surrounding irrigation channels • An existing, operational, 150mm dia. PVC sanitary sewer forcemain is located within Mamit Lake Branch Road immediately adjacent to and east of the subject Lot • Existing, operational, sanitary sewer disposal field (i.e., absorption beds) is in close proximity to the subject Lot • Develop a gravity sanitary sewer collection system, internal of the subject Lot, to allow for gravity sanitary sewer service connections for future homes, which could then be conveyed to a common area (i.e., low lying) that would necessitate the installation of a new sanitary sewer lift station that would be either tied into the existing forcemain on Mamit Lake Branch Road or other means • Well site located west of Site 3 ***(Community Feedback)***	• No existing water main systems near subject Lot • Lengthy water main extensions from the existing Shulus Springs water system to service the subject Lot • Potential to investigate a water system comprising of a new reservoir, supply and distribution water mains, fire hydrants, service connections (for existing and future), etc. • No existing storm sewer infrastructure near the subject Lot • Establishment of an easement or right-of-way for the purposes of stormwater management • Confirmation of available capacity for the existing 150mm dia. PVC sanitary sewer forcemain including the existing disposal field to consider connection to the existing system • Additional land area may be required to supplement and expand the existing sanitary sewer disposal facility • Likely a new sewage lift station will be required for this development
Other Considerations	
• Existing 3-phase power (above ground) is observed on the east side of Mamit Lake Branch Road and includes communication/tel on the same pole alignment	• *Nothing of note emerged through the high-level review*

Site Option 4 (BC215 CLSR BC, Nicola Mameet IR #1)

Summary of Opportunities/Constraints

- Residential Designation
- Access point from Mamit Lake Branch Road
- Risk of exposure to storm/flood events (flood protection and or engineered fill solution may be required)
- Groundwater not suspected to be contaminated
- No existing water main near site
- No existing storm sewer main near site
- Existing, operational sanitary sewer forcemain immediately adjacent to and southeast of the subject Lot including an existing, operational, sanitary sewer disposal field; however, may need expansion

Land Use

Opportunities

- Already designated as residential
- Near community amenities (Merritt Speedway, LNIB school)
- Close to the school and accessible for families ***(Community Feedback)***
- Development would border intact natural areas and may also encourage potential economic development initiatives such as passive agriculture and tourism

Constraints

- *Nothing of note emerged through the high-level review*

Heritage/Culture

Opportunities

- Elders pick berries in the surrounding areas ***(Community Feedback)***

Constraints

- Historical family significance. Recommendation to not develop ***(Community Feedback)***

Transportation/Active Modes

Opportunities

- Mamit Lake Branch Road access is immediately adjacent to the southeasterly property boundary and could serve as the primary access point to the subject Lot
- Creation of pedestrian and cyclist corridors along internal development roadways, which may attract other LNIB members and tourists/visitors to expand upon and plan a community trail network plan

Constraints

- Limited to one (1) existing road access near the subject Lot
- Potential improvements to the existing roadway crossing the existing irrigation channel that crosses Mamit Lake Branch Road
- Level of service applicable to the existing Mamit Lake Branch Road may require lane widening and surface drainage improvements to accommodate

• Consideration of both sidewalks and multi-use pathways to promote healthy lifestyles by means of walking, running, biking, and scooting • Several prospects exist to promote non-invasive active modes and recreation activities within the surrounding natural area	development population as well provision for future community growth • An overall LNIB community trail network plan has not been developed to inform future connectivity to existing active transportation corridors
Flooding	
Opportunities • Consideration of dyke protection infrastructure along the westerly limits of the subject Lot	**Constraints** • Subject Lot may be exposed to re-occurring storm and/or flood events • Potential flood protection berms may be required to protect the development from major storm and/or flood events • Potentially extensive engineered fill requirements to create habitable spaces above flood elevation
Environmental	
Opportunities • With the exception of manganese (exceeds Health Canada aesthetic objective), all other laboratory test results completed at APEC-6 (i.e., APEC-60 in Lightship) indicate that concentrations are below the applicable guidelines • Areas of Potential Environmental Concern (APEC) are observed at the northern limits (APEC-6) of the conceptual property boundary • Results of the closure soil sampling indicate that there is a low risk of contaminant exposure for potential receptors at the APEC's	**Constraints** • From the Legacy Clean Up Report, anthropogenic contamination was found in deep soils (> 1 meter below surface); however, due to soil depth and geotechnical constraints, only surface soil and waste were removed, and the site restored with a layer of clean fill • A limited contaminated soil remediation program was implemented • Closure (i.e., post-cleanup) soil samples, as per APEC-6 suggest concentrations (i.e., vanadium) are slightly elevated above CSR standards for protection of drinking water; and exceeding the CSR standards (i.e., zinc) for protection of livestock ingesting soil and fodder
Hydro-Geological	
Opportunities • An existing ground water monitoring well (W-18) is observed at the northern limits of the conceptual property boundary, which has a total installation depth of 6.6m, as measured from the existing ground surface, and did not encounter ground water during previous sampling and monitoring (Lightship) • Similarly, and as noted in the previous Lot, there are two (2) existing ground water monitoring wells (W-10 and W-17) observed at the southern limits of the conceptual property boundary, which are installed, as measured from the existing ground surface to a total depth of 12.5m and 10.7m, respectively • In addition, groundwater level measurements indicate subsurface water to be 11.9m (W-10) and 9.5m (W-17) below existing ground surface (Lightship)	**Constraints** • Previous existing groundwater test samples (applicable to W-17/APEC-60) indicate manganese exceeds Health Canada aesthetic objective • Existing groundwater well installation details are unavailable or have not been documented

Servicing	
Opportunities	**Constraints**
• Interconnect and extend the existing Rocky Pines water system and create a proposed water system loop • Extend and expand upon the existing Shulus Springs water system to accommodate development of this Lot, but also consider other future developments that may require servicing • Development of a stormwater management plan that addresses and accommodates the collection, conveyance, and safe discharge of surface water, west, towards existing Guichon Creek or the existing surrounding irrigation channels • An existing, operational, 150mm dia. PVC sanitary sewer forcemain is located within Mamit Lake Branch Road immediately adjacent to and south-east of the subject Lot • Existing, operational, sanitary sewer disposal field (i.e., absorption beds) is in very close proximity to the subject Lot • Develop a gravity sanitary sewer collection system, internal of the subject Lot, to allow for gravity sanitary sewer service connections for future homes, which could then be conveyed to a common area (i.e., low lying) that would necessitate the installation of a new sanitary sewer lift station that would be either tied into the existing forcemain on Mamit Lake Branch Road or other means such as a supplemental disposal field • A septic field exists south of Site 4 ***(Community Feedback)***	• No existing water main systems near subject Lot • Lengthy water main extensions from the existing Shulus Springs water system to service the subject Lot (Lightship) • Potential to investigate a water system comprising of a new reservoir, supply and distribution water mains, fire hydrants, service connections (for existing and future), etc. (Lightship) • No existing storm sewer infrastructure near the subject Lot (Lightship) • Establishment of an easement or right-of-way for the purposes of stormwater management • Confirmation of available capacity for the existing 150mm dia. PVC sanitary sewer forcemain including the existing disposal field to consider connection to the existing system • Additional land area may be required to supplement and expand the existing sanitary sewer disposal facility • It is probable a new sewage lift station will be required for this development however, investigation of providing gravity service should be considered with tie-in to the existing or new disposal field
Other Considerations	
• Establish an emergency access route to accommodate emergency vehicles, equipment, and personnel • Existing 3-phase power (above ground) is observed on the north side of Mamit Lake Branch Road and includes communication/tel on the same pole alignment	• The existing 3-phase power and existing communication/tel utility terminates at the existing access road to LNIB's community sewage disposal field (i.e., absorption beds)

Site Option 5 (BC215 CLSR BC, Nicola Mameet IR #1)

Summary of Opportunities/Constraints

- Residential Designation
- Close to existing residential subdivision
- No immediately convenient access options exist, unless a road extension is provided from Rocky Pines or an agreement with the TNRD can be established
- Risk of exposure to storm/flood events (flood protection and or engineered fill solution may be required)
- Riparian area immediately adjacent to Guichon Creek will likely reduce the buildable/serviceable land area available
- Existing water main located along the subject Lot boundary immediately west within an existing right-of-way
- Stormwater has the potential to be managed on-site
- Could expand and connect to Rocky Pines sewage disposal system, but likely undersized

Land Use

Opportunities

- Already designated as residential
- Close to existing residential subdivisions
- Close to community amenities (Community Hall) ***(Community Feedback)***
- More available land for an increase in number of lots ***(Community Feedback)***
- Land is well suited for residential development ***(Community Feedback)***
- Suited for multi-family residential housing (i.e., apartments) ***(Community Feedback)***

Constraints

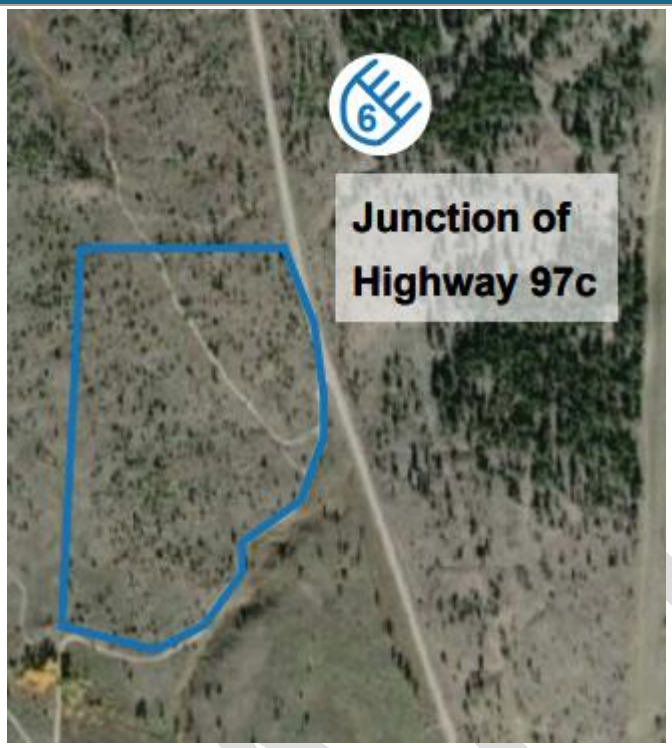
- Not easily accessible to Shulus Village

Heritage/Culture	
Opportunities • Preservation of known traditional or sensitive sites/locations • Elders pick berries in the surrounding areas ***(Community Feedback)*** • Winter homes identified north of Rocky Pines ***(Community Feedback)***	**Constraints** • Potential traditional land holdings exist ***(Community Feedback)*** • Identified mass burial sites ***(Community Feedback)***
Transportation/Active Modes	
Opportunities • Extend access from the existing Rocky Pines Subdivision within Lot 371 where existing sewage facility driveway is located • Investigate access to Aberdeen Road at the north-west corner of the subject Lot • Investigate access from Earnshaw Avenue and potential requirements for agreements with the TNRD • Highway is not close to this site ***(Community Feedback)*** • Existing bus service to and from this site ***(Community Feedback)***	**Constraints** • No immediately convenient access options exist, unless a road extension is provided from Rocky Pines or an agreement with the TNRD can be established to allow access from Earnshaw Avenue to the south-west • Potential that off-site roadway improvements will be required for the above noted Rocky Pines and Earnshaw Avenue extension/connections and/or Aberdeen Road • An extension to create access from Earnshaw Avenue (i.e., currently a driveway access) will need to consider roadway alignment and geometry to either avoid or relocate the existing residential building • An agreement from the TNRD to support the planned area development, and approve a proposed access from Earnshaw Avenue into the subject Lot • There is no practical road access option anywhere to the east of the subject Lot due to both floodplain and existing Guichon Creek, which are likely cost prohibitive • In addition, it is understood that an existing bridge crossing (north-east) is in the process of being reconstructed following the devastating floods from the 2017 freshet; however, it is assumed that access to the subject Lot would require an extension through Rocky Pines subdivision as noted above
Flooding	
Opportunities • It is understood that there is an existing control structure (i.e., dam) upstream of the subject Lot, which is managed by the LNIB in consultation with TNRD • Consideration of dyke protection infrastructure along the easterly limits of the subject Lot	**Constraints** • Risks attributed to the failure or faulty operation of the existing upstream control structure (i.e., dam) on Guichon Creek should be considered • Subject Lot may be exposed to re-occurring storm and/or flood events • Potential flood protection berms may be required to protect the development from major storm and/or flood events • Potentially extensive engineered fill requirements to create habitable spaces above flood elevation

	• Potential flooding issues from Guichon Creek. ***(Community Feedback)***
Environmental	
Opportunities • *Nothing of note emerged through the high-level review*	**Constraints** • Environmental monitoring of groundwater contamination may need to be considered for the northern section of the subject Lot • Riparian area immediately adjacent to Guichon Creek will likely reduce the buildable/serviceable land area available • Water issues and concerns are significant (i.e., rust in the water) ***(Community Feedback)*** • Identified deer and bear crossings ***(Community Feedback)*** • There are good berry picking and wild onion picking sites in proximity ***(Community Feedback)***
Hydro-Geological	
Opportunities • Investigate ground water supply including aquifer capacity, recharge, and resiliency (Lightship)	**Constraints** • New building, roadway, and utility infrastructure will need to be located beyond the existing sewer disposal or absorption field
Servicing	
Opportunities • Existing 150mm dia. HDPE water main located along the subject Lot boundary immediately west within an existing right-of-way • Proposed water main extension(s) and connections including consideration of water system looping could be a viable opportunity to supply at minimum domestic potable water • Improvement to the overall community water system(s) • Consideration for future developments populations that may require servicing • Stormwater has the potential to be managed on-site subject to approval from regulators to discharge surface drainage towards Guichon Creek to the east • Consideration to either expand the existing Rocky Pines Community Centre's existing sewage disposal facility or amalgamate and develop a community sewer with a centralized/localized treatment and disposal facility to allow housing to be created on the northern portion of the subject Lot • It may not be an ideal economic opportunity, but there will always be a need for this service and could be successfully established: potential to eliminate sewage disposal field infrastructure and instead create a community septic tank with pump-and-haul to an approved disposal facility	**Constraints** • Existing water system source, supply, capacity, and distribution should be assessed based on existing, proposed, and future demand scenarios • Assess a secure/safe alternative water transmission main alignment(s) pertaining to the existing 150mm dia. water main between Shulus Springs and Rocky Pines • Confirmation that there is sufficient fire flow available • No pre-existing drainage paths or irrigation ditches are observed, likely compelling regulatory approval agencies to consider direct surface water runoff into Guichon Creek • Consideration for potential lot layout options that consider the existing sewage disposal field extents • An existing sewer disposal system (i.e., for Rocky Pines Community Center), located on the northern portion of the subject Lot, is likely undersized to accommodate additional housing uses/needs • Location, extent, and provisions for a backup field related to the existing sewer disposal infrastructure should be investigated • Disposal of sewer to the ground may be restrictive as a result of the proximity to Guichon Creek and depth to ground water table

Other Considerations	
• There are great views of Nicola Mameet IR1 for potential residential properties. ***(Community Feedback)*** • Existing 3-phase power (above ground) is observed along the east side of Aberdeen Road and includes communication/tel on the same pole alignment	• Safety concerns – non-band members hunt in the surrounding area ***(Community Feedback)***

Site Option 6 (BC215 CLSR BC, Nicola Mameet IR #1)



Summary of Opportunities/Constraints

- Natural Area Designation
- Mamit Lake Branch Road could provide a primary access and Highway 97C a secondary access
- Potential improvements to the existing roadway crossing at the existing LNIB main irrigation channel that crosses Mamit Lake Branch Road
- Could extend existing water distribution main to the subject Lot
- LNIB's main irrigation ditch is situated in close proximity to the south-west boundary of the subject Lot providing option for surface water discharge
- No immediately available water system in close proximity to subject Lot (Industrial Subdivision's water system is non-potable and would require water treatment infrastructure/improvements
- No existing storm sewer infrastructure near the subject Lot

Land Use

Opportunities

- No existing easements or rights-of-way occupy the subject Lot
- Accessible location for community members ***(Community Feedback)***

Constraints

- Not close to existing community amenities
- Close to the highway, some community members feel unsafe at this location ***(Community Feedback)***

Heritage/Culture

Opportunities

- *Nothing of note emerged through the high-level review*

Constraints

- *Nothing of note emerged through the high-level review*

Transportation/Active Modes

Opportunities	Constraints
• Highway 97C and/or Mamit Lake Branch Road access is immediately adjacent to the east and south property boundary, respectively and could serve to provide a primary access (Mamit Lake Branch Road) and secondary access (Highway 97C) for emergency purposes • Investigate and seek the Ministry of Transportation's support to consider subdivision access road from Highway 97C, suggesting that minimal improvements would be required • Creation of pedestrian and cyclist corridors along internal development roadways, which may attract other LNIB members and tourists/visitors to expand upon and plan a community trail network plan • Consideration of both sidewalks and multi-use pathways to promote healthy lifestyles by means of walking, running, biking, and scooting • Several prospects exist to promote non-invasive active modes and recreation activities within the surrounding natural area • No current bus service ***(Community Feedback)***	• Potential improvements to the existing roadway crossing the existing LNIB main irrigation channel that crosses Mamit Lake Branch Road • Level of service applicable to the existing Mamit Lake Branch Road may require lane widening and surface drainage improvements to accommodate development population as well provision for future community growth • An overall LNIB community trail network plan has not been developed to inform future connectivity to existing active transportation corridors
Flooding	
Opportunities	**Constraints**
• Maintain existing LNIB main irrigation channel and consider erosion protection measures to reinforce and safeguard • Consider irrigation sluice gate/dam infrastructure upstream to manage irrigation flows	• Review and investigate historical flood records and develop hydrologic stormwater model based on available information to understand and identify the flood levels derived from a variety of rainfall events or storms
Environmental	
Opportunities	**Constraints**
• *Nothing of note emerged through the high-level review*	• *Nothing of note emerged through the high-level review*
Hydro-Geological	
Opportunities	**Constraints**
• *Nothing of note emerged through the high-level review*	• *Nothing of note emerged through the high-level review*
Servicing	
Opportunities	**Constraints**
• Consideration to extend the existing Industrial Subdivision water system by approx. 1,200m • Potential to extend a water supply main via Highway 97C boulevard in accordance with Utility Policy Manual	• No immediately available water system in close proximity to subject Lot • Industrial Subdivision's water system is non-potable and therefore would require water treatment infrastructure/improvements

• Potential option to only provide water system treatment applicable to an extension of the existing Industrial Subdivision's water system • Take advantage of the existing 300mm dia. water distribution main to extend water to the subject Lot • LNIB's main irrigation ditch is situated in close proximity to the south-west boundary of the subject Lot affording an option for surface water discharge • Development of a stormwater management plan that addresses and accommodates the collection, conveyance, and safe discharge of surface water, south-west, towards existing LNIB's main irrigation ditch • Consideration of storm water detention pond to mitigate negative effects from major storm events and incorporate sub-surface infiltration to recharge underlying aquifer • Investigate gravity sanitary sewer main extension from the subject Lot to the existing absorption bed located approx. 1,000m south on Mamit Lake Branch Road and to the immediate east	• Confirmation that existing water system is capable of supporting development and/or increase in population/use • No existing storm sewer infrastructure near the subject Lot • Dedicated area will need to be considered for detention ponds, which can be extensive in size depending on the required criteria • No immediately available sanitary sewer system exists in close proximity to the subject Lot • Confirm capacity of existing absorption field and verify if disposal field can be expanded to accommodate additional development • Feasibility of servicing may be challenging ***(Community Feedback)***
Other Considerations	
• *Nothing of note emerged through the high-level review*	• No existing power or communications is observed on along Highway 97C

4.0 Preliminary Sites Recommendations

Based on the review of policies, data, current infrastructure and servicing, and conversations and feedback with the LNIB community, three sites are recommended for more detailed review.

Sites Not Recommended for Further Exploration

Site 2 – Convenient access to Highway 8, but access into site may be challenging; potential concerns with flooding and marshy areas on south side of site; Johnny's on the Rez septic field located on site; odd shaped parcel limiting development potential; site not a preferred choice by the community

Site 5 – Beside river has experienced erosion; will likely need setbacks from 30m riparian area (no-build zone); Community Centre septic field discharging into ground and back-up field which would double the size of what currently exists; road connection challenges and access would need to go through TNRD and would need access agreements with TNRD that supports the increased anticipated traffic volumes); potential environmentally significant site (wetland/marsh) and potential slope stability issues on south and east side of site as flat bench of land is sparce with vegetation and likely does not have good supporting root structures to mitigate soil movement; community members have noted this area is a burial site; parcel shape and environmental/geotechnical constraints makes development difficult; community members identified as one of the preferred choices

Site 4 – Potential flooding concerns; potential groundwater contamination from previous dump sites that were partially remediated for the upper 1 meter of native soils, which may result in an insufficiently reliable groundwater source; site location supported by the community; need to extend water line from Shulus Water System through Site 3 to Site 4; would need to extend sewer line but would be less of an effort compared to Site 3; community members identified as one of the preferred choices

Sites Recommended for Further Exploration

Site 1 – Best potential for future development; convenient access to Highway 8; adjacent to community amenities and facilities; no perceived flooding risk; relatively flat site with high development potential; site is not a preferred choice for the community; community feedback to not develop agricultural land

Site 3 – Potential flooding concerns; potential groundwater contamination is probable; however, no indication of post-remedial testing was completed or reported and therefore, it may be challenging to find a sufficiently reliable groundwater source; site location supported by the community; wouldn't need to extend water line as far as Site 4 but would require a sewage lift station and potential expansion to existing disposal field; Sites 3 and 4 are comparable; however, the main trade-off being between extension of water line and sewage line. Site 3 is identified as a preferred choice as the extension of a water line to Site 4 would be more costly as compared to an extension of the sewer line, without a need for the existing disposal field expansion, to service Site 3.

Site 6 – Convenient access to Highway 97C and Mamit Lake Branch Road; main irrigation ditch along parcel boundary to discharge stormwater; no water, sewer, or power immediately available in proximity; could connect to Industrial Subdivision's waterline but would need a treatment and storage facilities (currently non-potable); a lot of opportunities for servicing capacity, but with high costs; site supported by the community