



**CBCL LIMITED**

Consulting Engineers



# Land Suitability Assessment and Design Concepts



# Contents

<b>CHAPTER 1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	A Climate for Growth .....	1
1.2	Potential Expansion Area .....	1
1.3	Validating the Development Potential .....	1
1.4	Consultation .....	2
<b>CHAPTER 2</b>	<b>Planning Context.....</b>	<b>3</b>
2.1	Urban Structure .....	3
2.2	Economic Development.....	4
2.3	Housing Needs .....	4
<b>CHAPTER 3</b>	<b>Site Analysis .....</b>	<b>6</b>
3.1	Zoning .....	6
3.2	Ownership.....	6
3.3	Services .....	6
	3.3.1 Water .....	6
	3.3.2 Sewer .....	7
	3.3.3 Power.....	7
3.4	Access.....	7
3.5	Natural Environment .....	7
3.6	Site Constraints .....	9
	3.6.1 Landform.....	9
	3.6.2 Site Geology and Aquifer Material .....	9
	3.6.3 Wetlands.....	9
	3.6.4 Groundwater Flow .....	10
	3.6.5 Water Table .....	11
	3.6.6 Archaeology .....	11
	3.6.7 Contamination .....	12
<b>CHAPTER 4</b>	<b>Development Potential .....</b>	<b>14</b>
4.1	Suitable Lands .....	14
4.2	Adequacy of Existing Services.....	14
<b>CHAPTER 5</b>	<b>Preliminary Layout Concepts .....</b>	<b>16</b>
5.1	Kelland Drive Extension .....	16
5.2	Concept 1 .....	16

5.2.1	Layout .....	16
5.2.2	Residential Capacity.....	16
5.2.3	Proposed Rezoning .....	17
5.3	Concept 2 .....	17
5.3.1	Layout .....	17
5.3.2	Residential Capacity.....	18
5.3.3	Proposed Rezoning .....	18
5.4	Phasing.....	19
<b>CHAPTER 6</b>	<b>Recommendations .....</b>	<b>20</b>
6.1	Growth Potential.....	20
6.2	Limitations .....	20
6.3	Further Studies.....	21

## Appendices

- A Suitability Assessment Maps 1 – 7
- B Development Concepts Maps 8 – 9
- C Density Calculations
- D Draft Municipal Plan and Regulations Amendment
- E Stage I Heritage Resource Impact Assessment

## CHAPTER 1 INTRODUCTION

### 1.1 A Climate for Growth

The Town of Happy Valley-Goose Bay is experiencing a period of growth and development unheard of since the construction of 5 Wing Goose Bay. As the employment, housing and service centre for Central and Coastal Labrador, the Town finds itself at the centre of a number of significant industrial development projects that have the potential to put increasing pressures on the Town for additional services, recreational facilities, and housing. Projects such as the development of the Lower Churchill Hydroelectric project and associated transmission line, expansion of the Iron Ore Company of Canada mine in Labrador City, new and expanding iron mines in Labrador West, ongoing mineral exploration throughout Labrador, and continued improvements to the Trans Labrador Highway are opening up new opportunities for business growth, investment and development. Continued demand for housing in the town has resulted in a need to identify new areas for future residential growth.

### 1.2 Potential Expansion Area

An area of 600 hectares has been identified by the Town as having potential to accommodate future growth of the community. The land is located just north of Kelland Drive and the limits of currently planned residential developments. The study area stretches from Corte Real Road in the east to the boundary of the 5 Wing Goose Bay tank farm in the west (Appendix A: Map 1 -Study Area).

### 1.3 Validating the Development Potential

In 2011, the Town hired CBCL Limited to evaluate the area, identify areas that are suitable for development and prepare concept plans for consideration by Council. This report presents the results of the evaluation beginning with a review of the study area in the context of the development needs of the larger community. The analysis of the site follows in Chapter 2. Chapter 3 identifies the lands determined to be suitable for development and addresses the adequacy of existing services. Two proposed conceptual designs for development of lands suitable for development are presented in Chapter 5 and final recommendations are presented in Chapter 6.

Appendix A contains Maps 1-7 referred to in the text, and the concept plan maps are presented in Appendix B. Appendix C contains development density calculations for both concepts.

#### **1.4 Consultation**

The concept plans prepared as part of the study were presented to Council on February 29, 2012 and to a public meeting on June 5, 2012. The public meeting satisfied the requirement for consultation for a Municipal Plan and Development Regulations amendment required to accommodate development in the area. Draft amendment documents are included in Appendix D.

## CHAPTER 2 PLANNING CONTEXT

### 2.1 Urban Structure

The bulk of developed land in the Town is located to the west of international airport 5 Wing Goose Bay stretching along the northern shore of the Churchill River (Appendix A: Map 2 – Urban Structure). Hamilton River Road serves as the major transportation spine, along which most commercial and institutional uses have developed. Even though Hamilton River Road appears to convey the image of stereo-typical strip development, a number clustered commercial and institutional nodes along strategic intersections have evolved. In particular the Hamilton River Road junctions with Loring Drive, Churchill Street and Grand Street feature a significant density of businesses and institutions. Industrial development is largely concentrated in the Northside Industrial Park to the north of the airport with the exception of a small industrial cluster along Churchill Street.



Fig. 2-1: Development Pattern (CBCL Limited)

With the construction of Kelland Drive, the Town has realized the potential to provide better access to the majority of residential development north of Hamilton River Road. The opening of Kelland Drive has established a loop of collector roads, not only providing current residential subdivisions with alternate transportation routes but also unlocking the potential development area north of the new collector.

Plans for a major retail power centre flanked by residential development announced by a private developer for the lands near the intersection of Hamilton River Road and the Trans Labrador Highway will shift the centre of gravity within the Town. The currently undeveloped lands are situated in the middle of the community, and if developed context-sensitive and with the right mix of uses, will have the potential become the recognizable heart of the Town. The expected impact of new big box stores on smaller retailers along Hamilton River Road may translate into some shifting land use dynamics along the existing retail strip. The shift will create opportunities for consolidation and concentration of commercial activity along Hamilton River Road and potentially the creation of mixed use nodes in new development areas.

## 2.2 Economic Development

Happy Valley-Goose Bay is the employment, service and housing centre for Central and Coastal Labrador. Natural resource driven projects such as the Vale Inco mine at Voisey's Bay and Lower Churchill Hydroelectric project are economic engines that have significantly contributed to the growth of the local economy, particularly the construction sector. The Trans-Labrador Highway has reduced travel times and provides year round vehicular transportation to Newfoundland and Quebec. Even though the future of CFB Goose Bay remains uncertain, potential for a heightened military presence is strong. As the Town attempts to diversify the economy, the availability of industrial and commercial lands and associated infrastructure will impact these diversification efforts.

## 2.3 Housing Needs

In 2011, the Town's population stood at 7,500. Over the past decade Happy Valley-Goose Bay has experienced a slight overall decline in population and an increasing Aboriginal population. Happy Valley-Goose Bay is in general a prosperous community relative to the province. Incomes are much higher than the provincial and national medians. Despite the relatively healthy median income, there are still a number of low income residents, particular among Aboriginal groups.

With increased economic development in Labrador, demand on housing is expected to grow. While recent residential developments have substantially added to the local housing supply, they have done so only in the single dwelling segment of the market. At the same time, rental housing in Happy Valley-Goose Bay has been in short supply and teachers, CONA faculty, students and healthcare workers have expressed difficulty finding suitable housing.<sup>1</sup> Presently, multi unit dwellings and social housing is concentrated in the lower valley neighbourhoods.

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<sup>1</sup> Town of Happy Valley-Goose Bay Integrated Community Sustainability Plan, 2010. CBCL Limited.



There is a need for both market-driven and affordable housing in the Town. The planned expansion of the community into the study area provides an opportunity to address those needs and achieve a sustainable balance and mix of low, mid and higher density housing.

## CHAPTER 3 SITE ANALYSIS

### 3.1 Zoning

Lands in the study area have not been comprehensively examined in a number of years. The current zoning of the study area is shown in Appendix A: Map 3 – Land Use Zoning, and is relatively unchanged from older iterations of Town’s municipal planning documents. The largest portion of the site (290 ha) is zoned Residential Low Density (RLD). The eastern end (105 ha) is zoned Rural (RU), while the western end (107 ha) adjacent to the DND tank farm is zoned Industrial Commercial (IC). Two Environmental Protection (EP) Zones (80 ha), a small Commercial (COM) Zone as well as Public Utility (PUB) Zone make up the remainder of the site. In 2012 the Town amended its Municipal Plan and Zoning Map to accommodate a utility substation in the Study Area. Permitted land uses and associated development standards are subject to the *Town of Happy Valley - Goose Bay Municipal Plan and Development Regulations (2008)*.

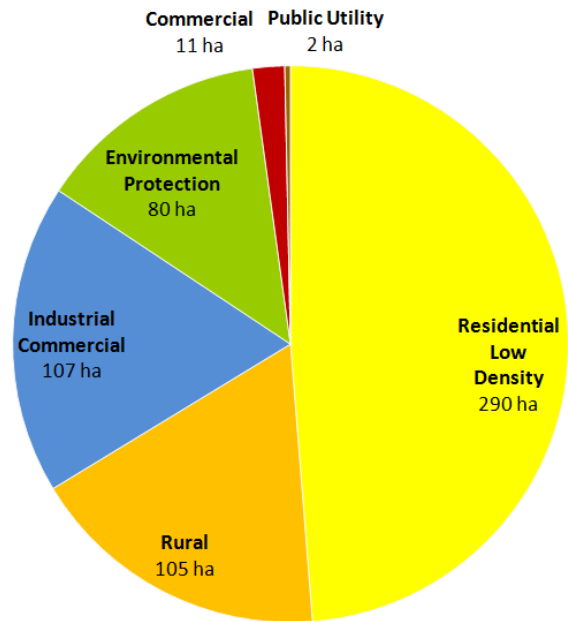


Fig. 3-1: Current Zoning in Study Area

### 3.2 Ownership

The majority of the study area is owned by the Crown, with the exception of 3 parcels of land owned by the Town located between the new Johnny Hill and Kelland Drive Subdivisions (See Appendix A: Map 1 – Study Area). These parcels are:

- Parcel L106567 – 17.4ha;
- Parcel L106570 – 9.2ha; and
- Parcel L106771 – 17.9ha.

### 3.3 Services

#### 3.3.1 Water

Happy Valley-Goose Bay has two water sources. The water treatment plant which supplies approximately 65% of the water is supplied by five wells located some 6 km west of the Town along

the Trans Labrador Highway. The second source, Spring Gulch delivers the remaining 35% of water. Water to the Happy Valley part of the town is distributed via the Sandhill reservoir at the top of MOT hill. It has a capacity of 1.2 million gallons. Water distribution lines are located in all residential subdivisions adjacent to the study area.

### **3.3.2 Sewer**

All dwellings in Happy Valley-Goose Bay have piped sewerage systems. The Town has approximately 50 km of sewers and two sewage outfalls that empty raw sewage into the Churchill River. The Town has been experiencing problems with the existing system during times of low flow in the river when the untreated wastewater becomes exposed causing odour and vector problems. A new sewage treatment facility with a capacity for 18,000 people is currently being built north of Mudd Lake Road in the eastern end of the Town.

### **3.3.3 Power**

Happy Valley-Goose Bay is provided with power generated at Churchill Falls. The transmission system in the area has a capacity of 63 MW. The 2006 load forecast by Newfoundland and Labrador Hydro was 61.8 MW. For loads exceeding the capacity, system enhancements and additions would have to be implemented. A new terminal station, an associated transmission line and access road proposed by Newfoundland and Labrador Hydro will be located north of Kelland Drive in the western section of the Study Area.

## **3.4 Access**

Kelland Drive and the planned extension to the east will provide excellent opportunities to access lands in the study area. Two north-south running collector roads (Churchill Street and Corte Real Road) can potentially be extended into the study area and could serve as a starting point for a hierarchical system of roads. Corte Real Road has a right-of-way extending along the eastern boundary of the study area, but is unpaved beyond the Johnny Hill Subdivision. Recently constructed subdivisions contain a number of secondary roads with reserved road right-of-ways that enable new connections into the study area. Among these roads are Tooktoshina Drive, Helfer Street and Garland Street.

## **3.5 Natural Environment**

The study area is encompassed by the High Boreal Forest - Lake Melville ecoregion, which includes the Churchill River Valley and the coastal plain surrounding Lake Melville. This ecoregion has the mildest climate in Labrador (120-140 day growing season), with cool summers and cold winters. In terms of forest cover, rich slopes are dominated by balsam fir, white birch, and trembling aspen; black spruce dominates in the shallow, well drained soils of upland areas, and in the lichen woodlands found on the coarse alluvial soils of river terraces. Wetland habitat can be abundant, with ribbed fens predominating in upland depressions and plateau bogs predominating on coastal plains (Govt. of NL, 2011). Prevailing winds are from the west.

Figure 3-2 illustrates the current conditions of the natural environment of the study area.



Fig. 3-2: Natural Environment (CBCL Limited)

## 3.6 Site Constraints

### 3.6.1 Landform

The study area appears generally flat, but gently sloping from south to north. The western portion of the area is slightly elevated and separated by a ridge from the lower lying areas. Only a small portion, west of the Johnny Hill Drive Subdivision features some steeper slopes. Accurate contour mapping for the study area is currently not available.

The existing topography of the site is **suitable** for residential development and provides a large degree of **flexibility** for the layout of roads and development parcels.

### 3.6.2 Site Geology and Aquifer Material

The geologic material underlying the study site is predominantly sand of mixed origins. There is a limited thickness of Holocene aeolian deposits in central parts of the site, underlain by glaciofluvial and marine blanket deposits of sand and gravel. Glaciofluvial deposits may contain unsorted coarse material including gravel sized particles. Marine deposits should exhibit well sorted beds of fine to medium sand, with the potential to include silt and gravel sized particles. The grain size distribution of 6 samples collected near the site reported a sand fraction of 96.5% or greater.<sup>2</sup> Water well records from the area describe the unconsolidated deposits as “sand” or “silty clayey sand”.<sup>3</sup>

Wetter areas in the north part of the study area exhibit beds of organic and silty material overlying the sandy units. This siltier material coincides with saturated soils mapping, and could provide a degree of confinement to the underlying aquifer. Bedrock underlying the study area is granitic gneiss. Water well records indicate that the bedrock surface is on average 30 to 40 metres below the ground surface.

The well-draining sandy soils are **suitable** for residential development and slab on grade construction. However, they create **some challenges** when digging servicing trenches due to the risk of collapsing trench walls. Water and sewer pipes are typically buried at 3m below ground. If the water table in an area is closer than 3m to the surface, digging trenches is problematic, unless perimeter drainage ditches are dug to drain down the surrounding area.

### 3.6.3 Wetlands

The study area is composed largely of a river terrace containing an open lichen woodland dominated by black spruce, lichen, white birch, glandular birch and various ericaceous species (kalmia, blueberry, partridgeberry, etc...). The subtle topography of the study area also gives rise to a large fen complex to the north, with numerous low-gradient drainage channels extending into the southern portion of the study area. This wetland complex contains deep peat deposits, and a

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<sup>2</sup> Newfoundland and Labrador Department of Natural Resources. 2010. Granular-Aggregate Resources of the Goose Bay Map Sheet (NTS 13F/8). Open File 13F/08/0073. Map 2010-36.

<sup>3</sup> Newfoundland and Labrador Department of Environment and Conservation. 2010. Drilled Well Database.

regionally typical flora for such wetlands including black spruce, tamarack, Sphagnum moss, ericaceous species (Kalmia, blueberry, Labrador tea, sweet gale, etc...), sedges (Carex spp.) and cotton grass (Eriophorum spp.).

The wetlands were delineated through a combination of aerial photography interpretation and field work in August 2011. The wetland boundaries are approximate and are recommended to be formally delineated by a qualified wetland specialist prior to further development. Wetlands cover over 37% or 161ha of the study area. This amounts to more than double the amount of land that is designated for Environmental Protection in the Town's Municipal Plan and Development Regulations (Appendix A: Map 4 – Wetlands).

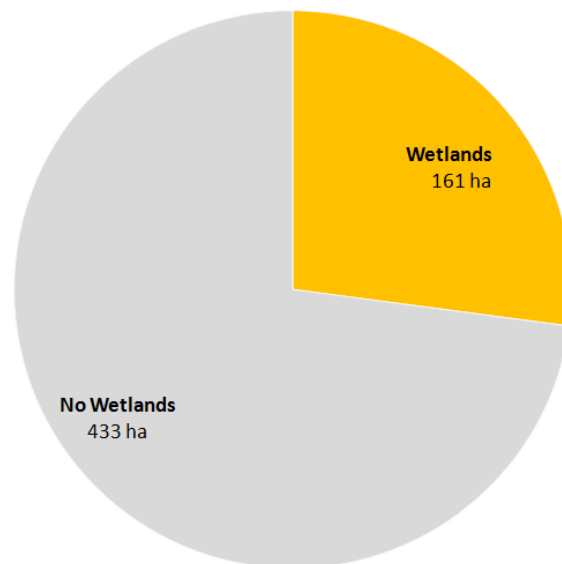


Fig. 3-3: Wetlands Relative to Study Area

Wetlands are considered **unsuitable** for development. Even though infilling, dredging and other disturbances for the construction of roads and residential developments are permitted in the Province as long as the development does not aggravate flooding problems or has adverse effects on water quality, infilling for development is not advisable. The surface water in the wetlands approximately conforms to the water table elevation, thus requiring extensive infill to achieve the necessary depth for the burying of water and sewer service infrastructure.

### 3.6.4 Groundwater Flow

Deposits of sand underlying the study area are expected to comprise a 30 to 40 metre thick unconfined aquifer. Deposits of peat and siltier material may impose semi-confined conditions over the northernmost parts of the site. The hydrogeologic setting suggests that flowpaths in the unconfined aquifer will generally be local to the site and should therefore conform to drainage patterns observed at the ground surface. Topographic patterns indicate that there is a shallow groundwater flow divide to the south of the site. Shallow groundwater flow would be primarily northward across the site with components of recharge to local streams and drainage swales.

Topographic and hydrologic mapping suggest that most or all of the groundwater on the site is derived from on-site recharge. The topographic high area to the west of the site could generate a deeper component of flow directed toward the site and discharging to the wetlands bordering the north of the site. The digital elevation model also suggests that there could be components of flow from west to east across the centre of the site.

Groundwater recharge (downward flow) is expected to occur primarily in areas to the south of the site and on the southernmost part of the site. Vertical gradients across the remainder of the site are

expected to be neutral in upland areas and neutral or upward in zones adjacent to wetland/drainage courses.

### 3.6.5 Water Table

Perhaps the most important subsurface variable of all is the presence of water. The water table is the underground surface below which the interstices of the soil grains are filled with water. A hydro-geological desktop study found that hydraulic conductivity of the aquifer material is expected to be moderate to high, and groundwater gradients are expected to be low. These conditions would lead to little or no mounding of the water table between the drainage courses on-site. If the water table is, as mapping suggests, relatively level and uniform, the water table elevation should conform to surface water levels observed in the drainage courses on-site.

Preliminary delineation of wetlands on the site indicates that water courses are connected to a large wetland complex to the immediate north of the study area. Water levels in the wetland complex and the unconfined aquifer are water table features; as such the function and capacity of this larger wetland system is likely to affect the water table depth on the site. The catchment of the wetland complex as a whole could thus affect the depth to the water table in the study area.

The water table will be closest to the ground surface in the northern parts of the study area, particularly in zones adjacent to the wetland complexes. The risk of flooding and inundation of foundations and buried services is highest in these zones. Higher hydraulic conductivities and low gradients are also expected to allow for large and potentially rapid water table fluctuations during large storm events and significant elevation changes between wet and dry seasons (e.g. up to a metre or more).

A test pitting program performed in October of 2011 yielded water table depth measurements in 26 test pits distributed over the site. Water table depths range from 1.2m to 5.0m across the study area, with larger depths recorded mainly in the southern and western portions of the site (Map 5 – Test Pit Locations).

The shallow depth of the water table is the most **significant constraint** on future development. The water table is relatively level and uniform and the water table elevation should conform to surface water levels observed in the drainage courses on-site. In order to develop accurate conclusions about the water table, a topographic survey of the entire study area would have to be performed. By and large, areas with water table depths **shallower than 2.5m** are **not suitable** for residential development. Contractors in Happy Valley – Goose Bay have reported placing water lines in areas with only 2.2m water table depth, but this resulted in increased development cost.

### 3.6.6 Archaeology

There are four known archaeological sites, all of which are located in the western portion of the study area (Appendix A: Map 6 – Archaeological Records). Additional archaeological field work in October 2011 (Appendix E: Stage I Heritage Resource Impact Assessment) identified areas with low archaeological potential where no further archaeological work is required (green shading on Figure

3-4) and areas with elevated potential, where additional archaeological work is required if construction is to be undertaken (yellow shading on Figure 3-4).



Fig. 3-4: Archaeological Potential (Scott Neilsen, 2011)

Apart from the known archaeological records, lands in the southern portion of the study area have low archaeological potential and are **suitable** for development. Areas with elevated archaeological potential further north require additional archaeological investigations prior to development.

### 3.6.7 Contamination

The Town of Happy Valley-Goose Bay is reportedly in possession of a study that concluded that no contamination exists on the western portion of the study area that is currently zoned Industrial (Town Manager, pers. comm.). The detailed findings of this study have not been included in this Phase 1 report. There are a number of monitoring wells located on the tank farm lands to the immediate west of the study area, which have indicated varying levels of petroleum contamination. (Figure 3-5).

There is currently **no indication** that contaminated soils pose constraints on the development suitability of the site. However, prior to any development, testing for contaminants should be conducted in areas adjacent to the tank farm.



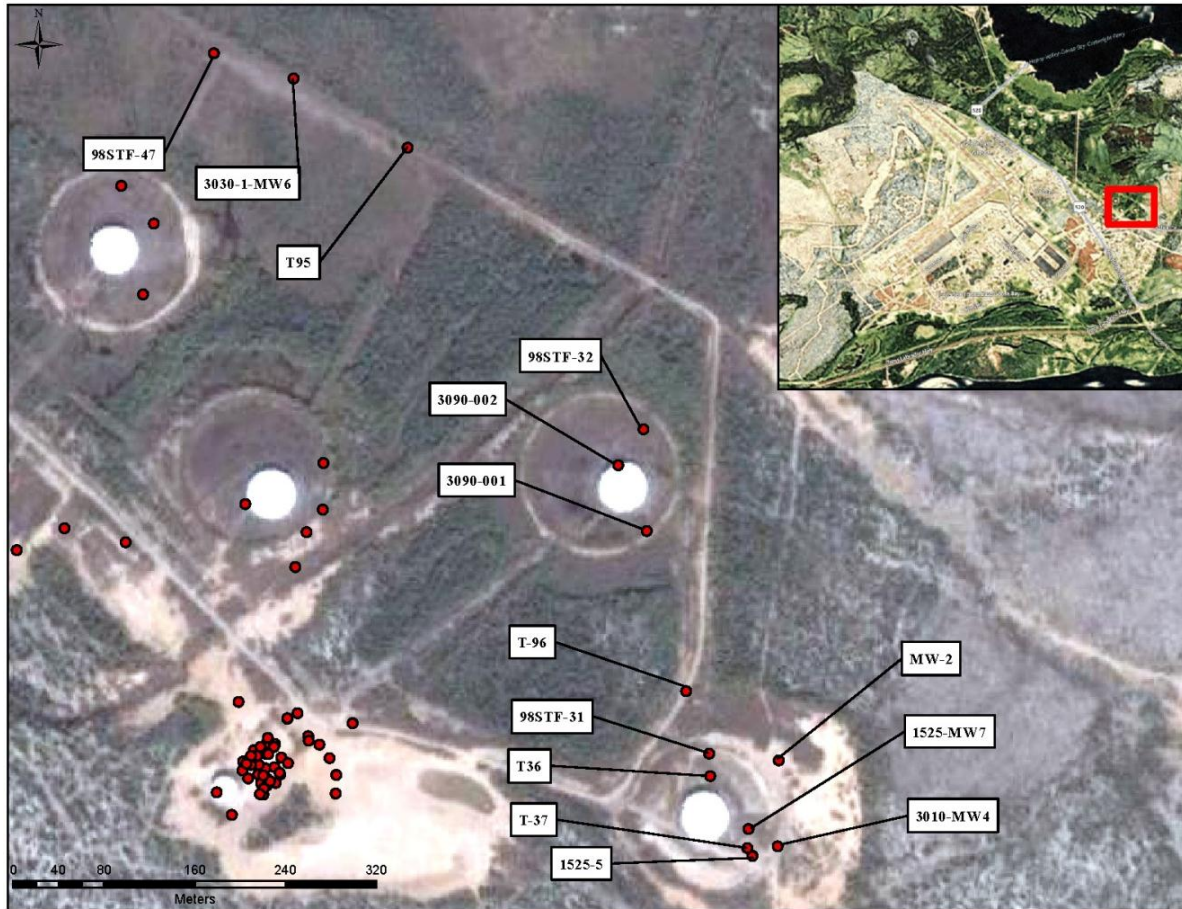


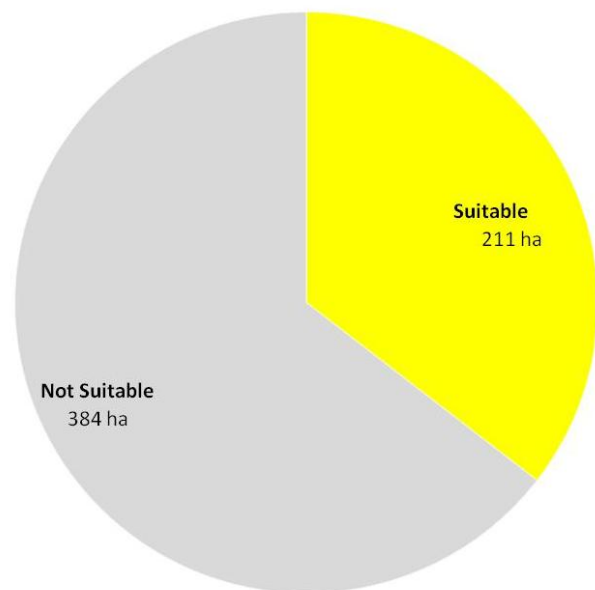
Fig. 3-5: Location of Monitoring Wells at Tank Farm (CBCL Limited)

## CHAPTER 4 DEVELOPMENT POTENTIAL

### 4.1 Suitable Lands

Assuming, that lands with a water table depth less than 2.5 m are unsuitable for development, Appendix A: Map 7 –Development Potential shows the approximate areas with development potential. In the absence of a topographic survey, the edges of the development areas are to be considered somewhat soft. A survey that would be conducted prior to detailed design and construction of new subdivisions, would eventually refine the exact limits for development.

In the absence of detailed contour information, the estimated gross area available for development amounts to about 211 ha or 35% of the total site. Assuming that up to 25% in a conventional residential subdivision are taken up by road right-of-ways, the remaining net area for development would be about 158 ha.



### 4.2 Adequacy of Existing Services

Existing developed areas in Happy Valley-Goose Bay are serviced with water and sewer. Based on population assessments, the capacity of the Town's proposed wastewater treatment facility appears to be sized to accommodate the areas identified for potential development. The capacity of sewer mains located downstream from suitable lands should be checked prior to proceeding with any development in these areas. New infrastructure, in the form of larger mains, or trunk sewers, may be required.

The Town's water supply system consists of two sources that feed a reservoir, which, in turn, provides water to the distribution network. To ensure that the Town's water supply system can accommodate the developable lands, the capacity of the various system components, including the wells, treatment plant, reservoir and distribution mains should be checked. In short, the Town could

benefit from a having a water system master plan prepared, which would address all of these issues. This plan could be used to identify infrastructure upgrades required to support future development.

## CHAPTER 5 PRELIMINARY LAYOUT CONCEPTS

### 5.1 Kelland Drive Extension

Map 8 and Map 9 (Appendix B) provide conceptual layout plans for the development of suitable parcels within the study area. As the Town has identified a need to create road linkages in both concepts, Kelland Drive is extended to meet Corte Real Road. Kelland Drive will become an arterial connection through the area, and as a result the number of intersections from the surrounding subdivisions have been limited.

### 5.2 Concept 1

#### 5.2.1 Layout

Concept 1 (Appendix B: Map 8 – Concept 1) assumes that all suitable parcels are developed as single family residential lots with a density that is similar to those found in the new subdivisions along the southern boundaries of the study area (12 people per residential acre). Generally, the roads are aligned east-west to allow homes to take advantage of passive solar opportunities associated with a southern exposure. Open space trail connections are provided from the residential areas to the surrounding undeveloped areas, limiting the requirements for dedicated park areas within the subdivisions. Given that a large big box retail power centre is under consideration for an area just to the southwest of the study area (north of the Hamilton River Road just west of the Labrador South Health Centre), only a relatively small area of local retail commercial development is proposed at the corner of Kelland Drive and Corte Real Road.

#### 5.2.2 Residential Capacity

Concept 1 assumes that residential development parcels 1 through 6 are re-zoned to Residential Special (RS). Current development regulations allow for a minimum lot area of 900sqm in RS zones. Given those development standards, Concept 1 can accommodate 1,718 households or 4,638 people, based on a current household size of 2.7 (Statistics Canada, 2006 Census). If portions or all of the study area were to be rezoned to Residential Low Density (RLD) with a minimum lot area requirement of 650sqm, up to 38% more people could be accommodated by Concept 1. Detailed density calculations are presented in Appendix C.

<b>CONCEPT 1</b>	Area ID	Gross Area (ha)	Net Area (ha) <sup>1</sup>	Available Lots / Number of Households	Number of People <sup>3</sup>
<b>Residential Special (RS)<sup>4</sup></b>					
	1	75	57	628	1,696
	2	42	32	351	949
	3	10	7	80	216
	4	30	22	249	673
	5	25	19	210	567
	6	24	18	199	538
<b>Commercial (COM)</b>					
	7	5	4	N/A	N/A
<b>TOTAL</b>		<b>211</b>	<b>158</b>	<b>1,718</b>	<b>4,638</b>

Table 5-1: Concept 1 Population Estimates

### 5.2.3 Proposed Rezoning

Along with the layout of Concept 1, the proposed rezoning would result in a distribution of land uses as seen in figure 5-1. A Holding Zone is proposed for those areas that are currently unsuitable for conventional development due to a high water table. The Holding Zone can be lifted should development become feasible due to technical solutions that enable servicing.

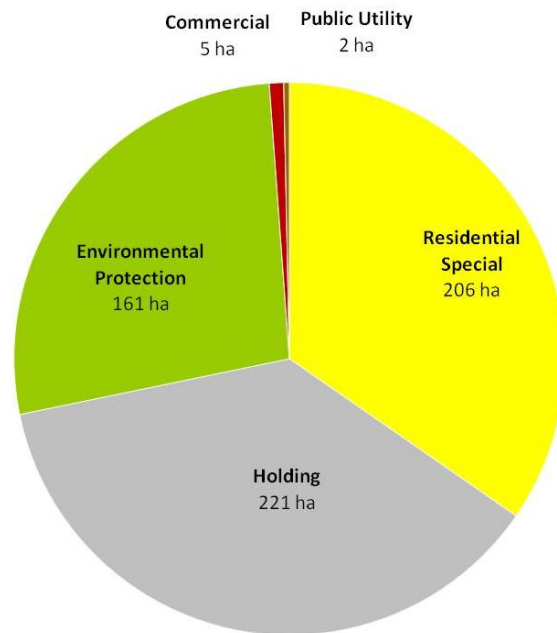


Fig. 5-1: Proposed Rezoning – Concept 1

## 5.3 Concept 2

### 5.3.1 Layout

Concept 2 (Appendix B: Map 8 – Concept 2) provides a variety of alternatives to the single family residential lot pattern provided in Concept 1.

Since the parcels with suitable conditions for development are more-or-less separate, it is possible to consider each parcel for different types and densities of development. This concept illustrates some options related to:

- single family residential development at higher density lot sizes in the area north of Kelland Drive and Churchill Street and south of Kelland Drive, east of the prison and the area north of the corner of Kelland Drive and Corte Real Road;
- multi-unit residential north of Kelland Drive and Deharving Drive/Winter Crescent, and parallel to the Kelland Drive extension running east from the corner of Kelland Drive and Corte Real

Road. These areas are somewhat separate from other development areas, reducing potential issues with neighbours, have very good access to major roads to handle higher volumes of traffic, and are adjacent to large areas of open space providing good views and opportunities for passive recreation for residents living in higher density condition;

- commercial/industrial development of the most westerly parcel. The area adjacent to Kelland Drive is reserved for retail or commercial development that would benefit from higher exposures along the road frontage. Land in these areas is generally able to be sold for higher prices and the additional funds generated could be used to finance other less profitable, but still desirable aspects of the development; and
- local retail development at the corner of Kelland Drive and Corte Real Road for the same reasons given in Concept 1.

### 5.3.2 Residential Capacity

Concept 2 assumes that residential development parcels 2, 4 and 6 are re-zoned to Residential Low Density (RPD) and parcels 3 and 5 are rezoned to Mixed Development (MD) to allow for multi-unit residential buildings. Given the current development standards, Concept 2 can accommodate 1,968 households or 5,313 people, based on a current household size of 2.7 (Statistics Canada, 2006 Census). For detailed density calculations see Appendix C.

<b>CONCEPT 2</b>	Area ID	Gross Area (ha)	Net Area (ha) <sup>1</sup>	Available Lots / Number of Households	Number of People <sup>3</sup>
<b>Residential Low Density (RLD)<sup>4</sup></b>					
	2	42	32	486	1,313
	4	30	22	345	931
	6	24	18	276	745
<b>Mixed Development (MD)<sup>5</sup></b>					
	3	10	7	237	641
	5	25	19	623	1,682
<b>Commercial (COM)</b>					
	7	5	4	N/A	N/A
	8	10	8	N/A	N/A
<b>Industrial - Commercial (IC)</b>					
	1	65	49	N/A	N/A
<b>TOTAL</b>		<b>211</b>	<b>158</b>	<b>1,968</b>	<b>5,313</b>

Table 5-2: Concept 2 Population Estimates

### 5.3.3 Proposed Rezoning

Along with the layout of Concept 2, the proposed rezoning would result in a distribution of land uses as seen in figure 5-2. A Holding Zone is proposed for those areas that are currently unsuitable for conventional development due to a high water table. The Holding Zone can be lifted should development become feasible due to technical solutions that enable servicing.

## 5.4 Phasing

In both concepts, the Town may wish to consider developing the area west of Corte Real Road first as this would allow the arterial road to be constructed as development progresses. Alternatively, the area located at the north end of Churchill Street could be developed first as this area is currently accessible by road. The most westerly parcel could be developed last to allow options based on what development happens in the area over the next few years. If the retail commercial development of the power centre to the south takes off and there is need for additional land, the area could be developed to support that use. If the Town requires additional industrial land, this area could be suitable due to its proximity to the tank farm to the west and its separation for the development location to the east. If neither of these needs becomes apparent the land remains suitable for residential development.

Both concepts were presented to Council on February 29, 2012 and at a public meeting on June 5, 2012. Concept 2 emerged as the preferred concept. A Draft Municipal Plan Amendment and Regulations Amendment that would facilitate development of Concept 2 is included as Appendix D.

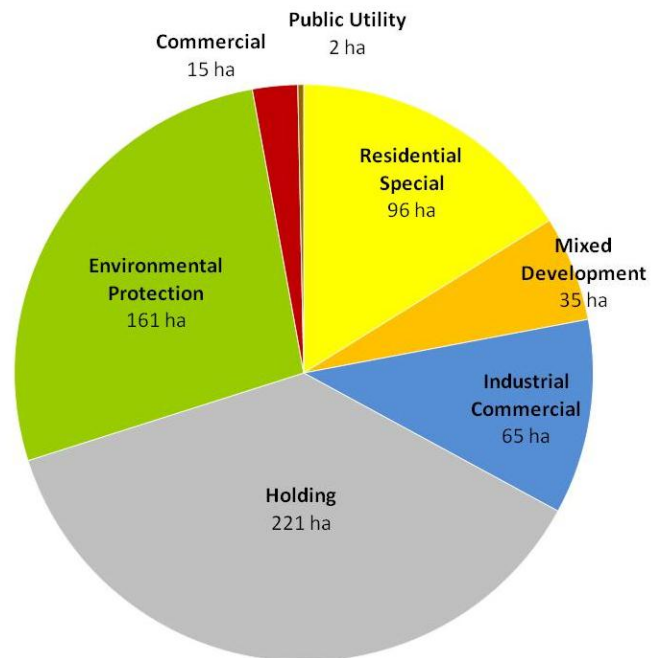


Fig. 5-2: Proposed Rezoning – Concept 2

## CHAPTER 6 RECOMMENDATIONS

### 6.1 Growth Potential

Despite the large portion of unsuitable lands within the study area, the Town can expect to accommodate a significant population growth within the assessed area. Both development concepts presented in this study would allow for an approximate 50% increase of the Town's population.

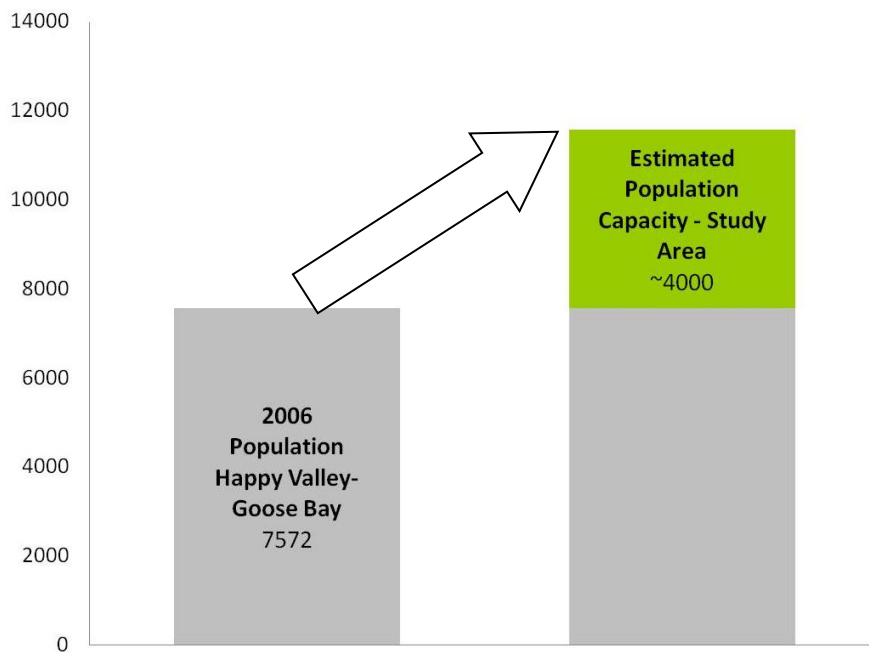


Fig. 6-1: Estimated Population Capacity

### 6.2 Limitations

Over the course of this study, an extensive field program was conducted which included archaeological field work, preliminary wetland delineation and water table test pitting. However, in the absence of detailed contour information, the boundaries of suitable land and the ensuing concept plans with associated population estimates are approximate.



In the absence of a topographic survey, the edges of the development areas are to be considered somewhat soft. A survey that would be conducted prior to detailed design and construction of new subdivisions, would eventually refine the exact limits for development.

### 6.3 Further Studies

Prior to rezoning the study area, the Town should conduct the following studies and Municipal Plan amendments to further refine, confirm and manifest the development potential of the site:

1. Topographic survey or purchase of existing LiDAR data;
2. Detailed hydro-geological modelling based on contour data and test pitting results;
3. Contaminant study for western portion of study area;
4. Detailed wetland delineation;
5. Detailed servicing capacity study; and
6. Proceed with amendment to Municipal Plan and Development Regulations to facilitate implementation of Concept 2.

## References

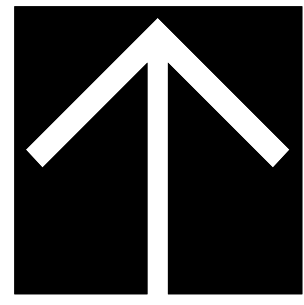
- Government of Canada, Natural Resources Canada, Earth Sciences Sector, Mapping Information Branch, Centre for Topographic Information. 1999. Geospatial Database Edition 12.0. CanVec topographic data for grid reference NTS 13F/8, Goose Bay.
- Government of Canada, Natural Resources Canada, Earth Sciences Sector, Mapping Information Branch, Centre for Topographic Information. 2010. National Topographic Database Edition 2.1. Geogratis Digital Elevation Model for grid reference NTS 13F/8, Goose Bay.
- CBCL Limited. 2010. Happy Valley - Goose Bay Integrated Community Sustainability Plan.
- Gardner Pinfold Consulting Economists Ltd. 2009. Economic Trend Analysis: Canadian Forces Base 5-Wing Goose Bay.
- Hatch. 2010. Nalcor Energy - Lower Churchill Project Supplemental Dam Break Analysis Final Report
- Newfoundland and Labrador Department of Environment and Conservation. 2010. Drilled Well Database.
- Newfoundland and Labrador Department of Environment and Conservation. 2001. Policy for Development in Wetlands.
- Newfoundland and Labrador Department of Mines and Energy, Geological Survey. 2000. Landforms and Surficial Geology of the Goose Bay Map Sheet (NTS 13F/8). Map 2000-44.
- Newfoundland and Labrador Department of Natural Resources. 2010. Granular-Aggregate Resources of the Goose Bay Map Sheet (NTS 13F/8). Open File 13F/08/0073. Map 2010-36.
- Newfoundland and Labrador Department of Natural Resources. 2011. GeoScience Atlas On-Line. <http://gis.geosurv.gov.nl.ca/resourceatlas/viewer.htm>, accessed October, 2011.
- Saint Croix, R., and Walters, C. 2009. Newfoundland and Labrador Department of Natural Resources Open file Report. Detailed Soil Survey of Goose River Labrador.
- Saint Croix, R. 2002. Newfoundland and Labrador Department of Agriculture, Soil and Land Management Division, Department of Forest Resources and Agrifoods. Soils of the Happy Valley East Area, Labrador, Soil Survey Report.
- Stobbe, P.C., and Nowosad, F.S. 1957. Canada Department of Agriculture, Experimental Farms Service, Field Husbandry Division, Ottawa. Report on the Soils and Settlement Possibilities in the Goose Bay, Labrador Area, Newfoundland, Canada.
- The Lichen Group Inc. 2007. Happy Valley-Goose Bay Community Plan for Addressing Homelessness and Transitional Housing.
- Town of Happy Valley - Goose Bay. 2008. Development Regulations 2008 – 2018.
- Town of Happy Valley - Goose Bay. 2008. Municipal Plan 2008 – 2018.

APPENDIX A

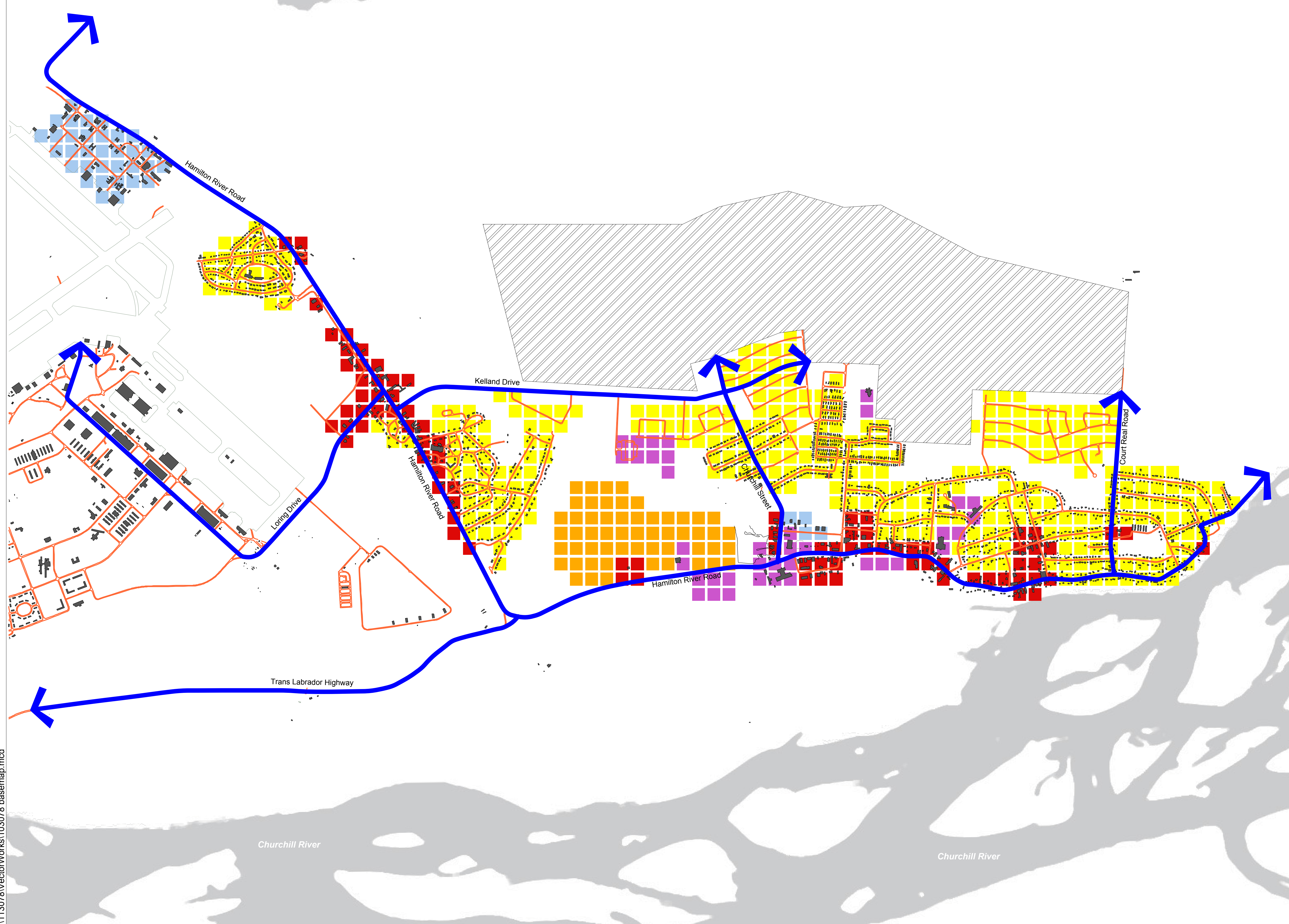
# Development Suitability Maps 1-7

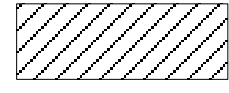



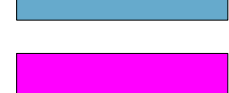








Hamilton Inlet

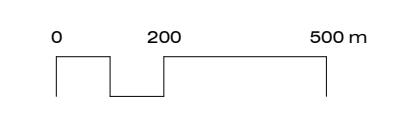


-  Study Area
-  Major Transportation Spine
-  Predominantly Residential
-  Predominantly Commercial
-  Predominantly Industrial
-  Predominantly Institutional
-  Predominantly Retail with some Residential (Planned)

Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
 ASSESSMENT AND  
 CONCEPT PLAN**

Map 2  
 Urban Structure

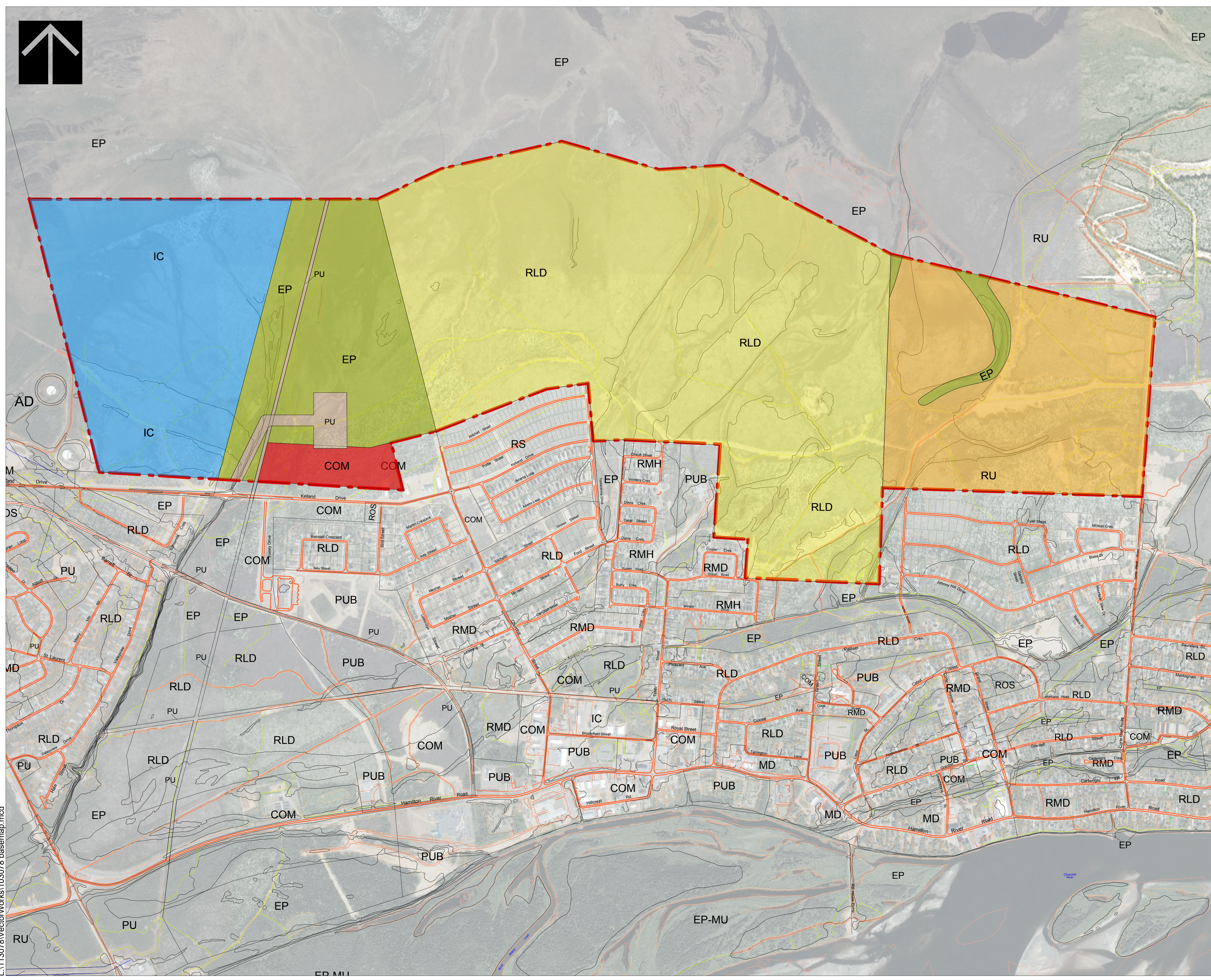
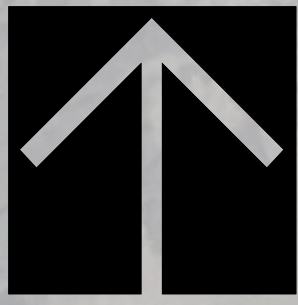
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Project: 103078  
 Date: December 2011

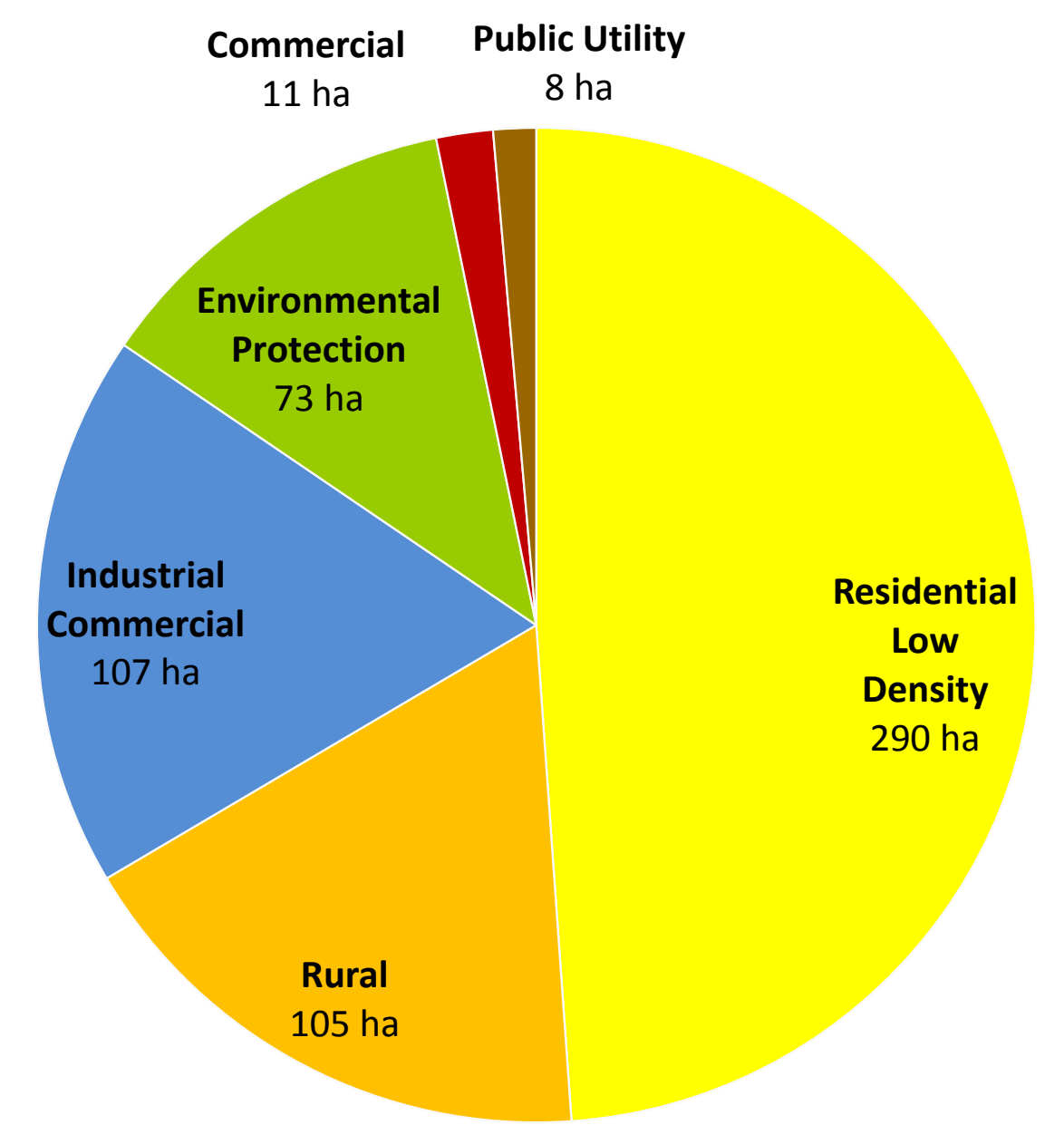


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- Study Area**
- Residential Low Density
  - Rural
  - Industrial Commercial
  - Environmental Protection
  - Commercial
  - Public Utility

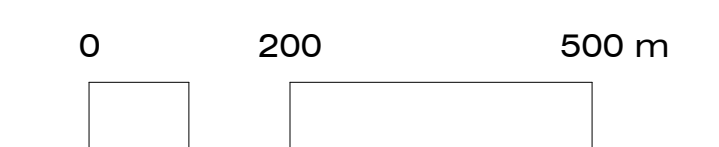
Total Study Area: 595 ha



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY ASSESSMENT AND CONCEPT PLAN**

Map 3  
 Current Zoning

Scale: 1:7500



Project: 103078  
 Date: December 2011



**CBCL LIMITED**  
 Consulting Engineers

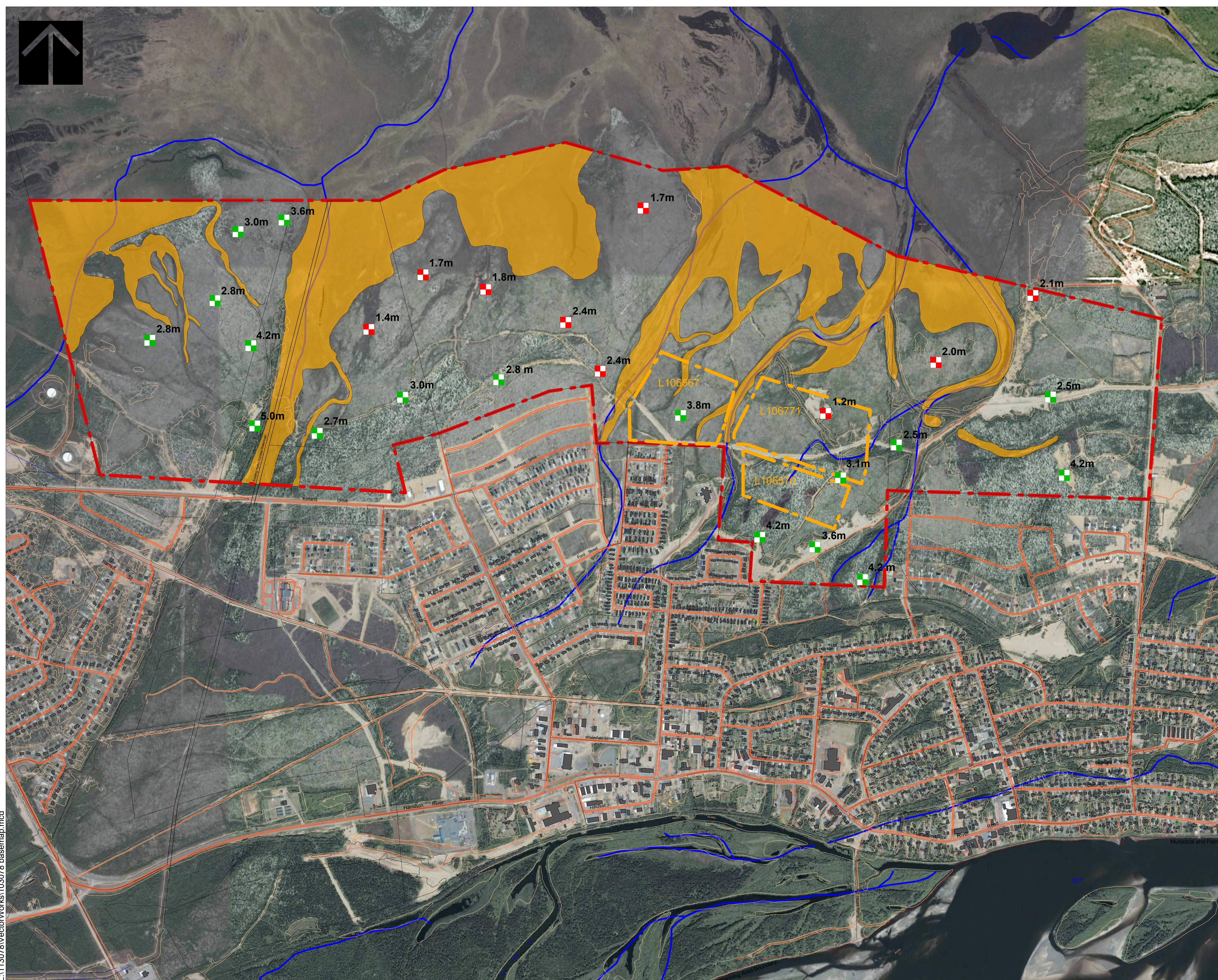
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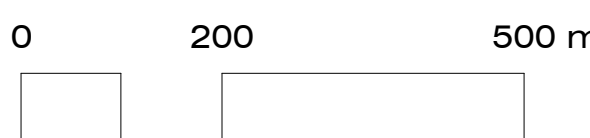


-  Study Area
-  Town Owned Properties
-  Wetlands
-  Test Pits - Depth of Water Table >2.5m
-  Test Pits - Depth of Water Table 0-2.5m



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
 ASSESSMENT AND  
 CONCEPT PLAN**

Map 5  
 Water Table Test Pit  
 Locations and  
 Measurements

Scale: 1:7500  


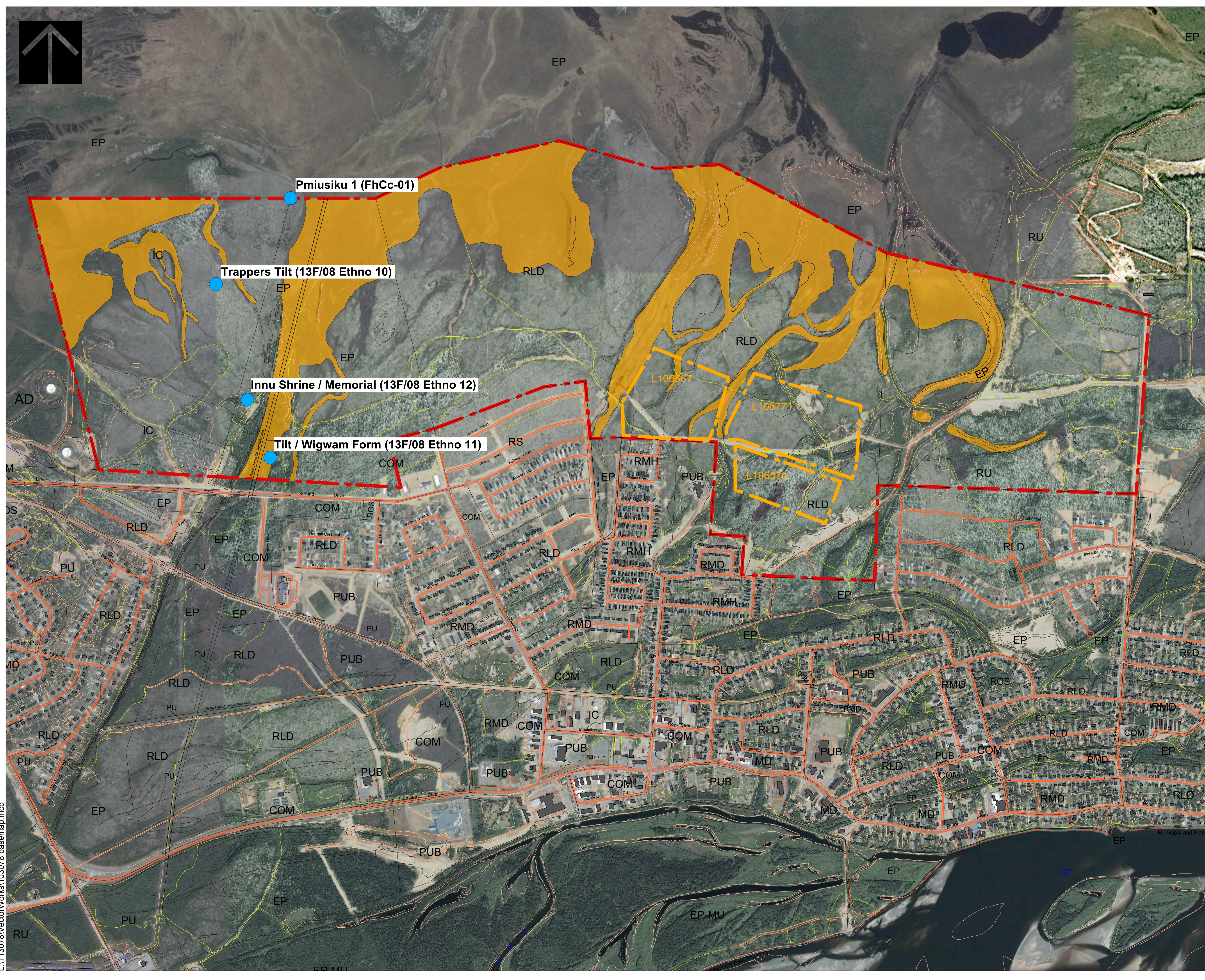
Project: 103078  
 Date: December 2011



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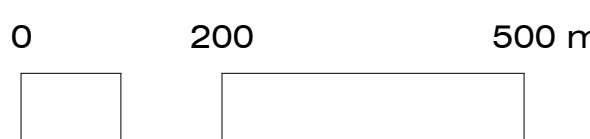


-  Study Area
-  Town Owned Properties
-  Wetlands
-  Archaeological Records



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
 ASSESSMENT AND  
 CONCEPT PLAN**

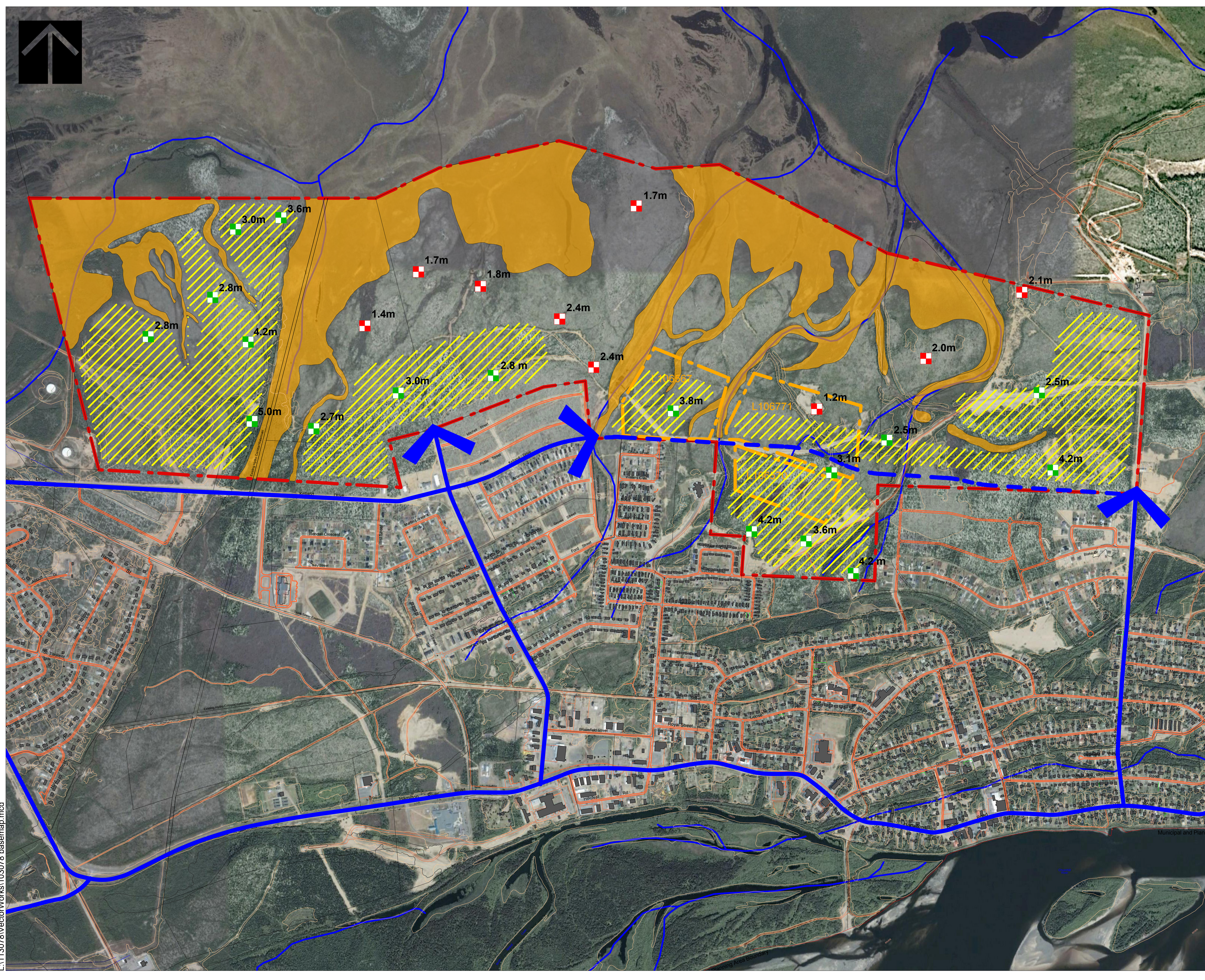
Map 6  
 Archaeological Records





Scale: 1:7500  


Project: 103078  
 Date: December 2011

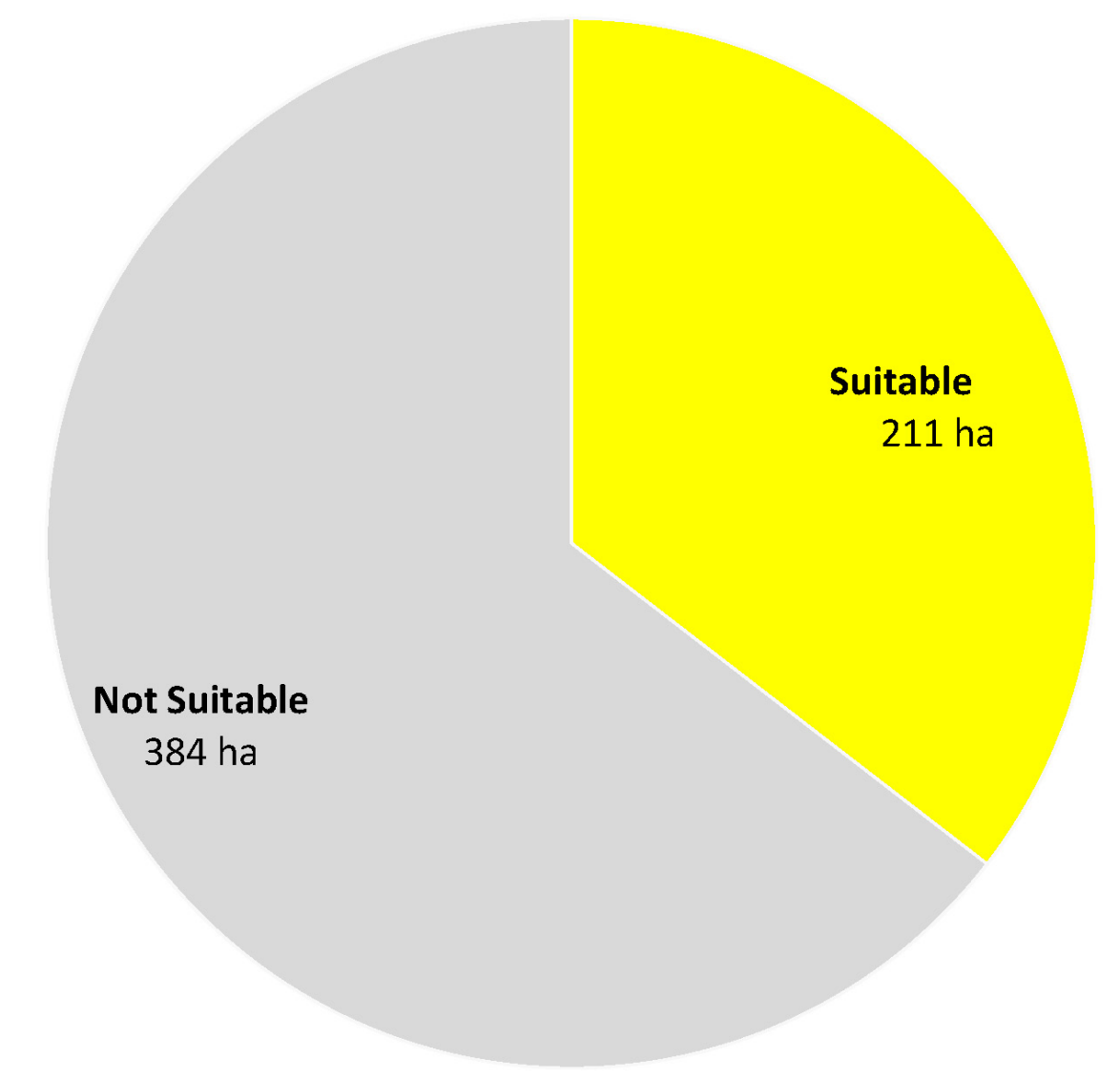


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-  Study Area
-  Town Owned Properties
-  Wetlands
-  Development Potential
-  Test Pits - Depth of Water Table >2.5m
-  Test Pits - Depth of Water Table 0-2.5m
-  Existing Collector Road
-  Proposed Collector Road

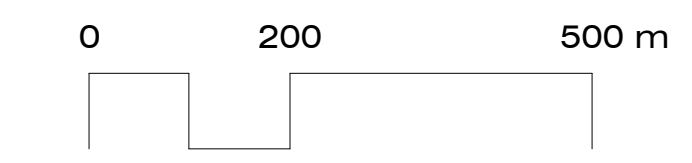
Total Study Area: 595 ha



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY ASSESSMENT AND CONCEPT PLAN**

Map 7  
 Development Potential

Scale: 1:7500



Project: 103078  
 Date: December 2011



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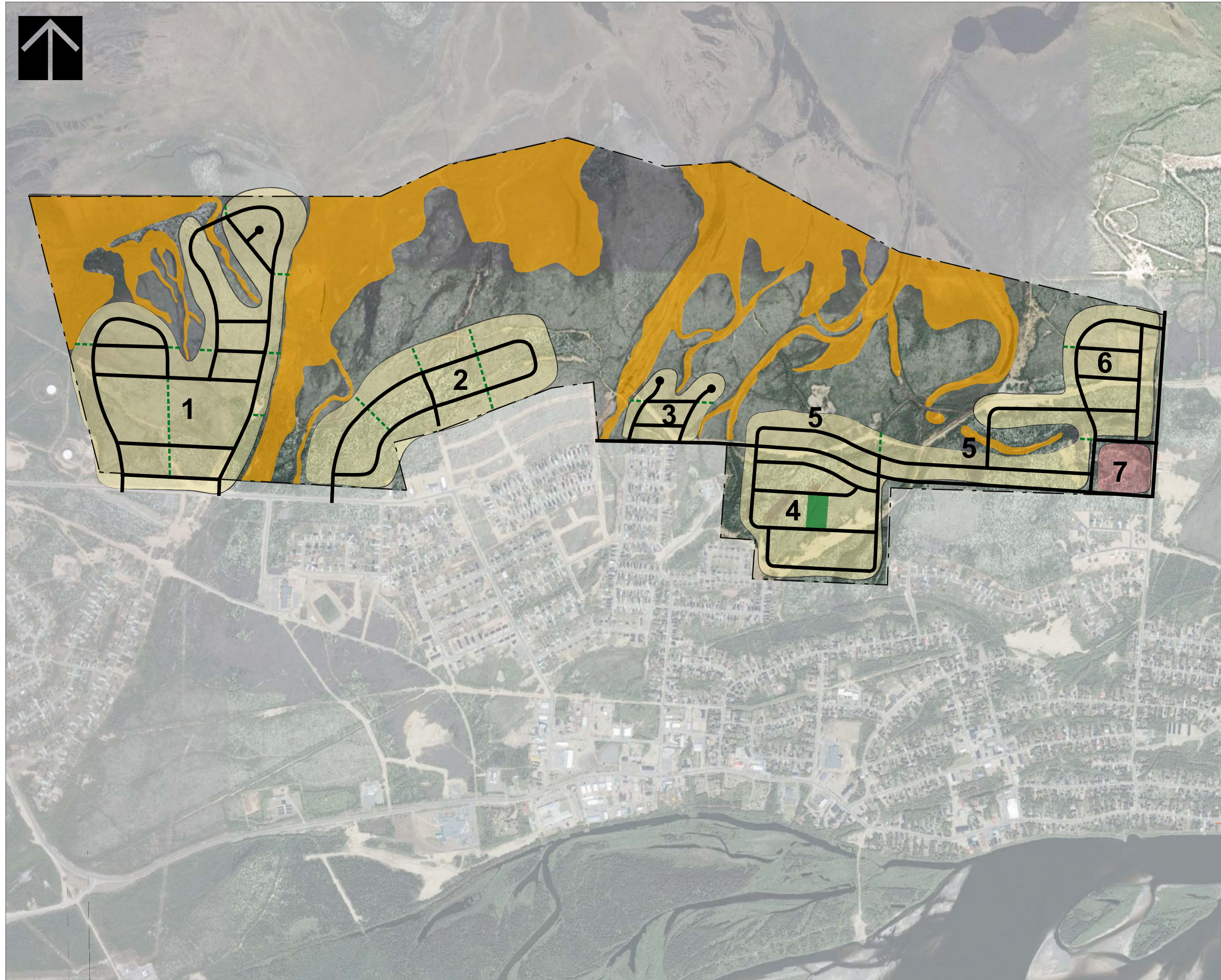
APPENDIX B

# Concept Plans Maps 8-9





- Study Area
- Wetlands
- Large Lot, Single Family Residential
- Local Retail
- Proposed Road Network
- Proposed Pathway Network



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
ASSESSMENT AND  
CONCEPT PLAN**

Map 8  
Concept 1









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Date: December 2011





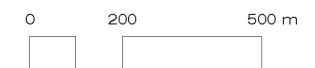
-  Study Area
-  Wetlands
-  Small Lot, Single Family Residential
-  Multi-Unit Residential
-  Local Retail
-  Industrial / Commercial
-  Proposed Road Network
-  Proposed Pathway Network



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
ASSESSMENT AND  
CONCEPT PLAN**

Map 9  
Concept 2

Scale: 1:7500



Project: 103078  
Date: December 2011



**CBCL LIMITED**  
Consulting Engineers



# Population Calculations



<b>CONCEPT 1</b>	Area ID	Gross Area (ha)	Net Area (ha) <sup>1</sup>	Minimum Lot Size (m2) <sup>2</sup>	Available Lots / Number of Households	Number of People <sup>3</sup>	Population Density (people per residential hectare)	Population Density (people per residential acre)
<b>Residential Special (RS)<sup>4</sup></b>								
	1	75	57	900	628	1,696	30.0	12.1
	2	42	32	900	351	949	30.0	12.1
	3	10	7	900	80	216	30.0	12.1
	4	30	22	900	249	673	30.0	12.1
	5	25	19	900	210	567	30.0	12.1
	6	24	18	900	199	538	30.0	12.1
<b>Commercial (COM)</b>								
	7	5	4	600	N/A	N/A	N/A	N/A
<b>TOTAL</b>		<b>211</b>	<b>158</b>		<b>1,718</b>	<b>4,638</b>		

1.) Assuming that up to 25% in a conventional residential subdivision are taken up by road right-of-ways.  
 2.) Schedule C, Town of Happy Valley - Goose Bay Development Regulations - 2008 - 2018; same lot size as in Kelland Drive Subdivision  
 3.) Assuming average household size of 2.7 (Statscan 2006 Community Profile)  
 4.) Same lot size as in Kelland Drive Subdivision

<b>CONCEPT 2</b>	<b>Area ID</b>	<b>Gross Area (ha)</b>	<b>Net Area (ha)<sup>1</sup></b>	<b>Minimum Lot Size (m2)<sup>2</sup></b>	<b>Available Lots / Number of Households</b>	<b>Number of People<sup>3</sup></b>	<b>Population Density (people per residential hectare)</b>	<b>Population Density (people per residential acre)</b>
<b>Residential Low Density (RLD)<sup>4</sup></b>								
	2	42	32	650	486	1,313	41.5	16.8
	4	30	22	650	345	931	41.5	16.8
	6	24	18	650	276	745	41.5	16.8
<b>Mixed Development (MD)<sup>5</sup></b>								
	3	10	7	600	237	641	89.0	36.0
	5	25	19	600	623	1,682	89.0	36.0
<b>Commercial (COM)</b>								
	7	5	4	600	N/A	N/A	N/A	N/A
	8	10	8	600	N/A	N/A	N/A	N/A
<b>Industrial - Commercial (IC)</b>								
	1	65	49	600	N/A	N/A	N/A	N/A
<b>TOTAL</b>		<b>211</b>	<b>158</b>		<b>1,968</b>	<b>5,313</b>		

- 1.) Assuming that up to 25% in a conventional residential subdivision are taken up by road right-of-ways.
- 2.) Schedule C, Town of Happy Valley - Goose Bay Development Regulations - 2008 - 2018
- 3.) Assuming average household size of 2.7 (Statscan 2006 Community Profile)
- 4.) Smaller lot sizes than in Kelland Drive Subdivision
- 5.) Number of people is based on estimated suburban mid-density of 36ppa

APPENDIX D

# Draft Municipal Plan and Regulations Amendment



**Town of**  
**Happy Valley-Goose Bay**  
**Municipal Plan Amendment**  
**No. 2, 2012**

**Prepared for the**  
**Town of**  
**Happy Valley-Goose Bay**

**by**  
**CBCL Limited**  
**March, 2012**

# Town of Happy Valley-Goose Bay Municipal Plan Amendment No. 2, 2012

## Introduction

The Town of Happy Valley-Goose Bay, incorporated in 1973, adopted a Municipal Plan and Development Regulations in 2008. The Town now wishes to amend the Municipal Plan, and this report has been prepared to explain the proposed changes, and to serve as a basis for consideration by the general public before they are approved by Council and submitted to the Minister of Municipal and Provincial Affairs for registration.

## Background

The Town of Happy Valley-Goose Bay is experiencing a period of growth and development unheard of since the construction of 5 Wing Goose Bay. As the employment, housing and service centre for Central and Coastal Labrador, the Town finds itself at the centre of a number of significant industrial development projects that have the potential to put increasing pressures on the Town for additional services, recreational facilities, and housing. Projects such as the development of the Lower Churchill Hydroelectric project and associated transmission line, expansion of the IOC mine in Labrador City, ongoing mineral exploration, as well as continued improvements to the Trans Labrador Highway are opening up new opportunities for business growth, investment and development. Continued demand for housing in the Town has resulted in a need to identify new areas for future residential and commercial growth.

An area of 600 hectares has been identified by the Town as having potential to accommodate growth of the Town. The land in question is located just north of Kelland Drive and the limits of currently planned residential developments. This area stretches from Corte Real Road in the east to the boundary of the 5 Wing Goose Bay tank farm in the west.

Council commissioned a land suitability assessment on this area to determine the extent of development that could potentially occur. This study assessed topography, wetlands, groundwater and in particular the depth of the water table, archaeological resources and potential contamination, in addition to evaluating the current zoning and ownership of the land, existing services, access, and the natural environment. It was determined that 35% or 211ha of the total site was suitable for development. Concept plans were then created based on the land suitability.

The Report prepared is attached as Appendix A.

## Proposed Amendment

Following the results of the *Land Suitability Assessment and Design Concepts* report, Council proposes to amend the Municipal Plan by redesignating the land uses on the area north of Kelland Drive to accommodate future growth in the Town. A corresponding Development Regulations Amendment will rezone these areas to the appropriate land use zone.



## Amendment No. 2, 2012

The Happy Valley-Goose Bay Municipal Plan is amended by:

1. The addition of the following policy to **Section 2 General Goals and Development Policies**:

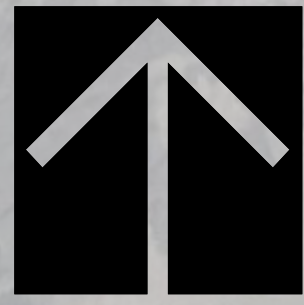
### **2.20 Urban Expansion North of Kelland Drive.**

The area north of Kelland Drive between the former tank farm and Corte Real Road has been identified as an area that can accommodate future development. A plan has been prepared for this area and lands suitable for development identified.

- Within areas identified for residential development, the intent of the Plan is to permit single dwelling residential development as the primary residential form.
- In areas designated Mixed Development, it is envisaged that mixed use residential development and complementary commercial uses could be accommodated.
- Commercial development is envisaged at the corner of a future extension to Kelland Drive and Corte Real Road.
- Areas designated Environmental Protection include wetlands identified as part of the land use assessment. Environmental policies of the Plan apply to these areas.
- Lands designated Rural are areas where lands are suitable for development, but a shallow water table poses a constraint to servicing. Should technologies or solutions to dealing with the depth of the water table become available, these areas could be considered for future urban development provided the land is redesignated and rezoned to accommodate proposed residential or commercial uses.
- The area to the west, is designated Comprehensive Development Area and is intended to be developed over the long term for either commercial uses and light industrial uses, or potentially for additional housing development depending on demand and land use needs. A comprehensive development plan and corresponding rezoning amendment will be required prior to development.

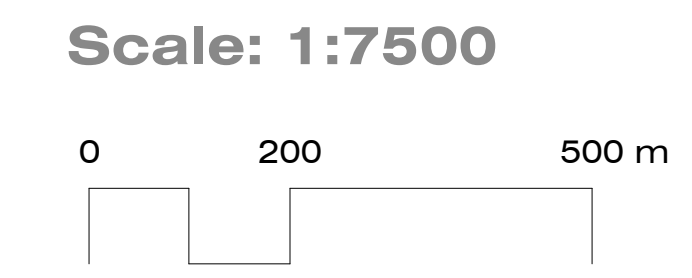
In areas that have been identified for development, further assessment and verification of the depth of the water table must be carried out prior to development approval.

2. Redesignating the lands north of Kelland Drive as shown on the attached Schedule A - Town of Happy Valley-Goose Bay Municipal Plan Amendment No. 2, 2012.



Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
 ASSESSMENT AND  
 CONCEPT PLAN**

Map X  
 Proposed Future Land  
 Use Map



Project: 113078  
 Date: June 2012



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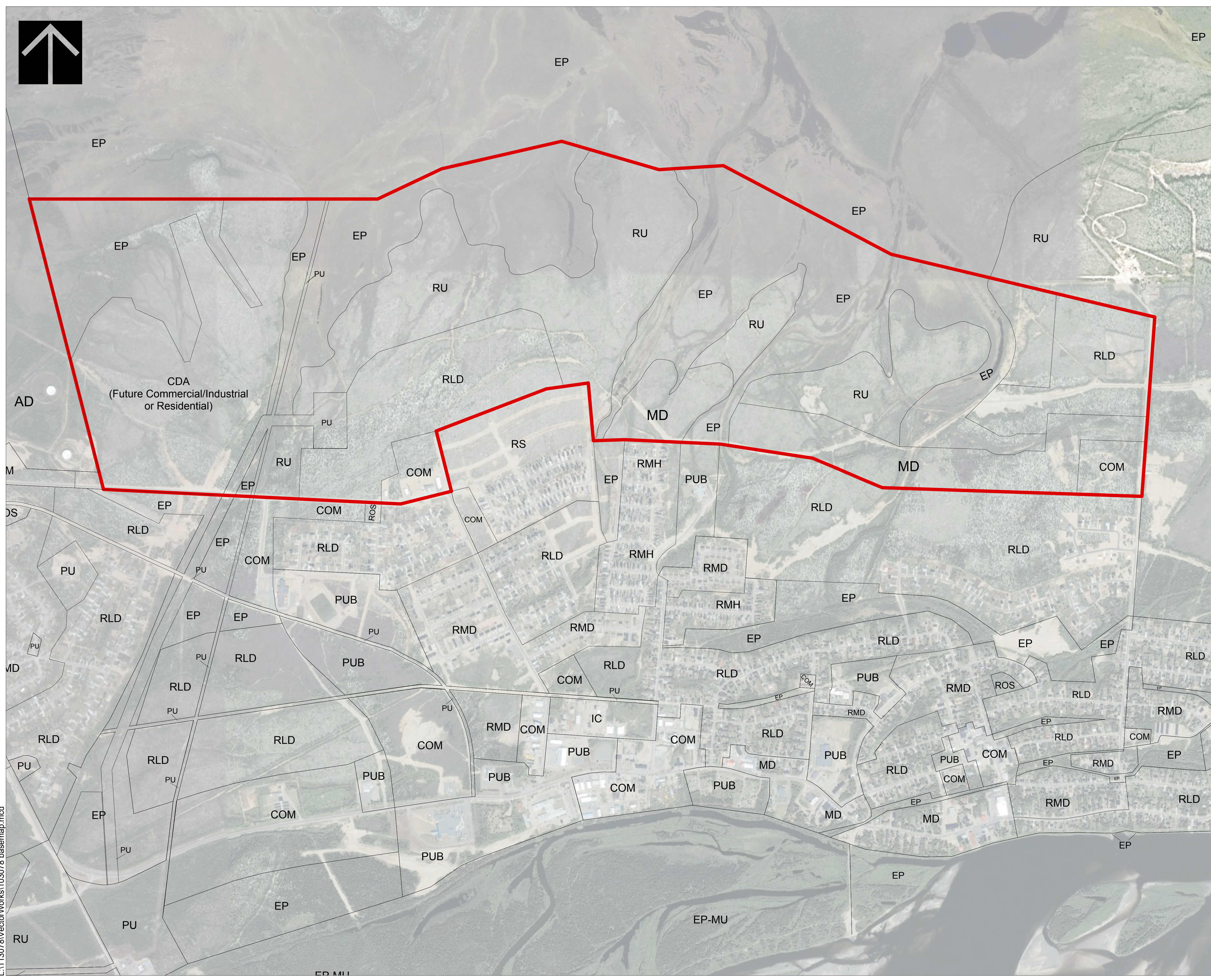
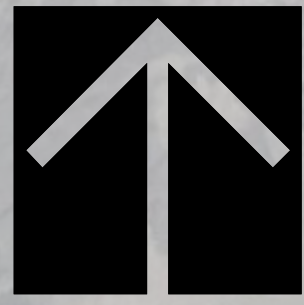
**Town of  
Happy Valley-Goose Bay  
Land Use Zoning, Subdivision and Advertisement  
Regulations (Development Regulations)  
Amendment No. 3, 2012**

**Prepared for the**

**Town of  
Happy Valley-Goose Bay**

**by**

**CBCL Limited  
March, 2012**

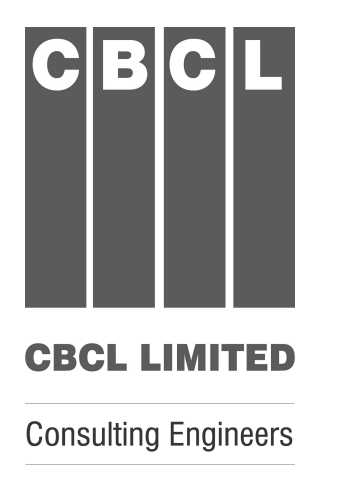


Town of Happy Valley - Goose Bay  
**LAND SUITABILITY  
 ASSESSMENT AND  
 CONCEPT PLAN**

Map X  
 Proposed Land Use  
 Zoning Map

Scale: 1:7500  
 0 200 500 m

Project: 113078  
 Date: June 2012



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## **SCHEDULE A**

### **Purpose**

The purpose of the proposed Development Regulations amendment is to rezone lands north of Kelland Drive between the former tank farm and Corte Real Road for future urban development.

### **Amendment No. 3**

The Town of Happy Valley-Goose Bay Development Regulations 2008-2018 are amended by:

1. Rezoning the area north of Kelland Drive between Corte Real Road and the former DND tank farm as shown on the map attached as Schedule A.



APPENDIX E

# Stage I Heritage Resource Impact Assessment





# Stage I Heritage Resource Impact Assessment

---

## Final Overview Report

Conducted on Behalf of CBCL for the Town of Happy Valley-Goose Bay

Scott W Neilsen

June 6, 2012

Archaeological Permit 11.40

## SUMMARY

This report details the results of the Stage I Heritage Resource Assessment undertaken as part the land suitability assessment being conducted by CBCL Ltd., on behalf of the Town of Happy Valley – Goose Bay, Labrador. This Stage I assessment was undertaken by Scott Neilsen, under archaeological permit number 11.40; and, is subject to the terms and conditions outlined in that permit as well as the Heritage Resource Impact Assessment guidelines for the Province of Newfoundland and Labrador.

The primary goal of the Stage I assessment for this project is to assess the potential of the Study Area to contain significant heritage resources, and to make recommendations on how to avoid impacts to said resources. The tasks undertaken in pursuit of these goals included: review of site record forms and previous studies from within the region and study area; discussions with Innu Nation and the Labrador Historical Society regarding the known uses of the region and the potential for cultural resources within the study area; review of satellite imagery, aerial photography, historical and modern mapping of the study area; publication review (e.g. web sites, journal articles and books); and fieldwork.

The scope and general focus of the data review and discussions were broad and focused on the Goose Bay peninsula as a whole, while the fieldwork was more project and site-specific. The spaces surveyed were identified by CBCL Ltd. as the most suitable locations for development and they requested that the allotted fieldwork time focus there. As a result of this fieldwork, certain spaces within the Study Area were identified as low potential, while other locations were judged to have elevated potential (Figure 2). All the areas judged to have low potential were accessed on foot. Some of the areas judged to have elevated potential were also accessed on foot, while others were identified through data review only (i.e. documents, maps and images). It would be possible to further refine, i.e. limit, the elevated potential areas if all parts of the Study Area were accessed on foot.

In addition to aiding in the delineation of low and elevated potential areas the data review also resulted in the identification of known heritage resources within the Study Area. The mitigative measures recommended are designed to limit impacts to these known resources and reduce the possibility of encountering unknown resources within the identified elevated potential areas. If these measures are followed it is unlikely that significant heritage resources will be impacted by development of the Study Area.

## Introduction

As a result of the on-going resource and infrastructure development in central Labrador, the community of Happy Valley-Goose Bay (HVGB) is undergoing a period of growth. With this, the community has identified a need for additional land, to accommodate future residential development. As a first step in this process HVGB has contracted CBCL to undertake a Residential Land Suitability Assessment on a 600 hectare parcel of land immediately north of Kelland Drive, and bounded by Corte Real Road in the east and existing developments along Hamilton River Road in the West (see figure 1). As part of the suitability assessment HVGB has requested that CBCL include a heritage component in their study. CBCL does not possess the skills to meet this request in-house, so they have sub-contracted the author of this report (i.e. Scott Neilsen, MA) to complete a Stage I Heritage Resource Impact Assessment (HRIA) for the Study Area.

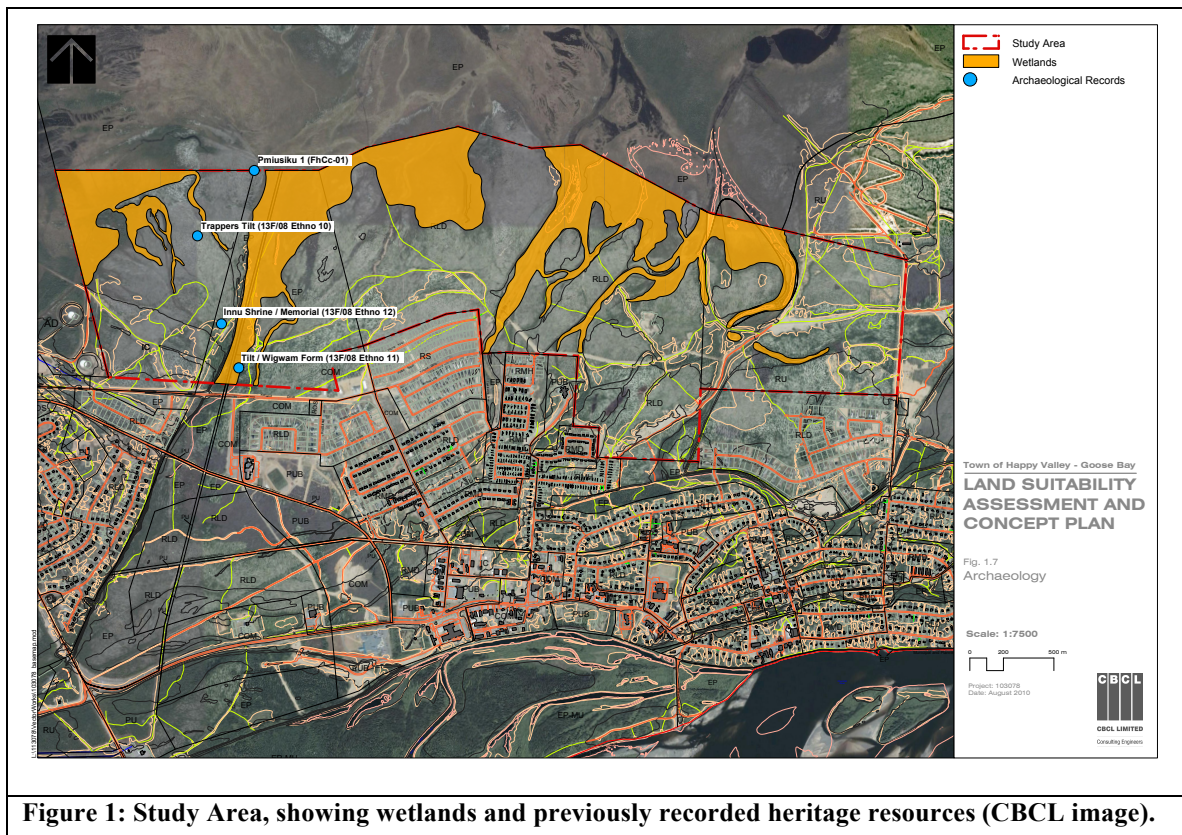


Figure 1: Study Area, showing wetlands and previously recorded heritage resources (CBCL image).

The purpose of the HRIA, as requested by CBCL and HVGB, is to identify known heritage resources, as well as locations of elevated archaeological potential within the developable portions of the Study Area (see figure 2), so that this information may be considered during the planning stage of future developments. This is a proactive approach to heritage resource management, which will limit the likelihood of unexpected surprises and potential construction delays down the road. HVGB should be commended for such an approach.



**Figure 2: Study Area, with wetlands in orange. Areas marked with red balloons were indicated by CBCL to be unlikely for development and were not included in the pedestrian survey. Areas marked by yellow balloons were indicated as likely for development by CBCL and included in the pedestrian survey (CBCL image).**

This report details the methods, outcomes and recommendations employed during, and resulting from the HRIA conducted under archaeological permit 11.40. If the recommendations included in this report are implemented properly it is unlikely that future developments in the Study Area will have an adverse impact on heritage resources.

## Methodology

HRIAs in the province of Newfoundland and Labrador (NL) are regulated by the Minister of Tourism, Culture and Recreation, through the Provincial Archaeologist and her support staff in the PAO. Under permit from the minister, it is the responsibility of the consulting archaeologist to adhere to the NL regulations while addressing the client/proponents project specific goals and needs. Because all projects are different to some degree, not all HRIAs employ the same methods. Having said this, the overall outcome of HRIAs must be the same. As outlined in the regulations, a Stage I HRIA is an “overview assessment”, and must “identify and assess Historic Resources potential or sensitivity within the study area, and recommend the appropriate methodology and scope for detailed impact assessment studies in Stage 2” (Government of Newfoundland and Labrador 2010).

For the CBCL Land Suitability Assessment, being undertaken for the town of HVGB the Stage 1 HRIA included:

- **A Document Search** to identify site record forms (SRFs), reports, articles, and any other documents related to heritage resources within the Study Area; as well as maps, satellite imagery (Google Earth) and aerial photographs of the region.
- **Direct Consultation** with local organizations and knowledgeable community members to determine if any known, but unrecorded, or suspected heritage resources are present within the Study Area; and to see if there are any concerns for heritage resources stemming from potential development in the Study Area.
- **Preliminary Field Reconnaissance** (pedestrian survey) of known sites within the Study Area, as well as areas identified by CBCL as likely for development (refer to Figure 2). Areas identified by CBCL as unlikely for development were noted and assessed when encountered, and as time allowed.

- **Overview Report** (this document) contains the results of the three tasks defined above, including: figures and descriptions of known heritage resources and areas of elevated heritage resource potential within the study area; a list of the potential impacts of development on heritage resources in the region; and recommendations on how to mitigate these potential impacts.

The results and recommendations of this Stage I HRIA will be considered in CBCLs suitability assessment, and therefore the future development plans of HVGB. The primary purpose of the study is to identify locations of developable land that have a low potential for the presence of heritage resources, and outline the steps required in the event development is planned outside the low potential areas, in locations where known sites and/or elevated potential for the presence of heritage resources exists.

## **Results**

This section of the Overview Report details the results of the three primary tasks outlined above, and the recommendations that have grown out of this work. Please note that the results and recommendations are a direct product of the scope of work required by the client; and that the scope of work necessitated some of the broader mitigation measures recommended at the end of this report. For example, it is not possible to accurately judge the potential of locations within the Study Area that were not accessed due to time constraints and the fact that they were identified as unlikely for development by CBCL.

### ***Document Search***

As a result of HRIAs associated with the Trans Labrador Highway (IELP 2002), the Lower Churchill Project (LCP) (JWEL 2000, 2001), and other smaller projects (e.g. Erwin 2005; Penney 2008; Neilsen 2006; Schwarz 1997, 1998) the documentary history of the Lake Melville Region is well known. Archival sources, and unpublished and published reports and articles have been mined and summarized in detail in the reports referenced above, and the reader is referred to those sources for detailed overviews of the regions history.

To summarize it here, Aboriginal people have inhabited the Lake Melville region for at least the past 4000 years, and likely longer. Although there may have been individuals/families who resided in the region on a more permanent basis, the region was probably inhabited as part of the seasonal mobility strategy followed by the Aboriginal communities. The first Europeans to inhabit the region were traders who came to access interior furs through the local aboriginal population(s). Over time, men left the employ of the trading companies to establish families, and homesteads. At first, their homesteads were spread around the lake, but eventually came to focus in the small communities of North West River, Rigolet and Mud Lake.

Although HVGB did not exist at this time, the peninsula on which it is situated figured into the seasonal rounds of the Aboriginal people and settlers, who use to fish, pick berries, trap, and hunt across and along the peninsula and over the land backing it. In the 1940s, with construction of the Military Base in Goose Bay, people began to move into the upper Lake Melville area to seek work. First, they settled in the Terrington Basin/Otter Creek area, but were later resettled to islands in the Churchill River and then the Goose Bay peninsula and what is today referred to as Happy Valley, or simply “the Valley”. As control of the base transferred from the Americans to Canada, settlement expanded from the valley to locations bordering CFB Goose Bay. By the end of the 1980s HVGB had developed into the service centre for central Labrador, and to some degree the north Labrador coast.

Focusing on the project study area and adjacent locations, a review of site record forms from the NL PAO identified eleven known heritage sites on the Goose Bay peninsula: six archaeology sites and five ethnographic sites (refer to Table 1 and Figure 3).



Figure 3: Study Area with known Archaeology and Ethnographic sites, Goose Bay peninsula (google earth image).



Site Number	Within Study Area	Description
FhCc-01	Yes	Ancient campsite with at least three loci. Testing and excavation here recovered red, pink and tan quartzite debitage and two chert endscrapers. Date not know, but assumed to be within the early portion of the Intermediate period (based solely on lithic assemblage, endscraper style and and site elevation).
FhCb-02	No	Spot find. Single specimen of schist recovered from a test pit, with evidence of battering along one edge. Resembles a stone axe. Date unknown; based solely on site elevation (10m asl) it could date to the Early period, or more recently.
FhCb-03	No	Ancient campsite. Quartzite debitage and a biface fragment recovered from two separate test pits. Date not known, but assumed to be approximately 2800 BP, within the Intermediate period (based on lithic assemblage, site elevation, and proximity to radio carbon dated site FhCb-04).
FhCb-04	No	Ancient campsite. Chert and quartzite debitage and tools recovered in association with a cooking feature. Feature radiocarbon dated to 2810+/-70 BP, within the Intermediate period. Items recovered through excavation and shovel testing. Potential for additional loci nearby.
FhCb-05	No	Possible ancient campsite. Single specimen of red quartzite debitage recovered in association with heated cobbles (which were left in place). Date not known, but assumed to date to approximately 2800 BP; based on proximity to FhCb-04, site elevation and to a lesser degree the presence of red quartzite.
FhCb-06	No	Spot find. Two quartzite flakes recovered from test pits along a former watercourse. Date not known; based solely on site elevation (10-12m asl) it could date to the late Intermediate period or more recently
13F/8ethno-10	Yes	Remains of a cabin/tilt. Appears to have burnt. Surface remains include: barrel stove; brick, ceramic and glass fragments; household garbage; and, burnt structural remains.
13F/8ethno-11	Yes	Tilt/tent frame. Constructed from 5 interlocking courses of logs. Frames such as this were used as “foundations” for canvas tents, which would form the walls and roof of the structure.
13F/8ethno-12	Yes	Innu Shrine/memorial. Consists of a small wooden plaque, votive candles, rosaries, and a small circle of cobbles placed in and at the base of a silver birch.
13F/8ethno-13	No	Wooden platform. Possible tent foundation constructed from 2x4 flooring. Associated with tin cans, firewood and glass fragments.
13F/8ethno-14	No	Tent site. Stove and chimney parts associated with beer cans, and burnt 2x4s, a car seat and a mattress.
BL-1	No	Innu birth site. Location where an Innut gave birth in ???; mapped during the Innu land use studies for the LCP.

Interestingly, these sites may span a period from modern day to just over 3000 years ago. And, recognizing that the peninsula was not inhabitable much before the presumed age of the earliest known site in the database, it seems likely that these sites span the breadth of human occupation on the peninsula. The earliest site, FhCc-01, is located at the northern boundary of the study area (refer to Figure 1 and 3). It was discovered as part of the LCP heritage assessment (JWEL 2001), and later partially excavated by Neilsen (2006), for my Master's research. This site is located on the 23 m asl terrace, and was estimated, based on site elevation and lithic assemblage characteristics, to be approximately 3000 to 3300 years old. The site was revisited in 2008 by Gerald Penney, as part of a Stage I HRIA for a housing development along Kelland Drive (Penney 2008). Despite this previous work, it remains a fact that only a small portion of this site and the surrounding area has been investigated in any detail; therefore, the vicinity requires mitigation in advance of any development (refer to Recommendations section).

Three of the archaeology sites (FhCb-03, 04, and 05) are located in proximity to one another; on a 17m asl terrace a few kilometers north-east of the study area (refer to Figure 3). Like FhCc-01, these sites are located in proximity to a former waterway. They are not within the study area for this HRIA, but they do speak to the increased potential for heritage resources at this elevation, particularly in association with terraces and former hydrological features. One of these sites was excavated as part of my Master's research (Neilsen 2006). Charcoal associated with a pit, stones and artifacts was collected and radiocarbon dated to 2810 $\pm$ 70 BP (Beta-19378).

Much of the study area for this HRIA is elevated at a similar elevation to the sites mentioned above, and there is potential for archaeological resources of similar form and antiquity within portions of the study area (refer to the Preliminary Field Reconnaissance section). Due to the fact that archaeology sites FhCb-03, 04 and 05 are well outside the study area, there is no potential that development related activities undertaken with the study area will impact these sites; therefore, no mitigation is required at this time. Having said this, if development is ever proposed for the area surrounding these sites mitigation will be required.

The remaining two archaeology sites, FhCb-02 and 06 are located at lower elevations than FhCc-01 and FhCb-03, 04 and 05 (refer to Figure 3). Based on their elevation between 12 and 10 m asl it is unlikely that they date to the same time frame as the archaeology sites previously discussed, as the land on which they are situated would have been underwater at the time the other sites were inhabited. Although it is strictly an assumption, and based solely on their elevation, it seems that these sites must date to the Late or Historic period. Both of these sites were found through shovel testing programs, focused on former shoreline features (i.e. areas that were once associated with waterways); and therefore, reinforce the potential for the presence of archaeological resources in association with ancient terraces and shoreline features, as was mentioned in the discussion of sites FhCc-01 and FhCb-03, 04 and 05. The sites themselves however are well outside the study area for this HRIA, and will not be impacted by development within it; therefore, no mitigation is required at this time. Having said this, collections from these sites – although meager – demonstrate that the peninsula continued to be used by Amerindians following the Intermediate period (and on into the Historic period (JWEL 2001)), and speaks to the potential for archaeology sites at lower elevations elsewhere in the region.

The ethnographic sites recorded on the peninsula, 13F/8ethno10, 11, 12, 13, and 14 are evidence of more recent inhabitation of the region (refer to Figure 3). Exact dates of these resources are difficult to pin down; however, based on the documentary history of the region and the reported/observed remains it seems likely they post-date arrival of the military presence in the 1940s. Unlike the archaeology sites, these resources do not appear to be associated with any specific landforms, such as ancient watercourses. Two of the sites, 13F/8ethno13 and 14 are outside the study area and will not be impacted by development activities within it. Furthermore, based on the description of these sites they seem like they may be modern day gathering or party spots, that likely would not require mitigation even if they were to be impacted by development activities. The remaining three ethnographic sites - 13F/8ethno10, 11 and 12 - are located in the western portion of the HRIA study area. Like FhCc-01, they are outside the area that was indicated as likely for development (refer to Figure 2). Based on their recorded descriptions, it appears as

though 13F/8ethno10 and 11 are former tilt sites that relate to modern (post-1940s) use of the peninsula by residents of “the valley” for trapping, hunting and gathering purposes. In the overall history of the peninsula these sites may not be that significant; however, they do date to a period of transition in the history of the peninsula that has not been deeply studied. For this reason, while recognizing that it may not be important to preserve these site locations per say, it would be prudent to learn as much about the locations as possible. For this reason some mitigation may be warranted (see Recommendations section). Site 13F/8ethno12 is a shrine of sorts. In some aspects it is similar to shrines along the highway between HVGB and North West River, which were created by Innu to commemorate the passing of specific individuals. Although more recent (post-1980s), if this site is a shrine for a deceased individual it may be considered more significant (by some) than any of the other ethnographic sites, and perhaps even the archaeology sites. Due to this assumed significance, site-specific mitigation has been designed for this resource and is detailed in the Recommendations section of this report.

In addition to the heritage resources recorded in the PAO site database, the document search undertaken identified an additional site located on the Goose Bay peninsula. This site (BL-1 in table 1) is a known Innu birth site. It was mapped in reports produced and submitted to the LCP federal/provincial review panel, and the reader is referred there to view its exact location (Armitage 2010). The site is not located within the study area, and surprisingly it was the only contemporary Innu land use site identified on the peninsula within the report. Furthermore, according to the web site [www.innuplaces.ca](http://www.innuplaces.ca), there are no known Innu place names associated with the study area or the peninsula proper. This leaves the impression that the peninsula has not figured significantly within contemporary land use practices of the Innu. This of course does not preclude the possibility that the peninsula was utilized historically.

Beyond the sources referenced above, topographic maps and satellite images of the study area were also reviewed. This was done to identify landscape features that are considered to hold elevated potential for the presence of heritage resources, so that they may be confirmed during the field assessment portion of the HRIA; and to familiarize myself

with the layout of the study area and the land surrounding it. This review indicated that ancient watercourse features, i.e. channels and shorelines, are present within the study area (many of these are wetlands today, refer to Figure 1 and 2). Some are located within the areas that CBCL identified as unlikely for development, while others are not. These later locations are discussed in the Preliminary Field Reconnaissance section below.

In summary, the document search identified known heritage resources (archaeology and ethnographic sites) as well as landscape features that have an elevated potential for the presence of unknown heritage resources within the study area. These resources and locations are considered further in the Preliminary Reconnaissance and Recommendations sections of this report.

### ***Direct Consultation***

In order to gauge whether or not there is potential for significant heritage resources within the study area a meeting was held with Mr. Richard Nuna, Director of Environment for the Innu Nation. Mr. Nuna was aware of the HRIA for the land suitability assessment being conducted by CBCL (as he had received a copy of the permit application from the author), as well as the potential for significant archaeological resources on the peninsula indicated by previous assessments undertaken in the region. At our meeting in October 2011 I was specifically interested to learn if he had any additional knowledge on the birth location identified by Armitage in 2010 and the Innu shrine identified by Penney in 2008. Also, I thought he might have information on travel routes across the peninsula, if any existed.

In our meeting Mr. Nuna indicated he was glad to have some information on the towns planned expansion, but informed me he did not have any details on the shrine or the birth site. Mr. Nuna also said he was not aware of any travel routes across the peninsula, and indicated that anyone leaving the Sheshatshiu area by boat was likely to travel across the open water to head up the Churchill River, rather than to paddle into Terrington Basin and portage the distance across the peninsula. He did mention that there were snowmobile routes across the peninsula, and felt that if there were older travel routes that

the snowmobile trails might follow these (this conclusion was backed up by a discussion with Beatrice Dickers, a long-term resident of “the valley” who’s family moved here when the military base opened in the 1940s; she indicated that she thought the current snowmobile trail followed an older trail across the peninsula). Mr. Nuna assumed that the Innu probably did gather berries on the peninsula at one time and that they may have also used the area for trapping occasionally, but that he did not think this had occurred much since the base arrived and HVGB became the community that it is today. He did not have any specific concerns for the proposed developments on the peninsula, as long as measures were put in place to mitigate impacts to the known archaeology sites, and any other resources that may be identified during the HRIA.

No other direct consultations were undertaken for the stage I HRIA. It was indicated by CBCL that a community consultation would be undertaken in advance of the development, and this will likely be the best place to learn if the HVGB community has any heritage concerns associated with potential development in the study area (see the Recommendations section for specific comments related to the community consultation and the two known ethnographic sites in vicinity of FhCc-01). Given what has been identified by the document review, the author’s knowledge of the area and discussions with Mr. Nuna it seems unlikely that any significant concerns, beyond those already recorded, will be identified.

### ***Preliminary Field Reconnaissance***

This portion of the Stage I HRIA included a pedestrian survey of as much of the locations identified by CBCL as likely for development as could be undertaken in the time allotted (refer to Figure 4). This task was facilitated by the use of a polygon (shapefile) provided by CBCL and uploaded in the authors GPS. This simple step meant that it was possible at all times to tell exactly where one was in relation to the study area features and boundary. This maximized time by ensuring that effort was not spent outside the study area boundary or within the locations identified as unlikely for development.



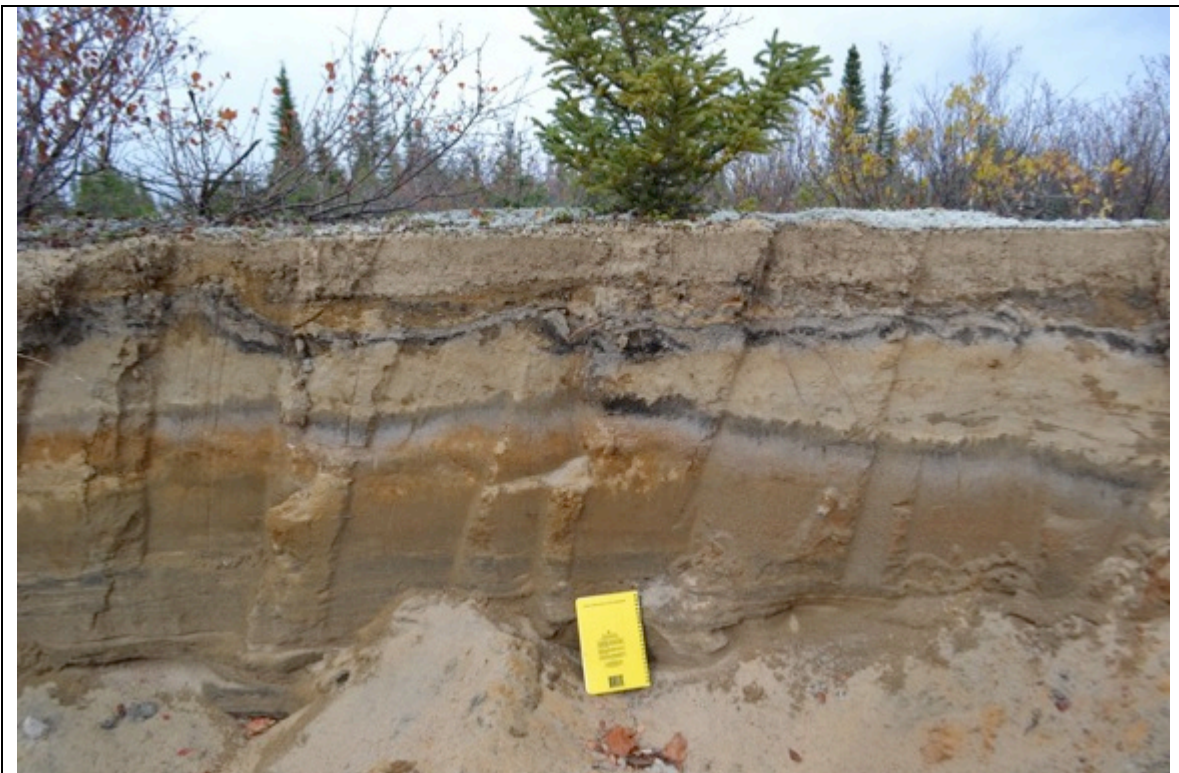
**Figure 4: Survey results. Black lines indicate survey tracks; yellow tinge indicates areas of elevated potential; green tinge indicates areas of low potential; and blue pins identify locations of interest marked during survey (google earth image).**

During the survey, the tracking function of the GPS was used to record all movements, and to mark locations that were of interest. Although some modern activity areas were encountered, no new archaeological or ethnographic sites were recorded. However, areas exhibiting elevated potential for the presence of unknown resources were identified, within locations recognized as likely for development (refer to Figure 4). These locations, along with the previously recorded heritage resources will require mitigation in the event development is to occur within their vicinity (refer to Recommendations section).

As stated, survey efforts focused on the areas identified by CBCL as likely for development. Looking at Figure 2, you can see that this included three primary locations (as indicated by the yellow balloons). The first area investigated is furthest to the west; it is bounded to the west and east by a large wetland that passes north-south through the entire study area and along the northern border for about  $\frac{3}{4}$  of its length, and to the south by a housing development, businesses and Kelland Drive. Vegetation in the area was a mixture of young, open forest in the southern portion, and open shrub vegetation and tree stumps in the north (refer to Figure 5). Prior to being cut, it appears as though much of the northern area was burnt-over. Soil throughout the location, except within the wetlands, consists of a thin sod layer, overlying sand and in some locations, paleosols (refer to Figure 6).



**Figure 5: showing vegetation, topography and disturbance within the low potential area of the first survey location.**



**Figure 6: showing soil profile near border between low potential and elevated potential areas in survey location 1 (this profile was already present when the area was surveyed).**



Within the southern portion of this survey location there was lots of evidence of human activity, including: roads, trails, disturbance, activity areas and garbage. All of this activity post dates the 1980s and for the most part appears to be even more recent. As Penney predicted in his 2008 report, expansion of the housing developments off Kelland Drive has increased human activity in the area. With exception of the dumping of landscape and household garbage, the vast majority of the ground disturbing activity appears to be associated with motorized vehicles and four-wheeling. Other evidence of human activity includes “campsites” associated with “parties” (although evidence of human activity, these resources do not meet the intention of an ethnographic designation, and they were not recorded).

As can be seen in Figure 4, survey activity focused on the southern portion of the survey location; and for the most part the area was found to exhibit low potential for the presence of heritage resources. The topography is mainly flat and undifferentiated, and does not exhibit characteristics commonly associated with heritage resources on the Goose Bay peninsula. Furthermore, given the amount of disturbed area, if significant heritage resources were present it is likely some indication would have been seen during the pedestrian survey. There are however, two primary exceptions. First, the wetlands passing north-south through the study area and bounding the survey location at the western and eastern limits; these are actually former watercourses. The banks former banks are prominent and for the most part undisturbed (refer to Figure 7 and 8). Given what was learned during the document review, i.e. the tendency for archaeological resources to be associated with former watercourses on the peninsula, these features are considered to have an elevated potential for the presence of heritage resources. Second, another ancient watercourse, somewhat smaller than the ones bounding the survey location, was identified near the centre of this survey location, where the vegetation transitions from open forest to shrub-land. Two branches of this former watercourse come together here and extend northward throughout the study area. The vicinity of this former watercourse also has an elevated potential for the presence of heritage resources. All three of these areas will require mitigation if development is to proceed here (refer to Recommendations section for details).



**Figure 7: Former watercourse/modern wetland in southwest corner of the first survey location (labeled relic brook on Figure 4). Adjacent locations (former banks) have an elevated potential for heritage resources.**



**Figure 8: Former watercourse/modern wetland-trail. This feature is the eastern boundary of the first survey location. Labeled as relicbrook2 in Figure 4, and indicated as wetland in Figure 1 and 2.**

The second survey location, also marked by a yellow balloon in Figure 2, juts out of the southern portion of the Study area, and is bounded to the north by wetland and existing development to the west, south and east. Similar to the southern portion of the first survey location, this survey location has been impacted by modern activities, including trails, dumping, fire, and partying; as well as vegetation removal and excavation of a large drainage ditch passing west-east through the centre of the location (refer to Figure 9). Where it remains, vegetation in this survey location is a mixture of young-open forest and open-shurb area. There is some evidence of forest fire and cutting here as well. With the exception of the south-east corner of the survey location the topography is similar to the first survey location - relatively flat and undifferentiated.

The south-east corner, where the study area borders on the “Johnny Hill” is the exception. Here, there is a significant rise in the topography, similar to the difference between the terrace association with FhCc-01 and the study area to the east of it. This is a large terrace area, and former prominent shoreline, that most likely was once the eastern boundary of a large watercourse, or an islanded area within the mouth of a significant watercourse (refer to Figure 10). Of all the locations observed within the study area this location is the highest potential. Unfortunately some of the area has been impacted by the existing and on-going housing developments in the vicinity. The intact portions are within the south-west corner of this survey location, and extend eastward into the southern portion of third survey location. If development is to occur here mitigation will certainly be required (refer to Recommendations section). As with the first locations, pedestrian survey did not extend into the northern portion of the study area. This area was identified by CBCL as wetland and unlikely to be developed. If development is to occur here mitigation will be required (refer to Recommendations section).



**Figure 9: Area of disturbance in survey location 2.**



**Figure 10: Ancient shoreline, terrace and associated trail in southeast corner of survey location 2, just north of the current Johnny Hill housing developments (indicated as relicshore in Figure 4).**

The third survey location is situated in the eastern extend of the study area, bounded by “Johnny Hill” to the south, and Corte Real Road to the east. As can be seen in Figure 4, the majority of this survey location was judged to be low potential. Much of the area has been disturbed and with the exception of the former shoreline that extends into the location from the west (as discussed above, and visible in Figure 4) the terrain does not include any features that would lead one to believe it has an elevated potential for the presence of significant heritage resources. This entire survey location was accessed during the pedestrian survey. There are trails and roads throughout, and large areas where the A horizon has been stripped (refer to Figure 11). Signs of human activity in the location include party sites (one was a lean 2), dumping of household and construction garbage, and four-wheeling/ATV riding.



**Figure 11: Disturbance in survey location 3.**

To summarize the results of the pedestrian survey, no significant heritage resources were identified in the portion of the study area accessed. The locations that were accessed were primarily low potential; however, there were areas within the survey locations associated with ancient watercourse features such as shorelines and terraces. The land associated with these features was judged to have elevated potential for the recovery of as yet unknown heritage resources; and mitigation will be required in these areas if development is to occur. The required mitigation is detailed in the following Recommendations section.

## Recommendations

This section of the Overview Report details the recommendations that have come out of the tasks undertaken during the stage I HRIA, for the land suitability assessment being undertaken by CBCL on behalf of HVGB. Although known heritage resources, and areas judged to exhibit an elevated potential for the presence of yet unknown heritage resources have been identified within the study area, it is unlikely that development related activities will have an adverse impact on significant heritage resources if the following recommendations are implemented in full.

- As stated, it was not possible to conduct a pedestrian survey of the entire study area in the time allotted. Therefore, it was not possible to judge the potential of the entire study area. Due to the presence of ancient watercourses and shorelines within the un-surveyed portion of the study area, and the possibility of encountering heritage resources associated with these features, the entire un-surveyed portion of the study area has been indicated as having an elevated potential for the recovery of significant heritage resources (refer to Figure 4). No ground disturbing activities can occur in this area without further assessment.
- If a pedestrian survey were undertaken in the un-surveyed portions of the study area it is very likely that the elevated potential areas indicated in Figure 4 would be reduced significantly. Having said this, there is no doubt that extensive shovel testing would be required in vicinity of FhCc-01, as well as any ancient shorelines in advance of any ground disturbing activities.
- The significance of the shrine, recorded as 13F/8ethno12, is not known at this time. Efforts should be made at the public consultation session to determine what the significance of this site is, and whether or not the community believes it requires protection.
- Although the site itself does not seem significant, similar efforts should be made at the public consultation session to collect information related to ethnographic site 13F/8ethno10 and historic land use on the Goose Bay peninsula.
- The ancient shorelines associated with the modern wetlands in the first and second survey locations, which were observed during the pedestrian survey and mapped in Figure 4, exhibit an elevated potential for the recovery of heritage resources. No ground disturbing activity may occur within 30 m of these features. If this cannot be avoided, a shovel-testing program must be implemented in advance of the ground disturbing activity to ensure that significant heritage resources are not present. If heritage resources are identified during the shovel-testing program,

stage III mitigation will be required (this could include avoidance, partial or complete excavation, etc.).

- The ancient shoreline just west and north of “Johnny Hill” (observed during the pedestrian survey within the second and third survey locations, and mapped in Figure 4) is the highest potential location within the entire study area. Ground disturbing activity must not occur within 50 m of this feature. If this cannot be avoided, an extensive shovel-testing program must be avoided in advance of any ground disturbing activities. If significant heritage resources are identified during the shovel-testing program stage III mitigation will be required (this could include avoidance, partial or complete excavation, etc.).
- All known heritage resources and elevated potential areas should be clearly flagged prior to development in the study area, so that they are not inadvertently impacted by construction related activities.
- Given the potential for significant heritage resources on the Goose Bay peninsula and elsewhere in HVGB, it is recommended that HVGB employees be given heritage awareness training so that they may spot areas of elevated potential and heritage resources themselves. HVGB may also want to consider requiring contractor employees take similar training in advance of development projects within the community. Note, however, that heritage awareness training is not a substitute for a HRIA conducted by a qualified archaeological permit holder. At its best, it is only a supplement.
- Any heritage resources identified during the construction process must be brought to the attention of the NL PAO. It is often a good idea to have a protocol put in place in advance of ground disturbance so that all project related personnel are aware of their responsibility and the means by which such notification should occur.

Although it is impossible to be 100% certain that significant heritage resources are not present within the study area, it is likely that significant adverse impacts to heritage resources will be avoided if the recommendations outlined above are fully implemented.

## Bibliography

Armitage, Peter. 2010. Appendix A: Innu of Labrador Contemporary Land Use Study. [http://www.env.gov.nl.ca/env/env\\_assessment/projects/Y2010/1407/I\\_i\\_t\\_l\\_e\\_a\\_aboriginal\\_cs\\_app\\_a.pdf](http://www.env.gov.nl.ca/env/env_assessment/projects/Y2010/1407/I_i_t_l_e_a_aboriginal_cs_app_a.pdf)

Erwin, John. 2005. Mud Lake Road Agricultural Reserve HRIA 05.14, 05.14.01. Report on file at NL PAO.

Innu Environment Limited Partnership. 2002. Trans-Labrador Highway Phase III Happy Valley-Goose Bay to Cartwright Junction. Final Report: Historic Resources Component Study. (Schwarz & Stopp) 02.38. Report on File at NL PAO.

Jacques Whitford Environment Limited and Innu Environmental. 2000. Labrador Hydro Project 2000 Studies, Historic Resources Field Program, LHP 00-17. Report on File at NL PAO.

2001. Labrador Hydro Project 2000 Studies, Churchill River Power Project, Historic Resources Overview Assessment Interpretive Summary, Recommendations and Appendices (1998-2000), Volume 1: Report (draft report). Report on File at NL PAO.

Neilsen, Scott. 2006. Intermediate Indians: The View from Ushpitun 2 and Pmiusiku 1. M.A., MUN.

Penney, Gerald. 2008. HROA (Stage 1) Valley Stretch Residential Area. 08.12. Report on File at NL PAO.

Schwarz, Fred. 1997. An Historic Resources Overview Assessment of Forest Management Districts 19 and 20 South-Central Labrador. Report on File at NL PAO.

1998. In the Eagle's Nest: Archaeological Investigations in the Mistassini Lake Area, Upper Eagle River, South-Central Labrador. 97.39. Report on File NL PAO.