

AIRPORT LAKE RECREATIONAL LEASE PLANNING STUDY



INTRODUCTION

The Department of Municipal and Community Affairs (MACA) has undertaken several initiatives in recent years to more effectively manage recreational uses on Commissioner's Land. For example, in 2007 MACA conducted a Land Verification Project to identify land management issues at Cassidy Point, a recreational cabin area just outside of the City of Yellowknife. MACA identified several potential issues in this area including the spread of untenured development and the lack of a comprehensive land management strategy.

In follow up to this initiative, in 2008 MACA implemented the territory wide Interim Trespass Enforcement Strategy (ITES). The ITES served to provide direction to MACA's land administrators on how to identify and take action to address the unauthorized use of Commissioner's Land. Since its implementation, the ITES has successfully dealt with twelve incidents of trespass on Commissioners land. However, while the enforcement of trespass is considered critical to improving land management in the Northwest Territories (NWT), the underlying root cause of the trespass problem remains the imbalance in the demand and supply of land available for recreational use.

In December 2009, MACA announced that it would develop a Recreational Leasing Policy Framework ("Framework") for Commissioner's Land in the NWT. The objective of the Framework is to create policies and regulations that support the sustainable development and effective management of Commissioner's Land used for recreational purposes. The Framework will include two streams of work. First it will lay out a broad policy framework for the use of Commissioner's Land for recreational use. Second, it will create development controls unique to each area of the NWT where recreational use is of particular and immediate concern.

The initial step forward in implementing these objectives was the Recreational Lease Planning Study ("Density Study") conducted in 2010 for an area of Commissioner's Land outside of the City of Yellowknife (Prosperous, Banting and Walsh lakes area). This land use planning study was conducted in order to establish limits for recreational development densities and to help mitigate impacts on the natural environment in this area. The Density Study was used as a model for the development of this report, the Airport Lake Recreational Lease Planning Study ("Airport Lake Study"). The Airport Lake Study is one of the next key building blocks in the development of the overall Framework for managing recreational use on Commissioner's Land.

PURPOSE

The objectives of the Airport Lake Study are as follows:

- a. Identify potential sites in the Airport Lake area ("Study Area") suitable for recreational cabins;
- b. Identify potential sites in the Study Area for casual day use;
- c. Identify areas where recreational development should be discouraged due to environmental sensitivity, challenging topography, and other relevant considerations;
- d. Assess the number and density of recreational cabins that the Study Area could reasonably accommodate without resulting in adverse impacts to the natural environment;
- e. Recommend the most appropriate manner and pattern in which recreational development should occur in the Study Area.

RECREATIONAL LEASE PLANNING STUDY AREA

The Study Area is located on Commissioner's lands southeast of the Town of Inuvik, and south of the Inuvik airport. The boundary follows a setback roughly 100 metres in width parallel to the northerly shore of Airport Lake extending from the north westerly tip to the south easterly limit of the lake. Airport Lake is surrounded by Gwich'in Settlement Land. The Gwich'in Settlement Land is outside of the Study Area. The Study Area has been withdrawn from disposal until December 9, 2012, so that controls can be developed for the orderly development of this area. A map of the Study Area is included in Appendix A.

Airport Lake is accessed from the Dempster Highway by a 1.5 kilometre gravel road that crosses over the airport reserve and Lot 5, Plan 4233. Boat access is possible via Airport Creek, but access is restricted during the autumn and other low water periods. Snowmobile access is possible during the winter months. The Study Area is one of the primary recreational areas used by the residents of the Town of Inuvik for fishing, camping, boating, and snowmobiling.

There are currently 42 cabins identified on the Commissioner's Land around Airport Lake with most being located either along the southern shoreline or west of the access road on the north westerly shoreline. There is no other cabin development on the northerly shoreline east of the access road (see Appendix B).

The Study Area is located within the Mackenzie Delta Eco-Region. The vegetation includes open woodland, scrub lands and wetlands. This area contains the northern most reaches of the tree line east of the Richardson Mountains. The topography is a flat plateau covered with numerous water bodies and channels. It is home to a variety of waterfowl, large and small mammals, and a variety of fish.

COMMISSIONER'S LAND LEGISLATIVE, REGULATORY AND POLICY FRAMEWORK

The administration of Commissioner's Land is legislated and regulated by the *Commissioner's Land Act* and the *Commissioner's Land Regulations*. The Government of the Northwest Territories' Land Pricing Policy sets out a model for pricing land for sale or lease.

JURISDICTIONAL REVIEW

Recreational land management practices in other jurisdictions were reviewed for comparative and informative purposes. Three jurisdictions were selected for comparison: Ontario, British Columbia and the Yukon Territory. All three jurisdictions regulate lot size, setback requirements, enforce restrictions based on ecological considerations and include fire safety as a critical component of recreational use.

Study Area Planning Principles and Best Practices

The jurisdictional review highlighted a number of recreational planning principles and best practices including:

- *Site Characteristics and Capacity*: Assessing the physical site characteristics and capacity for development should be based on the best available information.
- *Recreational Opportunities*: Consideration should be given to the range of reasons why individuals find recreational properties attractive, including aesthetic, experiential/appreciation opportunities, and ecological values.

- *Public Access:* Optimal preservation of and public access to shorelines. Sites needed to accommodate public access and use of land or water resources are normally retained for public use rather than alienated for private use. This is because public access is only meaningful if it is provided together with at least minimum space for basic requirements such as suitable slopes for boat launching/landing (foreshore) and backshore areas.
- *Preservation of Resources:* Preservation of environmental resources, heritage, and historic archaeological resources. Criteria should include: unique or representative landscape features, environmentally sensitive areas, wildlife habitats, and archaeological sites.
- *Existing Use and Occupancy:* Consideration should be given to historical and existing land use and occupancy.
- *Third Party Interests and Rights:* Existing third party interests and rights should be considered. Land management proposals should respect, and where required accommodate legal non-conforming uses (which may require 'grandfathering' to ensure continued use and enjoyment).
- *Land Use Conflict Mitigation:* Avoidance and/or mitigation of land use conflicts. This includes recognition that facilitating outdoor recreational use should be compatible with and related to the shoreline environment.
- *Public Natural Capital:* Retain access to natural resources (as public natural capital). Commissioner's Land is a public asset and there is a responsibility to ensure it is managed to maximize and sustain the flow of social and environmental benefits.
- *Hazard Lands:* Protect recreational land and water users from hazardous conditions - subject to the provisions and limitations in land disposition instruments.
- *Public Health and Safety:* Recognition of public health and safety objectives (watershed protection; water quality; sewage; solid waste) should be considered.
- *Public Infrastructure:* Recognition and protection of public infrastructure and utilities should be considered.

LAND USE PLANNING

General Site Planning Assessment Criteria

From a land use planning and best practices perspective the ideal site assessment methodology encompasses core principles and criteria, including:

Biophysical Criteria

- Geology and soil properties;
- Topographic features and slopes;
- Surface and subsurface drainage; and
- Ground cover and vegetation.

Land Use Planning and Land Management Criteria

- Compliance with applicable legislative and regulatory framework;
- Existing land use and occupancy;
- Lawful interests and rights;

- Aboriginal rights and land claim considerations;
- Unauthorized use and occupancy of Commissioner's Land;
- Existing and/or potential public infrastructure and works;
- Resource development potential;
- Future uses and activities;
- Land use compatibility; and
- Access by land and water.

Recreational Capability & Aesthetic Characteristics Criteria

- Heritage, historic or archaeological features;
- Scenic, conservation, and recreational values;
- View shed degradation; and
- Experiential/appreciation opportunities and values.

Environmental/Ecological Criteria

- Presence of species that may be at risk;
- Risk of habitat loss and fragmentation; and
- Ecological carrying capacity.

Public Health and Safety Criteria

- Flooding, erosion, wild fires, soil instability, or similar risks;
- Water quality and quantity; and
- Contaminated and/or disposal sites.

CARRYING CAPACITY AND DEVELOPMENT DENSITY

Recreational planning includes a number of basic principles and best practices such as:

- Outdoor recreation is oriented to, and is enhanced by water and the proximity to it; and
- Recreational planning takes land and water into account. Effective planning cannot take place without considering the two components simultaneously.

Shoreline Planning and Zoning

Demand for recreational sites is driven by the general universal desire to be near the water, both visually and for ease of access. Shoreline planning has typically been linear or 'ribbon development' along the shoreline with any in-depth development of the backshore an exception to the rule.

Core planning considerations with respect to lake development scenarios include:

- Shoreline Slope – slope influences swimming, wading, boat access and storage and building constriction. The optimum slope for a recreational site ranges from 7 to 15 percent;
- Private and Public Use – the need to determine the appropriate balance between private and public use of a lake, given that a lake generally represents a public resource.

Lake Carrying Capacity and Development Density Models

The concept of 'carrying capacity' is based on the idea that environmental and ecological constraints inform, or may even limit, the amount of human activity that any given water body can accommodate without damage to the natural environment. There is no agreed upon definition and methodology for how carrying capacity should be calculated. Carrying capacity is made up of three elements:

- Physical carrying capacity – the attributes of the physical environment and the amount of use it can sustain;
- Human activity carrying capacity – the number of people engaged in an activity at a density (and intensity) that is efficient and safe for the users; and
- Physiological carrying capacity – the acceptable density (and intensity) of people engaged in an activity as perceived by users themselves.

Irrespective of the method used to establish carrying capacity, the thresholds are often influenced more by value judgments and less so by scientific and technical decisions. As such, the application of such concepts should recognize that carrying capacity has more utility when understood not as a singular measure but rather a range of estimates. These estimates reflect varying degrees of supply and demand variables and the level of environmental quality and recreational experience that users are willing to accept. Notwithstanding the limitations of the carrying capacity concept, there are a number of models that have been used effectively in lake planning and management in areas geographically comparable to the Airport Lake Study Area.

A review of the existing research indicates that there are three models that could be used to calculate carrying capacity in the Study Area.

- **Natural Shoreline Reserve Model**

The Natural Shoreline Reserve Model stems from the principle that part of the shoreline of every lake should be retained in a natural state. Maintaining ecological integrity is at the core of this model in that a natural shoreline helps to maintain and preserve ecosystem functions (i.e. preserving aquatic plants, spawning areas, habitat functions). Natural shoreline is also important for visual and aesthetic functions.

Some jurisdictions, such as British Columbia and Ontario, have legislation to retain public ownership of a minimum of 25 percent of the shoreline of any lake. There are two main challenges with this model that are linked to whether it is based on a social values approach or an ecological approach. The social values approach looks at how much natural shoreline is required so that lake users will perceive that they are still in a 'natural' environment. The ecological approach is concerned with how much shoreline should be reserved from development in order to maintain ecological integrity.

The model uses a formula that includes the following elements: total shoreline length (meters); existing developed shoreline (meters); and an index of maximum capacity for development based on an amount designated in legislation. The ratio of existing development conditions to the desirable condition is calculated as a percent above or below the estimated capacity threshold.

- Shoreline Capability Model

The Shoreline Capability Model emerged from research done by the Ontario Ministry of Natural Resources and several American states bordering the Great Lakes where there was significant pressure for cabin oriented recreational development. The model compares the existing number of cabins on a lake with the number that is desirable from a sustainability perspective. The maximum number of cabins is based on the capability of the shoreline for development and is a function of factors that include lakeshore slope, drainage, soils, and surface materials. The capability assessment was based on an initiative called the Ontario Land Inventory – where shorelines were ranked on a general scale of seven categories. Within each shoreline capability category standards were established for development density and expressed in terms such as cabins per kilometer of shoreline, or desired cabin lot width.

The Shoreline Capability Model has a number of useful attributes but is constrained by the high intensity of time and resources required to make the model work.

- Shoreline Complexity Index Model

The Shoreline Complexity Index Model reflects the potential increase of development in proportion to the volume of a lake. In other words, the greater the irregularity of the shoreline and the shoreline features results in a higher complexity index. The shoreline complexity index is a ratio of the actual perimeter of a shoreline compared to the length of the circumference of a circle of area equal to that of the lake. The shoreline length includes islands, but the lake surface area excludes islands.

The model is based on the principle that an increase in the shoreline area in proportion to the volume of a lake indicates an increase in sensitivity to development. The Shoreline Complexity Index Model has been applied in a number jurisdictions in Canada, including British Columbia.

CLASSIFICATION OF LAKES

The purpose of the lake classification system is to identify which lakes are most suitable for development and at what density. The following criteria are used to classify lakes:

Lake Size

Lake size is an important factor in determining the potential to accommodate development. Lakes are categorized using a simple system: small, medium and large, with each classification having a unique effect on the ecology of a lake and its potential for human activities. The basic premise is that larger lakes are generally able to accommodate a higher level of development than smaller lakes. Lake sizes (surface area of a lake) are as follows:

- Small lake: less than 60 hectares;
- Medium lake: greater than or equal to 60 hectares;
- Large lake: more than 260 hectares

Based on these assessment criteria, Airport Lake is categorized as a large lake.

Lake Category

Lake categories set out criteria for assessment and development. The categories are:

- Development Lakes – Lakes that can accommodate a variety of uses and development without negatively impacting the lake environment. Use and development may include residential development, agriculture, outdoor recreation, and commercial-tourism use. Road access and potential for electricity are considerations;
- Limited Development Lakes – Lakes that have high aesthetic, recreational, or ecological significance that could be negatively impacted by development, but can accommodate a limited amount of use and development. Generally, these lakes have road access or seasonal access, and typically no electricity is available;
- Natural Environment Lakes – Lakes that are very sensitive to development and that should be left largely undisturbed and in their natural setting. These lakes may have unique geological/physical features, high aesthetic or ecological values and/or significant wildlife populations. Permanent residential uses are considered inappropriate for these lakes.

Based on these assessment criteria, Airport Lake is categorized as a Limited Development Lake.

APPLICATION OF THE MODELS TO THE STUDY AREA

The table below summarizes these values as well as the proportion of developed shoreline and the shoreline complexity index for the Study Area. The developed shoreline length is based on the proposed lease sizes for the existing cabins on Airport Lake.

| Lake | Surface Area | Shoreline Length | Developed Shoreline Length | % of Developed Shoreline | Lake Area Classification | Lake Category Classification | Shoreline Complexity Development Index |
|---------------------|-----------------|------------------|----------------------------|--------------------------|--------------------------|------------------------------|--|
| Airport Lake | 507.5 ha | 18,500 m | 1260 m | 6.8% | Large | Limited Development | 2.3 |

The utility and application of the three models that have been reviewed vary in their respective limitations and data requirements. The analysis of the models concluded that the Shoreline Complexity Index Model is the best fit for the Study Area.

The Shoreline Complexity Index Model places the following parameters for development on a Limited Development Lake:

- Where the shoreline development complexity index value is between 1-3, the maximum developable area is 20%;
- Where the shoreline development complexity index value is less than 3, the maximum developable area is 10%.

Airport Lake has a shoreline complexity development index of 2.3. This means the maximum recommended shoreline development for Airport Lake is 20 percent of its shoreline. This development density guideline also needs to be considered in the context of other constraints to development in the Study Area.

Development Constraints in the Study Area:

A number of constraints to development have been identified within the Study Area based on the following:

- Existing Development and Infrastructure

The Study Area is located adjacent to the Inuvik Airport with the runway about half a kilometer from Airport Lake at its closest point. The airport is located within a land reserve located roughly 100 meters north of the northerly shore of Airport Lake. Development within the airport reserve is restricted and subject to the approval of the Department of Transportation.

Airport Lake is accessed by a narrow gravel road that extends approximately 1.5 kilometers from the Dempster Highway to the midpoint on the north shore of the lake. East of the access road are two cleared areas with trails connecting the cleared areas to the road. These cleared areas are located partially within the Study Area. West of the access road is an active quarry for obtaining granular materials. Due to safety issues and noise consideration, recreational use in the vicinity of this area should be restricted.

Forty-two cabins exist in the Study Area. Almost all of the cabins are located directly on the waterfront in a “ribbon” type development. The distances between cabins vary, but they are about 100 to 150 meters apart. No further development or infilling is planned for these developed areas at this time.

- Topography and Vegetation

The slopes adjacent to Airport Lake vary from relatively gentle on the northeast shoreline to steep on certain portions of shoreline west of the quarry. The slopes along the northeast shoreline generally meet the 7 to 15 percent guideline for cabin sites. Most of the land around Airport Lake shoreline is relatively well drained. The lake is generally deeper in the eastern portion making it favourable for some water related recreational activities.

The vegetation in the Study Area consists largely of scrub lands and stunted coniferous trees. This type of vegetation does not provide an effective visual barrier between cabins.

- Wildlife Habitat

A bird nesting area (peregrine falcons) has been identified west of the access road on a rocky outcrop. Development should be restricted in this area.

PROPOSED LAND USE AND POSSIBLE RECREATIONAL SITES:

Study Area Site Assessment Methodology and Criteria

The following methodology and site assessment criteria were used:

- *Baseline Information:* The best available information was reviewed and consolidated to provide a basis from which to assess site constraints and opportunities. Multiple attribute layer and slope analysis mapping was developed utilizing GIS software, topographic information and other sources of data.

- Relevant land use planning principles and best practices were applied in a two-stage process. First, the primary criteria were applied and potential sites identified. The sites which met the primary criteria were then further assessed using the secondary criteria. The primary and secondary criteria are presented below.

Primary Criteria:

- Topographic relief and slope (up to 15 percent within 300 meters of the waters' edge);
- Access (by vehicle or boat);
- Existing land use and occupancy;
- Land use compatibility; and
- Visual separation.

Secondary Criteria:

- Existing lake development density and carrying capacity;
- Ecological resources;
- Existing and/or future infrastructure.

PRELIMINARY OBSERVATIONS AND CONCLUSIONS:

The sites which satisfied the primary and secondary criteria are shown on the map in Appendix C.

The land use categories developed for the Study Area are as follows:

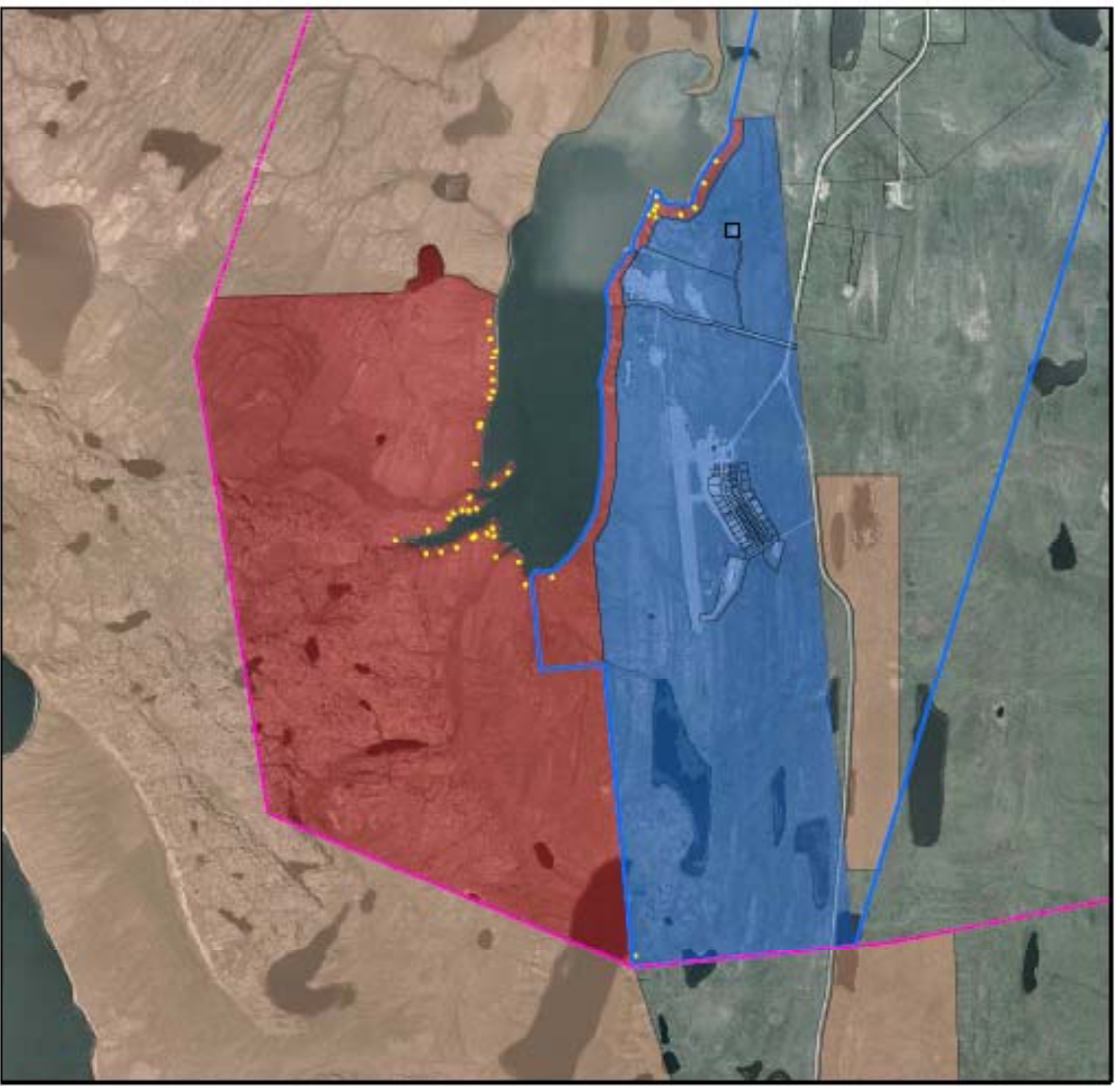
- **Recreational Cabin Use:** These sites are intended to accommodate recreational cabins. The suggested definition of recreational cabin use is: an occasional residential dwelling for the recreation, rest or relaxation and enjoyment of the surrounding natural environment by one household, not occupied continuously or as a principal residence or as a year round permanent dwelling.

It is recommended that: a) cabin sites should be developed in a dispersed pattern rather than in development "nodes"; b) no additional cabin sites be established west of the access road on the north shore of Airport Lake; and c) no additional cabin sites be established in the southeast portion of Airport Lake. Based on these constraints, the Study Area can support an additional 16 cabin sites without significant impacts to the natural environment.

- **Casual Day Use:** Notwithstanding the principle that untenured Commissioner's Land is "public land", a Casual Day Use site has been identified to ensure public access to the Study Area and to minimize potential conflicts with existing and proposed cabin sites. This site is in no way deemed to be a "territorial park" and as such no facilities or services are implied or anticipated. The purpose of the site is simply to afford the general public with a relatively accessible site on the water that can be used for day use activities such as picnics, barbeques etc.
- **Wildlife Habitat:** This designation recognizes known wildlife habitat areas where development should not be permitted. There is one site identified as Wildlife Habitat.

Appendix B Airport Lake Inuvik

Recreational Lease Applications



- Legend**
- ▭ Block Land Transfer
 - ▭ Municipal Boundary
 - Surveyed Parcel
 - ▭ Recreational Lease Application
 - ▭ Airport Reserve
 - ▭ Withdrawn Lands

Scale: 1:50,000



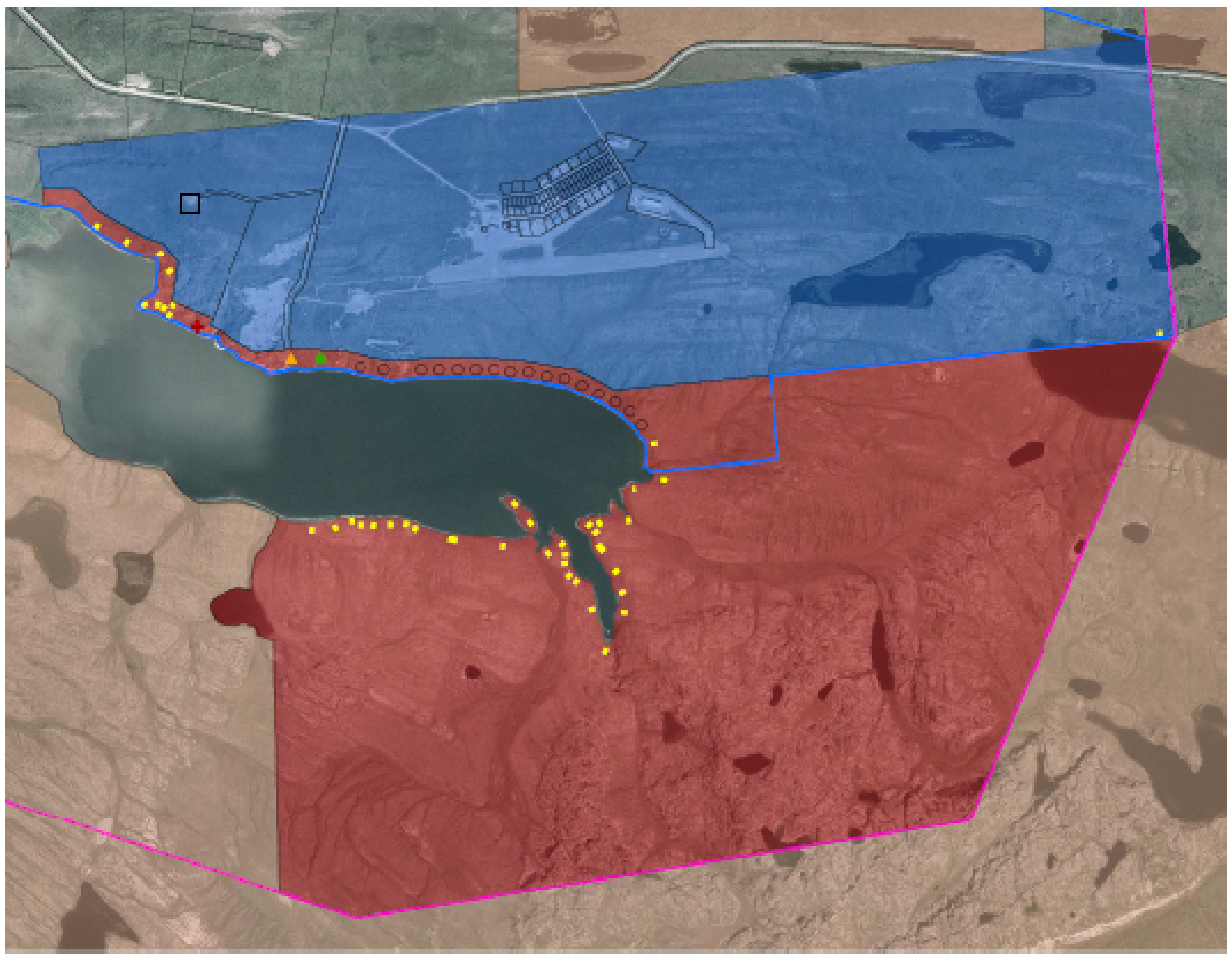
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Appendix C

Airport Lake Inuvik



- Legend**
- Block Land Transfer
 - Municipal Boundary
 - Surveyed Parcel
 - Deed-in Parcel
 - Withdrawn Lands
 - Airport Reserve
 - Recreational Lease Application
 - Proposed Recreational Cable Site
 - Public Access
 - Day Use
 - Wildlife Habitat



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