



**Yukon  
Water Board**

*Office des eaux  
du Yukon*

# **WETLAND INFORMATION GUIDELINES**

**March 2020  
(Version 2 - Draft)**

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Consulting Group Inc. and published under  
the authority of the Yukon Water Board  
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## **Overview**

The Yukon Water Board (“the Board”) has developed this document to guide applicants on the information to include in a water licence application when project undertakings are in areas where wetlands are present. The Board must meet its obligations under both the *Waters Act* and Chapter 14 of the Yukon First Nation Final Agreements to maintain the water of the Yukon in a natural condition while providing for its sustainable use. The objective of these information guidelines is to provide the Board with information for consideration during deliberation of water licence applications. This document outlines a recommended framework (table of contents) for presenting information about proposed project limits, activities, baseline wetland conditions, predicted wetland impacts and opportunities to re-establish wetlands. It also provides guidance on the type of information in each section of the table of contents.

The Board recognizes that each proposed project is unique; all recommended information will not necessarily apply to a given project application. However, information presentations that are consistent with the table of contents and information guidelines will aid the Board and third parties in efficiently reviewing applications. Additionally, the guidance provided within this document should allow applicants to prepare water licence applications that meet the Board’s information expectations. Applicants are therefore encouraged to follow the table of contents below, to the extent possible for a given project.

**Appendix A** lists resources available to support applicants in project planning and in their preparation of water licence applications.

## **Content Guidelines for Applicants**

### **1. Introduction**

An introduction provides the Board context for the proposed project. If all the information described in Section 1 is within the project application document, it would be sufficient to provide a short summary here, along with relevant section references to that document. The following sections are recommended.

#### **1.1 Project Overview**

A general overview that provides enough context to frame the proposed development and the rationale for preparation of the water licence application. Avoid specific project details in this section. Instead, present more details in in Section 3.1.

#### **1.2 Applicant Information**

The applicant should identify the project applicant(s), including their respective role(s) for the proposed project. Any collaborations or partnerships should be identified. All agents and/or consultants that were employed to provide the wetlands information on behalf of the applicant(s) should also be listed.

The Board recommends that the applicant include contact information for a “point of contact” for the wetland information in the water licence application.

### **1.3 Project Area**

Present *Project Area* that defines the maximum “footprint” of the proposed project, including all expected project components over its entire lifespan. This footprint will contain all direct impacts to wetlands. A distinction should be made between expected short-term and long-term project footprints, to the extent possible. An Overview Map<sup>1</sup> of the Project Area, including existing or proposed access from a maintained roadway, should be provided to show the proposed project boundaries in relation to its regional surroundings, including the nearest community.

### **1.4 Purpose of Wetland Information**

State the overall purpose of the document to make clear to the Board the applicant’s intention in preparing and submitting it (that is, to obtain a water licence), and to demonstrate their understanding of the information it includes.

## **2. Baseline Conditions within the Project Area**

The application should describe the baseline conditions (existing, pre-development) within the Project Area in enough detail to allow the Board to understand how the proposed project may affect site conditions and wetlands, in particular. Summarize relevant historical information, if available, along with any known accuracy limitations.

Baseline conditions mapping should be provided for the Project Area, as defined by the limits of the proposed project (Section 3). It is preferred that all mapping line work, such as proposed project limits and infrastructure footprints, be overlain on a current air photo or satellite image of the Project Area.

The following sections describe the baseline information that should be presented.

### **2.1 Description of Traditional Use and Knowledge**

Best efforts should be made to map traditional land use and summarize traditional knowledge in order to capture the importance Indigenous peoples place on the land within and adjacent to the Project Area. If available, the following are examples of activities and knowledge to be included in an application.

- Traditional subsistence hunting grounds;
- Traditional subsistence foraging grounds;
- Areas of traditional gathering;
- Areas of spiritual importance; and,
- Areas of traditional settlements (seasonal or permanent).

The description should detail the cultural significance that any Indigenous group places on the Project Area, past or present. Detail of both the physical and spiritual aspects of the area should be identified (for example: number of animals harvested a year, mental wellbeing achieved from being on the land or any other purpose/benefit the land provides). Engagement with local

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<sup>1</sup> Any maps included in the information provided should adhere to basic cartographic principles, such as including a north arrow, scale and appropriate legend (as applicable), and are best created using mapping software.

Indigenous populations is encouraged to ensure the full understanding of the benefits and uses of the land is captured.

## **2.2 Description of Existing Infrastructure**

The Project Area should be put in context with its local and regional surroundings. Mapping of the Project Area should be placed in a landscape and land use context, by including information such as the following:

- General topography;
- Existing roadways and available or proposed access;
- Existing services (for example, power lines);
- Nearby watercourses (including direction of flow); and
- Nearby land uses (for example, communities, parks, conservation areas, etc.)

The description should detail the opportunities and constraints for existing infrastructure (for example: roads, electrical distribution lines) to access and service the proposed project. A discussion of any potential conflicts and/or cooperative efforts with adjacent land uses, especially in relation to water use, should also be included.

## **2.3 Description of Soils and Permafrost**

A description of existing ground conditions within the Project Area, with an emphasis on soils and permafrost<sup>2</sup> (where applicable), should be provided to indicate their potential sensitivity to disturbance and the capacity for reclamation. A general characterization of regional bedrock and surficial geology should be provided for context. The distribution, approximate thicknesses and layers of overburden and soils should be estimated based on available data and site-specific investigations. Distinctions should be made between organic (for example: peat or topsoil) and mineral (for example: silt, sand or loam) soils. Typical or average depths to bedrock should be provided.

The presence or absence of permafrost should be specified based on appropriate evidence (for example: ground temperature, available mapping, landform/vegetative indicators, summertime ground ice). If present, a characterization of the general distribution of permafrost should be provided along with its approximate depths below ground surface. The locations and timing of any observations of ground ice should be noted.

Representative borehole logs, test pit records and/or geophysical survey data, where available, should be included to support these descriptions.

## **2.4 Description and Classification of Wetlands**

Wetlands within the Project Area should be described, classified and mapped in accordance with the *Canadian Wetland Classification System* (National Wetlands Working Group, 1997). The five general types of wetlands include bogs, fens, swamps, marshes and shallow water, all of which occur in Yukon. The wetland classification descriptions for the Project Area, which can include representative field photographs, should provide enough information from the local area (for example: topography, water sources and flows, soils, vegetation) to justify their class. The

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<sup>2</sup> Permanently frozen ground (i.e. soil or rock that remains below 0°C for more than two years).

estimated area (hectares or square metres) of each wetland class within the Project Area should be specified.

Wetland mapping within the Project Area should be at least completed to the class level and be easily related to the wetland descriptions. A photographic log of representative wetlands of each class within the Project Area would be beneficial.

## **2.5 Water Flows and Water Quality**

Wetlands occur in areas where precipitation, surface runoff and/or groundwater maintain wet conditions. Therefore, an understanding of existing sources and flow patterns of water in wetlands (that is, wetland hydrology) is fundamental to the assessment of the nature and extent of potential effects from the proposed project. Wetlands also influence local and downstream water quality, so baseline water quality must also be considered.

### **2.5.1 Inflows and Outflows of Each Wetland**

The pattern(s) of water inflows and outflows within the Project Area should be mapped, in order to demonstrate system linkages and provide site-level context for understanding the wetlands. How water passes through the Project Area, considering surface and subsurface linkages and relative rates of flow, should be described. The document should also highlight how water passes through, and is stored within, Project Area wetlands.

The sources of water for each wetland should be described in general terms (for example: local surface runoff, groundwater seeps/springs, river water [surface overflow and/or subsurface inflow], rainfall/snowmelt perched on permafrost), along with evidence for the description. The typical depths below ground surface to water within representative wetlands from each class should be specified based on visual observation and/or measurement. Water depths from representative wetlands should ideally be averaged from measurements made from multiple times of year, because seasonal fluctuations help determine wetland class and function. The presence of any open water (for example: ponding) should be noted. The locations of reported observations and measurements should be provided.

The locations and approximate size of the main surface inflow or outflow channel features (if present) should be specified, along with observations of seasonal variation. Approximate rates of inflow and outflow should preferably be provided based on field measurement from a single day (for comparative analysis of gains/losses). Data are ideally from multiple times of year.

### **2.5.2 Water Quality of Each Wetland**

At a minimum, a visual characterization of water quality should be provided for each wetland within the Project Area. This could include description of the clarity of any open water (for example: is the pond bottom visible or obscured by turbidity (suspended fine sediments?) or water visible in shallow test pits (for example: is the water that seeps in clear or discoloured, such as by its organic content?). The clarity of any surface inflows or outflows should also be described. The locations and timing of observations should be provided, given the Board's interest in understanding any spatial and/or seasonal variability.

Applicants are additionally encouraged to characterize water quality in undisturbed areas outside and upstream (or up-gradient) of the Project Area to document background conditions for future reference (for example, water may be naturally discoloured).



Although not required at this time, water quality would be more accurately assessed through *in situ* field testing (for example: multi-parameter meter) or even through laboratory analysis of collected water samples. Any water quality samples could be analyzed for parameters such as pH, turbidity, dissolved oxygen, total dissolved solids, conductivity, temperature, basic mineral/nutrient content and trace metals to allow future comparisons during project development and operations.

### **3. Proposed Project**

#### **3.1 Overview of Proposed Development and Operations**

The applicant should submit an overall Project Description with sufficient detail to inform the Board about the project, its purpose and its life cycle. Where appropriate, reference can be made to particular sections from the project application document to avoid duplication. However, project details and component descriptions should specifically highlight their relevance to water use/releases and waste deposition. The project description should also describe how the proposed development will integrate with existing (baseline) infrastructure (Section 2.1). Project details that should be described include the following:

- the project location(s);
- the project setting and history;
- the proposed development, its major components and schedule for development and operation;
- the proposed product(s) to be produced and the resulting waste products(s);
- the proposed product processing and delivery methods;
- project waste management plans; and
- other relevant information.

The project description should be accompanied by a Detailed Site Plan (a scaled map) of the proposed development. The Detailed Site Plan should be overlain on the Baseline Conditions Mapping to show the project in relation to wetlands, and at a minimum, the following information:

- Limits of the Project Area;
- Location(s) and footprint(s) of project infrastructure;
- Nature/function of project infrastructure components;
- Locations and limits of any fill placement or grading required;
- Location(s) of product and excess material (for example: tailings, overburden and organics) storage areas; and
- Location(s) and nature of project environmental controls.

#### **3.2 Proposed Infrastructure within Wetlands**

In addition to identifying the project infrastructure footprint on the Detailed Site Plan, the nature and function(s) of the infrastructure components that are proposed within wetlands should be identified and described. The Board considers areas within wetlands to include all areas or infrastructure components that may contribute to or influence wetlands impacts, including earthworks (Section 3.3). Justification for siting project components within wetlands, rather than outside, should be provided.

The predicted area of project overlap with wetlands should be mapped on the Detailed Site Plan or a companion figure.

### **3.3 Proposed Earthworks and Management of Soils**

Any earthworks required to develop the Project Area should be described. All materials such as tailings, organics and overburden to be removed and/or stored should be described, including predicted composition, quality and volume of the materials and the expected duration of the storage of organics. The methods used to strip, separate and store any materials should be described, including planned approaches to mitigate dust dispersal, leaching and surface erosion. The expected limits and depths of proposed excavations (cuts) should be outlined, ideally according to planned stages. The predicted type and volume of any imported fill should be described, including its source, to ensure it is clean and not prone to metal leaching or acid rock drainage. Any grading required should be outlined, including a description of the materials to used and/or redistributed.

Plans for the stripping, separation and stockpiling of organics and overburden, for subsequent reapplication, should be detailed. Separately storing organic material is critical to capping regraded overburden with an effective growth medium (that is, topsoil) during project closure. Any plans for progressive reclamation should be highlighted.

The location(s) of all earthworks and/or storage locations should be mapped on the Detailed Site Plan or a companion figure.

### **3.4 Proposed Erosion and Sediment Control**

The characteristics and functions of wetlands (and watercourses) can be impacted by the unnatural accumulation of sediments from erosion of exposed soils in disturbed areas. A description should be provided of how and where erosion and sediment control measures will be established to isolate the work/disturbance areas from the surrounding environment, minimize the release of sediments, and ensure that project infrastructure remains in working order. Priority should be given to minimizing the extent and duration of soil exposure over the course of project operation. A description should be provided of the initial erosion and sediment control measures to be implemented, including operational procedures (for example, preservation of vegetation buffers), material storage design, sediment control fencing/berms and other best management practices.

Erosion and sediment control measures are not static; they should have the flexibility to be adjusted to changing conditions as the project proceeds. The initial erosion and sediment control measures and planning should be mapped on the Detailed Site Plan or a companion figure. Subsequent changes to erosion and sediment control measures should be presented to the Board for review.

### **3.5 Proposed Timeline and Staging**

A project timeline should outline all major project components/activities, such as site preparation and infrastructure placement, operation duration and activities, and duration of closure activities. The expected timeline for any post-closure activities including monitoring should also be detailed. Any seasonality considerations (for example: periods planned without operation) should also be described.

## **4. Potential Wetland Impacts**

An understanding of the potential effects of the proposed project on wetlands should be demonstrated. Specific to the project, the predicted or potential impacts of the project on wetlands prior to any avoidance, mitigation or closure activities should be described. Descriptions should identify the potential areal extent, degree and permanence of the impacts. Potential impacts to wetlands could arise through, but not necessarily only from, the following:

- Direct loss due to project component placement (for example: infrastructure, product/tailings, or earthworks);
- Water drawdown or impoundment adjacent to project components;
- Water withdrawals;
- Wastewater releases;
- Permafrost thawing; and/or
- Chemical spills.

### **4.1 Mitigation by Design**

A description should be provided of any project design or operational approaches planned to avoid or reduce impacts to wetlands. The description should also highlight any environmental controls or mitigation measures designed to limit potential impacts to wetlands, such as maintaining or limiting changes to water flow patterns (both surface and groundwater), erosion and sediment control measures (Section 3.4) or process water re-use methods. A description should also be provided of the methods through which water inflows and outflows through the Project Area are proposed to be maintained, including any diversion measures (if required).

It is recommended that any physical environmental controls or mitigation measures be shown on the Detailed Site Plan (Section 3.1).

### **4.2 Area of Direct Disturbance**

The area of unavoidable direct disturbance to wetlands should be detailed by summarizing and mapping the project components within wetlands, as described in Sections 3.2 to 3.4. All areas of predicted impacts within the Project Area should be tabulated and mapped. Any environmental control materials (for example, sediment control fencing/berms) should be considered to be within the limits of the area of direct disturbance. All areas of disturbance should be reported in hectares or square metres by wetland class.

### **4.3 Area of Wetlands to Remain Physically Undisturbed**

The area of wetlands that is predicted to remain undisturbed within the Project Area should also be tabulated and mapped. All areas of wetlands to remain physically undisturbed should be reported in hectares or square metres.

## **5. Project Closure and Post-Closure Activities**

One objective of project closure and post-closure activities, the durations of which should be known and finite, is to ensure the site does not require active management or monitoring. Project closure and post-closure activities also aim to leave ground conditions within the disturbed Project Area in such a way that they allow for the potential for wetlands to naturally re-establish. The following sections outline considerations with respect to site contouring and re-establishment of

site drainage, and the application of overburden and organics. Opportunities for additional closure activities, including progressive reclamation, are also discussed.

All proposed closure and post-closure activities should be specific to the project and not a generic summary of best practices for reclamation.

### **5.1 Contouring and Re-establishment of Site Drainage**

Key to understanding the distribution of water in the post-closure landscape is a description of expected topography at project closure. Planned topography within the Project Area should be described and/or mapped with sufficient detail to represent drainage pathways and demonstrate where water will be at, or shallowly below (for example, <1 m), surface. Consideration should be given to the influence of different types (grain sizes) of overburden and soils on water movement.

Any surface inflows and outflows to closed depressions and low-lying areas should be identified, including connections to drainages (for example: watercourses) outside the limits of the Project Area.

Any opportunities for wetlands to naturally re-establish based on expected reconfiguration of site drainage should be highlighted, recognizing that wetlands require a near-continuous source of water to maintain their characteristics and functions.

### **5.2 Application of Overburden and Organics**

A description should be provided of how and where stockpiled tailings, overburden and organic material will be applied to the reconfigured landscape. If applicable, the description should demonstrate how the reconfiguration could support the re-establishment of wetlands. For example, the placement of enough fine-grained (for example: silt-rich) overburden in depressions or on level to near-level ground will promote moisture retention. Soil rich in organics, which may still include a viable seed bank if preserved in the stockpile, is a significant resource in reclamation and should be the preferred capping material to promote regrowth of vegetation.

Site-specific plans for the application of stockpiled overburden and organics should be provided. Plans should consider possible differences in the available and required volumes of material, given probable consolidation of stockpiled material and likely increases in ground surface area following earthworks. Application of overburden or organics on steep (for example, <2H:1V) slopes should be avoided. Consideration should be given to layering overburden, with the coarsest grain sizes (for example: gravel or cobble) at the bottom and the finest grain sizes (for example: sand and silt) near surface, for better moisture retention near surface and overall landform stability. Details should include, but not necessarily be limited to, planned distribution, thicknesses, application methods and timing (seasonal) of different materials.

### **5.3 Description of Additional Closure Activities**

Any additional closure (or post-closure) activities should be described, especially those with the potential to promote or counteract wetland recovery. The description should include final plans for the access roads or trails. Proposed access corridor conditions at project closure should be explained to enable evaluation of their potential long-term effects on local water flow patterns and wetland characteristics and functions.

### **5.3.1 Progressive Reclamation**

Progressive reclamation (the phased rehabilitation of ground conditions over the course of project operation) is the most effective approach for stabilizing terrain and re-establishing functional wetlands. An over-arching goal of progressive reclamation is to minimize the extent and duration of exposure of unvegetated, erosion-prone soils, which reduces potential soil loss and the cost and complexity of reclamation.

General approaches and site-specific plans for any progressive reclamation should be provided to demonstrate its feasibility. Descriptions should outline any planned staging of the operation and incremental reclamation activities.

## **5.4 Summary of Wetland Gains and Losses**

A summary should be provided of proposed wetland gains and losses following project closure activities (Sections 5.1 to 5.3). The summary forecasts a snapshot of ground conditions within the Project Area, immediately following project closure, based on which the Board evaluates their suitability for re-establishment of any wetlands. It is noted that there is likely to be a lag between project closure and establishment of particular wetland conditions. Therefore, the target presence and class(es) of wetland(s) should be described as the benchmark for evaluating proposed gains and losses, as opposed to the expected ground conditions immediately following project closure. The summary description should acknowledge and discuss any potential difficulties in achieving these target wetland class.

A conceptual post-closure map of the Project Area provides the most accurate representation of the proposed distribution and classes of wetlands and other terrain following project closure, and best demonstrates to the Board the feasibility of re-establishing wetlands. Mapping provides visual context for the specific areas of wetlands that will be permanently lost, replaced with the same wetland class, and replaced with a different wetland class. It also allows for the identification of any wetlands or other waterbodies proposed to be constructed outside pre-existing wetland limits.

### **5.4.1 Area of Wetland(s) that will be Permanently Lost**

The area of wetlands that will be permanently lost within the Project Area should be specified in hectares or square metres. Portions of wetlands are considered permanently lost if they no longer satisfy the criteria for one of the five wetland classes and/or if ground conditions (for example: water levels, soils and topography) at project closure are unlikely to support re-establishment of wetlands within 10 years.

### **5.4.2 Area of Wetland(s) to be Replaced with the Same Wetland Class**

While descriptions of the post-closure landscape should acknowledge that the ultimate targeted wetland classes may not immediately exist, the area of a particular wetland class to be replaced with the same wetland class should be specified in hectares or square metres. For example, an area of marsh to be lost during operation but then re-established as an area of marsh constitutes a “like-for-like” replacement with the same wetland class. The description of wetlands to be replaced with similar wetlands should include the expected methods/pathways through which the targeted wetland will develop in the post-closure landscape, including an expected timeframe.

### **5.4.3 Area of Wetland(s) to be Replaced with a Different Wetland Class**

The area of a particular wetland class to be replaced with a different wetland class should be specified in hectares or square metres. For example, an area of fen to be replaced with an area of shallow water constitutes a change in wetland class. Where wetlands cannot be replaced “like-for-like”, the description of replacement wetlands should include the expected methods/pathways through which the targeted wetland will develop in the post-closure landscape, including an expected timeframe.

### **5.4.4 Area of Newly Constructed Wetland or Other Waterbody**

The area of any new wetlands or other waterbodies proposed to be constructed outside the limits of pre-existing (natural) wetlands should be specified in hectares or square metres. In other words, any pre-existing upland (non-wetland) areas to be converted into wetlands or other waterbodies should be detailed. As for the descriptions above, the description of newly constructed wetlands or other waterbodies should also include the expected methods/pathways through which the targeted wetland will develop in the post-closure landscape, including an expected timeframe.

## **6. Monitoring of Reclamation Success**

Any plans to monitor reclamation success within the licence period (as a minimum) should be provided. Project allowances for conducting physical inspections or maintenance, and for monitoring water flows and quality and wetland conditions, should be outlined in the sections that follow.

### **6.1 Physical Inspections/Maintenance**

A description should be provided of how and with what frequency physical inspections of the Project Area are to be completed over the licence period, especially inspections of project operations that may maintain or adapt ground conditions to promote wetland re-establishment. Examples of maintenance may include activities such as localized re-contouring to optimize drainage and water levels, additional application of overburden and/or organics to improve moisture retention, or active seeding or planting of wetland species if natural colonization is unsuccessful. Consideration should be given to the availability of equipment to address any maintenance requirements, especially at project closure once access routes may have been decommissioned.

### **6.2 Water Levels and Flows**

A description should be provided of how and with what frequency water levels and flows entering, within and exiting the Project Area are to be monitored over the licence period. This provides a basis for verifying the effectiveness of reclamation in achieving its objectives, such as supporting the re-establishment of site drainage and wetland conditions, and minimizing water-related effects of the operation outside its limits. Details should be provided with respect to the proposed locations and methods for water level and flow monitoring, in sufficient detail that the expected reliability and representativeness of the results can be evaluated. Typical depths to groundwater in areas where water is not at surface is an important consideration in the potential for establishment and survival of wetland vegetation species.

### **6.3 Water Quality**

A description should be provided of how and with what frequency the quality of water entering, within and exiting the Project Area is to be monitored over the licence period. This provides a basis for verifying the effectiveness of reclamation in achieving the objectives of minimizing water quality effects of the operation outside its limits. Details should be provided about the proposed locations and methods for water quality monitoring, so that the expected reliability and representativeness of the results can be evaluated.

### **References Cited**

National Wetlands Working Group, 1997. The Canadian Wetland Classification System, 2nd Edition. Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada, 68 p.

**Appendix A**

**Select Resources to Support Project Planning and Wetland  
Information for Water Licence Applications in Wetlands**



**Table 1. Select Resources to Support Project Planning and Wetland Information for Water Licence Applications in Wetlands**

Source	Document Title	Overview of Relevant Content	Website Links
Ardea Biological Consulting	Southern Lakes Terrestrial Environment Baseline Studies 2010 Wetland Ecosystem Mapping	This report provides a summary of the methods and results of a wetland ecosystem mapping project completed for Yukon Energy Corporation (YEC). A total of 23 wetland and upland ecosite units was mapped within the Southern Lakes area of Yukon to provide baseline information to assess potential changes in wetland ecosystems from a proposed change in the operation of the Marsh Lake storage facility.	<a href="https://yukonenergy.ca/media/site_documents/Southern_Lakes/Baseline_Studies/Baseline%20Report%20WETLAND%20ECOSYSTEMS%20Southern%20Lakes%20Enhanced%20Storage%20Concept.pdf">https://yukonenergy.ca/media/site_documents/Southern_Lakes/Baseline_Studies/Baseline%20Report%20WETLAND%20ECOSYSTEMS%20Southern%20Lakes%20Enhanced%20Storage%20Concept.pdf</a>
Bonnaventure and Lewkowicz (2012)	A permafrost probability model for southern Yukon and northern British Columbia, Canada	This publication, the key results of which are conveniently available for download and through an online map viewer, provide continuous coverage of permafrost probability within a 30 m grid throughout southern Yukon.	<a href="http://permafrost.gov.yk.ca/data/permafrost_probability_map/">http://permafrost.gov.yk.ca/data/permafrost_probability_map/</a>
Ch'ihilii Chik Habitat Protection Area Working Group	The Ch'ihilii Chik Habitat Protection Area Recommended Management Plan	This management plan describes important values and provides recommendations to the parties for the long-term management of the Ch'ihilii Chik Habitat Protection Area. The ecological and cultural importance of the area to the Vuntut Gwitchin was the key principle driving the working group and this management planning process.	<a href="https://yukon.ca/sites/yukon.ca/files/engage/engage-chhilii-chik-habitat-protection-plan_0.pdf">https://yukon.ca/sites/yukon.ca/files/engage/engage-chhilii-chik-habitat-protection-plan_0.pdf</a>
CryoGeographic Consulting and Palmer Environmental Consulting Group Inc.	Mapping and classifying wetlands in the Indian River valley, Yukon	Five classes of wetlands are distinguished: bogs, fens, swamps, marshes and shallow water based on field investigations and interpretation of high-resolution aerial photography and satellite imagery. The description of the wetlands includes their distribution within the map area, associated landforms, soils, permafrost conditions, vegetation and (where possible) hydrological conditions.	<a href="http://www.emr.gov.yk.ca/mining/pdf/indian-river-wetlands-mapping-21jan2018.pdf">http://www.emr.gov.yk.ca/mining/pdf/indian-river-wetlands-mapping-21jan2018.pdf</a>  <a href="https://www.arcgis.com/apps/webappviewer/index.html?id=fde154c2332248899bee6875b314078b">https://www.arcgis.com/apps/webappviewer/index.html?id=fde154c2332248899bee6875b314078b</a>  <a href="http://www.emr.gov.yk.ca/mining/pdf/indian-river-wetlands-mapset-march2018.pdf">http://www.emr.gov.yk.ca/mining/pdf/indian-river-wetlands-mapset-march2018.pdf</a>
Ducks Unlimited Canada	Yukon Wetlands	Fact sheets providing diagnostic characteristics and benefits and functions of the five wetlands specific to Yukon.	<a href="http://www.env.gov.yk.ca/animals-habitat/documents/ducks_unlimited_wetland_factsheet.pdf">http://www.env.gov.yk.ca/animals-habitat/documents/ducks_unlimited_wetland_factsheet.pdf</a>

**Wetland Information Guidelines** Select Resources to Support Project Planning and Wetland Information for Water Licence Applications in Wetlands

Source	Document Title	Overview of Relevant Content	Website Links
Government of Alberta	Guideline for wetland establishment on reclaimed oil sands leases	This wetland guideline includes knowledge regarding reclamation of wetlands in the oil sands region. It describes an integrated approach to the planning, design, construction, monitoring and adaptive management of reclaimed wetlands.	<a href="https://open.alberta.ca/dataset/8d4f47e8-91a4-40e1-a0c1-4283aad35dfc/resource/c6ceb42f-f92f-431b-9a1d-73ef51cc9ed6/download/wetlandestablishmentreclaimedoilsands-2007.pdf">https://open.alberta.ca/dataset/8d4f47e8-91a4-40e1-a0c1-4283aad35dfc/resource/c6ceb42f-f92f-431b-9a1d-73ef51cc9ed6/download/wetlandestablishmentreclaimedoilsands-2007.pdf</a>
Government of Yukon: Energy, Mines and Resources	Lands Viewer and GeoYukon	These webmap viewers are public mapping tools of Yukon where layers of information related to mining, forestry, transportation, lands, ecology/biology, culture & heritage, and First Nations can be viewed and downloaded. They also enable access to low- to high-resolution aerial photography and satellite imagery for many parts of Yukon.	<a href="http://mapservices.gov.yk.ca/Lands/Load.htm">http://mapservices.gov.yk.ca/Lands/Load.htm</a> <a href="http://mapservices.gov.yk.ca/GeoYukon/">http://mapservices.gov.yk.ca/GeoYukon/</a>
Government of Yukon	Forest Resources Regulation – Wetlands Riparian Management Standards and Guidelines	The Forest Management Branch has established management guidelines and standards identifying operating procedures for forest resource harvesting and related activities as described in timber harvest plans, woodlot plans or site plans.	<a href="http://www.emr.gov.yk.ca/forestry/pdf/planning_standards_wetlands_riparian_management.pdf">http://www.emr.gov.yk.ca/forestry/pdf/planning_standards_wetlands_riparian_management.pdf</a>
Government of Yukon	Chapter 5 Focus on Ecosystems (Yukon State of the Environment Report)	This chapter discusses wetlands and forests in Yukon. There is a map of important Wetlands in Yukon and protection measures.	<a href="http://www.env.gov.yk.ca/publications-maps/documents/chap5.pdf">http://www.env.gov.yk.ca/publications-maps/documents/chap5.pdf</a>
Government of Yukon	Best Management Practices for Works Affecting Water in Yukon	The focus of this guide is to provide Yukon-specific BMPs that prescribe practical work-site guidelines that will help planners and developers protect water resources and comply with water regulations.	<a href="http://www.env.gov.yk.ca/publications-maps/documents/bestpractices_water.pdf">http://www.env.gov.yk.ca/publications-maps/documents/bestpractices_water.pdf</a>
Government of Yukon	Yukon State of the Environment Report 2018	This website provides an overview of wetlands and related resources materials in Yukon.	<a href="http://www.env.gov.yk.ca/publications-maps/report-land-important-wetlands.php">http://www.env.gov.yk.ca/publications-maps/report-land-important-wetlands.php</a>
Government of Yukon	ELC and mapping guidelines	These guidelines provide the Yukon ELC framework, mapping guidelines and case studies to provide expert knowledge of Yukon landscapes and accessible map products.	<a href="http://www.env.gov.yk.ca/animals-habitat/documents/ELC-classification-mapping-guidelines-version1.0.pdf">http://www.env.gov.yk.ca/animals-habitat/documents/ELC-classification-mapping-guidelines-version1.0.pdf</a>
Indian and Northern Affairs Canada	Handbook of Reclamation Techniques in the Yukon	This handbook offers a range of options and approaches to minimizing environmental impact to the land caused by placer exploration or mining, and to provide the rationale behind them.	<a href="http://www.emr.gov.yk.ca/mining/pdf/handbook_placer_regulations.pdf">http://www.emr.gov.yk.ca/mining/pdf/handbook_placer_regulations.pdf</a>

## Wetland Information Guidelines

Source	Document Title	Overview of Relevant Content	Website Links
Klondike Placer Miner's Association	Best Management Practices for Placer Mining in Yukon Wetlands – Recommendations and Guidelines	This report provides practical and affordable guidelines and recommendations for reclaiming placer-mined wetlands in Yukon. It is based on recent local field research by the authors and an extensive literature review of wetland reclamation for various industries.	<a href="https://www.kpma.ca/wp-content/uploads/2017/07/KPMA-Wetland_reclamation-final.pdf">https://www.kpma.ca/wp-content/uploads/2017/07/KPMA-Wetland_reclamation-final.pdf</a>
Klondike Placer Miner's Association	Wetland Reclamation for Placer Mining	This report provides practical and affordable guidelines and recommendations for reclaiming placer-mined wetlands in Yukon. It is based on recent local field research by the authors and an extensive literature review of wetland reclamation for various industries.	<a href="https://www.kpma.ca/wp-content/uploads/2017/07/KPMA-Wetland_reclamation-final.pdf">https://www.kpma.ca/wp-content/uploads/2017/07/KPMA-Wetland_reclamation-final.pdf</a>
Natural Resources Canada	Canadian Forest Services Publications	This website captures land cover information (Earth Observation for Sustainable Development of Forests (EOSD)) for supporting forest monitoring and management.	<a href="https://cfs.nrcan.gc.ca/publications?id=29220">https://cfs.nrcan.gc.ca/publications?id=29220</a>
National Wetlands Working Group	The Canadian Wetland Classification System (2nd edition)	This guideline provides the national wetland classification system methods.	<a href="http://www.env.gov.yk.ca/animals-habitat/documents/canadian_wetland_classification_system.pdf">http://www.env.gov.yk.ca/animals-habitat/documents/canadian_wetland_classification_system.pdf</a>
Paul Matheus and Toos Omtzigt	Yukon Revegetation Manual – Practical Approaches and Methods	This manual describes methods for planning and implementing revegetation projects in Yukon. It takes a practical approach based on experience with various methodologies and plant species that have proven to be successful in the territory over the past three decades.	<a href="https://www.yukoncollege.yk.ca/sites/default/files/inline-files/Yukon-Revegetation-Manual.pdf">https://www.yukoncollege.yk.ca/sites/default/files/inline-files/Yukon-Revegetation-Manual.pdf</a>
Yukon Chamber of Mines	Yukon Mineral and Coal Exploration Best Management Practices and Regulatory Guide	This guideline document provides a practical overview oriented toward exploration activities on all lands in Yukon, with reference to pertinent regulatory policy and Best Management Practices.	<a href="https://www.yukonminers.org/index.php/all-docs/guidebooks/3-yukon-mineral-and-coal-exploration-best-management-practices-and-regulatory-guide/file">https://www.yukonminers.org/index.php/all-docs/guidebooks/3-yukon-mineral-and-coal-exploration-best-management-practices-and-regulatory-guide/file</a>
Yukon Ecoregions Working Group	Ecoregions of the Yukon Territory	This report is a comprehensive document of ecoregion descriptions and current scientific references about natural resources in Yukon. Technical contributions have been gathered from a wide range of resource professionals from federal and territorial agencies, universities and non-government organizations.	<a href="http://www.env.gov.yk.ca/animals-habitat/documents/ecoregions_of_yukon_reduced.pdf">http://www.env.gov.yk.ca/animals-habitat/documents/ecoregions_of_yukon_reduced.pdf</a>
Yukon Geological Survey	Yukon Digital Bedrock Geology Compilation	This website includes links and references to all available surficial geology mapping coverage in Yukon, in both PDF and GIS formats.	<a href="http://www.geology.gov.yk.ca/databases_gis.html">http://www.geology.gov.yk.ca/databases_gis.html</a>
Yukon Geological Survey	Yukon Digital Surficial Geology Compilation	This website includes links and references to all available surficial geology mapping coverage in Yukon, in both PDF and GIS formats.	<a href="http://www.geology.gov.yk.ca/digital_surficial_data.html">http://www.geology.gov.yk.ca/digital_surficial_data.html</a>