

APPENDIX C ENVIRONMENTAL PROTECTION PLAN

Blue Hill Wind Energy Project

Environmental Protection Plan

Volume 1 - Construction Phase



December 2017

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1.0 INTRODUCTION

As part of the Environmental Impact Statement (EIS) for the Blue Hill Wind Energy Project (the Project), Algonquin Power Co. (Algonquin) has committed to the development of an Environmental Protection Plan (EPP) to summarize Algonquin's corporate commitments and regulatory requirements for the Project's environmental management. The EPP is divided into 3 Volumes and a map atlas (included in the Exhibits section) outlining site-specific information.

Volume 1 of this EPP identifies the **Contractor responsibilities** with respect to environmental protection procedures during Project construction. Algonquin intends for the Contractor to use Volume 1 of this EPP, with reference to the Project EIS document, as guidance documents to support the implementation of appropriate site-specific environmental protection measures.

2.0 REGULATORY FRAMEWORK

The central elements of the regulatory framework, which creates the context for this EPP, are noted below (grouped by jurisdiction).

Federal:

*Fisheries Act, 1985 (amended 2013);
Migratory Birds Convention Act, 1994 and Migratory Birds Regulations;
Species at Risk Act, 2002;
Canadian Environmental Protection Act, 1999.*

Provincial:

*The Environmental Assessment Act;
The Environmental Management and Protection Act, 2010 and Hazardous Substances and Waste Dangerous Goods Regulations;
The Dangerous Goods Transportation Act and Dangerous Goods Transportation Regulations
The Wildlife Act, 1998;
The Heritage Property Act;
The Saskatchewan Employment Act and Occupational Health and Safety Regulations, 1996;
The Planning and Development Act, 2007;
The Water Security Agency Act;
The Weed Control Act, 2010.*

Municipal:

Municipal bylaws relating to land development are also applicable to this Project. Algonquin has worked with the RMs of Morse and Lawtonia such that the Project is in alignment with their respective development plan requirements.

3.0 PROJECT ACTIVITIES AND SCHEDULE

A proposed schedule of Project activities for the construction phase is provided in Appendix A. The timing of Project construction activities will be conducted such that effects to the environment are reduced or avoided (refer to Section 7.2 of this volume for timing of clearing, if required). However, the schedule is influenced by and subject to change depending on the timing of the receipt of Ministerial approval.

4.0 ENVIRONMENTAL MANAGEMENT – ROLES AND RESPONSIBILITIES

The responsibilities for Project environmental management are as follows:

Contractor Responsibilities:

A General Contractor will be assigned to construct the Project. The General Contractor will hire a Construction Manager. The responsibilities of the General Contractor Construction Manager (“Construction Manager”) with respect to the EPP will be as follows:

- Responsible for implementing the Project EPP volume 2 and volume 3 (if applicable).
- Communicate environmental protection procedures outlined in the EPP to Contractor staff.
- Provide the most recent version of the EPP and parts therein at the construction site at all times during construction.
- Promote compliance with federal and provincial environmental legislation and municipal bylaws (see Section 2).

Owner Responsibilities:

Algonquin will retain the services of an “Environmental Support Specialist”. The Environmental Support Specialist will:

- Be retained prior to construction start-up and will inspect construction works to support conformance with this volume of the EPP.
- Notify the General Contractor’s Construction Manager and Owner’s representatives of any environmental issues determined to be non-compliant with the EPP.
- Advise the General Contractor’s Construction Manager on methods required to mitigate environmental issues should there be any uncertainty.
- Communicate environmental-related concerns of the General Contractor’s Construction Manager to Algonquin’s representatives.

The Owner will be responsible for communicating any alterations of the Project design or layout to the General Contractor’s Construction Manager, including any updates to the EPP and parts therein.

5.0 CONTACTS AND REPORTING

The reporting matrix to be followed when communicating environmental issues for the purpose of confirming the EPP is provided in Appendix B. This matrix includes contact information which may be periodically updated and distributed to the Construction Manager.

6.0 PROJECT LAYOUT AND SITE-SPECIFIC CONDITIONS

The EPP Overview Map in the Exhibits, illustrates the Project layout as of December 2017. Should the Project layout be revised before or during Project construction, Algonquin will communicate the revised layout to the Contractor. The Project consists of a maximum of 56 wind turbine generators (WTGs), access roads, collector lines, an operation and maintenance building, and a substation. The EPP Overview Map also shows contingency locations for WTGs and the substation which have been included as part of the maximum Project layout in order to be conservative.

The draft EPP figures in the Exhibits represent a map atlas showing constraints within the Project area, including at each WTG, access road and collector line site. If additional constraint conflicts are identified, these figures will be updated. The environmental protection measures necessary to mitigate or avoid areas of interest with respect to any environmentally sensitive features are listed below in Section 7.

7.0 ENVIRONMENTAL PROTECTION MEASURES

The Construction Manager, assisted by the Environmental Support Specialist, will confirm that the following environment protection measures are applied to the construction of the Project facilities. Sensitive environmental features that require site-specific mitigation measures (e.g., revegetation of natural areas) are identified in the draft EPP figures in the Exhibits.

In addition, the EIS prescribes mitigation commitments during construction (as well as operation and decommissioning) which must be adhered to in order to be in compliance. These commitments have been used as a basis for development of the EPP.

7.1 PROJECT SITE ACCESS

Access to the Project Site during the construction phase of the Project will be limited to authorized personnel (e.g., Construction Manager, the Environmental Support Specialist, and other construction staff site manager). Appropriate signage will be posted in advance of Project activities to indicate access restrictions. Landowners may access construction areas on their land with prior authorization from the Construction Manager, providing they follow all environmental, health and safety procedures. Landowners will be advised in advance of construction activities on their property.

7.2 VEGETATION CLEARING AND SOIL STRIPPING

When clearing areas for construction, the following additional mitigation measures will be followed:

- If there is any construction in native prairie, which is very limited as per the EIS, the boundaries of the vegetation clearing will be staked in the field. The Construction Contractor will confirm that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to work areas are not disturbed.
- Construction activities will be timed to occur outside of the bird nesting season (April 26 to August 15) (ECCC 2017) and following any additional timing and setback restrictions as outlined in the SKMOE Activity Restriction Guideline (SKMOE 2017b).
- If construction cannot avoid the nesting season, vegetation clearing activities will occur prior to the bird nesting season and pre-construction surveys (e.g., nesting bird surveys) will be completed by a qualified environmental monitor prior to the start of construction activities.
- Construction vehicles and personnel will stay within the defined Project construction area.
- Minimize clearing to the extent feasible.
- Avoid clearing slopes unless adequate erosion control measures are used.
- Grade disturbed soil to a stable slope.
- Stockpile cleared topsoil for redistribution at disturbed areas not required during Project operation.
- Stockpile material will be stored greater than 30 m from the edge of rare plant occurrences or, where not possible, cover the piles when not in use.
- Stockpiles left for longer than 30 days will be covered or stabilized by seeding, sodding, mulching or equivalent.
- Halt construction during extreme weather events (e.g., heavy rainstorms) to avoid rutting and compaction that could lead to topsoil loss or erosion.
- Prevent sediment from entering any nearby waterbodies by placing overburden or topsoil stockpiles well above the high-water mark.

7.3 ACCESS ROADS

Access roads will be sited, as best as possible, to reduce disruption to the following environmental features should they be present:

- Wetlands
- Drainage ditches
- Other waterbodies, such as potholes
- Soils with low weight bearing capacity
- Sensitive biological areas
- Cultural and historic resources
- Farmyards, shelter belts and fences

The following mitigation measures will be followed during construction:

- Dust control measures will be implemented along access roads when needed to suppress dust conditions.
- Access roads will maintain a 100 m setback from wetlands, where possible.
- Speed limits will be implemented for specific areas of concern.
- The Contractor will communicate with local authorities with regards to traffic management plans.

Landowners will also be further consulted regarding the location of access roads before construction begins.

7.4 STREAM CROSSINGS

The current Project layout does not anticipate the need for any stream crossings. Should the Project layout be altered or should environmental conditions of the Project site change during Project construction such that a stream crossing (or alteration to the configuration of the bed, bank, or boundary of any river, stream, lake, creek, marsh, or other watercourse or water body) be required, appropriate stream crossing procedures will be implemented by the Contractor in accordance with an Aquatic Habitat Protection Permit (AHPP). In addition to these requirements the following mitigation measures will be followed for any stream or water crossing:

- Construction equipment will only cross streams/drainage channels at established permanent and temporary crossings.
- Minimal alterations to surface water drainage pattern and installation of properly designed and sited culverts as required to maintain flows.

If required, the Environmental Support Specialist will inspect each stream crossing to confirm the specified mitigation measures are used. The Construction Manager and Environmental Support Specialist will confirm that standard operating procedures for stream crossings are followed.

7.5 WETLANDS

As described in the EIS, the Project design setback to wetlands is 100 m. However, the current Project layout will also be field-truthed in an effort to maintain 100 m setbacks from wetlands for access roads and collector lines, where possible. Standard industry practices, avoidance measures, and the Project-specific mitigation measures listed below will be implemented during construction.

- Maintain 100 m setbacks from wetlands for access roads and collector lines, where possible.
- Maintain existing vegetation buffers around water bodies, where possible.
- Submit notifications and applications to regulators for wetland effects, as required, with the appropriate lead time.
- Complete work during dry or frozen ground conditions to lessen soil compaction.
- If working in saturated soils during non-frozen ground conditions, use equipment and techniques that distribute ground pressure (e.g., swamp mats, geofabric and padding, corduroy) to avoid soil compaction and admixing.
- Use silt fencing and direct surface runoff away from wetlands and waterbodies.
- Restrict water taking during periods of extremely low flow.
- Refueling or fuel storage activities will occur at least 100 m from wetlands.
- Minimal alteration to surface water drainage patterns and installation of culverts as required to maintain flows.
- Install properly designed and sited culverts in water crossings, along roads and permanent facilities to maintain pre-disturbance surface run-off as much as possible.
- Clean up wetlands in such a manner that compaction and rutting are reduced.
- Use natural re-vegetation for wetlands in native vegetation types.

Site-specific mitigation measures will be implemented should any future alterations to the Project layout be required such that wetlands areas may need to be temporarily disturbed and the Contractor will work in accordance with an AHPP.

7.6 EROSION AND SEDIMENTATION CONTROL

Erosion and sediment control measures will be implemented prior to construction and maintained during the construction phase. The following procedures and mitigations will be used as directed by the Construction Manager, to control erosion and sedimentation:

- Daily monitoring
- Installation of silt fencing where soils with erosion potential occur
- Use a three-lift soil stripping process where required, such as saline or stony soil, instead of a two-lift process
- Reduce the duration between stripping and excavation to the extent feasible
- Avoid stockpiling soil to reduce soil erosion when practical
- Store stockpiles of saline and stony soils separately
- Store stockpiles of topsoil and subsoils separately and do not place subsoil directly on topsoil
- Stabilize stockpiles left for longer than 30 days by covering or by seeding, sodding, mulching or equivalent
- Avoid clearing slopes unless adequate erosion control measures are used.
- Grade disturbed soil to a stable slope
- Restrict heavy machinery or traffic on slopes.
- Retain existing vegetation where feasible
- Retain soil to use during rehabilitation and revegetation of disturbed areas not required for operation and maintenance
- Reduce vehicle traffic on exposed soil to the extent feasible
- Direct surface runoff away from wetlands and waterbodies

7.7 DRAINAGE PROTECTION

The Construction Manager will confirm that the following procedures are followed to maintain drainage protection:

- Reduce alteration to surface water drainage patterns and install culverts as required to maintain flows
- Install properly designed and sited culverts in water crossings, along access roads and permanent facilities to maintain pre-disturbance surface run-off as much as possible
- Stockpile any soil from excavations and trenches in an area where natural drainage will not be impeded
- Avoid and protect drainage ditches, field tiles and field drains

7.8 LOCAL WATER USE

Saskatchewan Water Security Agency (WSA) approval is required for the temporary use of any surface or ground water for road construction, firefighting or other construction purposes. Algonquin will discuss proposed work with owners of domestic wells and contact the Saskatchewan WSA (<https://www.wsask.ca/About-WSA/Regional-Offices/>) Moose Jaw office before commencing construction (contact: 306-694-3900). The regional office will be contacted in advance of any water withdrawals. Water withdrawals will be restricted during periods of low flow and Algonquin will advise the Contractor of restrictions regarding the use of domestic wells and surface waters, as required.

7.9 VEGETATION AND WILDLIFE

Field surveys conducted in 2017 in support of the EIS identified locations of sensitive features (e.g., sharp-tailed grouse leks, rare plants). In order to avoid disturbance, the appropriate activity restriction setbacks, in accordance with SKMOE's Activity Restriction Guidelines (SKMOE 2017b) have been applied to these features and are shown in the draft EPP figures in the Exhibits. Where there is potential to infringe on sensitive features, site specific mitigations will be developed by the Environmental Support Specialist and reviewed with SKMOE to determine the appropriate approach.

The following mitigation measures will be used to protect vegetation and wildlife at the site:

7.9.1 Vegetation

- Based on 2017 rare plant surveys, known occurrences of plant SOMCs are being avoided by the current Project layout. If previously undetected rare plants are found during construction, mitigation measures will be determined on a species-specific basis in consultation with rare plant ecologists, Algonquin, and SKMOE.
- Prior to the start of construction, the topsoil/seedbank will be stripped and preserved, then reapplied in suitable rehabilitation areas post-construction.
- If there is any construction in native prairie, which is very limited as per the EIS, the boundaries of the vegetation clearing will be staked in the field. The Construction Contractor will ensure no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to work areas are not disturbed
- Rare plant areas will be fenced or staked prior to the start of construction.
- Use areas of non-native land cover (e.g., cultivated land) for temporary workspaces.
- Dust control measures will be implemented along access roads within areas of native vegetation types.
- Where active reclamation is deemed necessary by a qualified environmental monitor, sites on native vegetation types will be re-vegetated using appropriate Certified No. 1 seed (Canada Seed Growers' Association) unless it is not available for a chosen reclamation species. Provincial regulators should be consulted in the selection of native plant seed mixes.

7.9.2 Wildlife

- The Environmental Support Specialist will review proposed activities with the Construction Manager and will recommend site-specific impact management practices.
- Construction activities will be timed to occur outside of the bird nesting season (April 26 to August 15) (ECCC 2017) and following any additional timing and setback restrictions as outlined in the SKMOE Activity Restriction Guidelines (SKMOE 2017b).
- If construction cannot avoid the nesting season, vegetation clearing activities will occur prior to the bird nesting season and pre-construction surveys (e.g., nesting bird surveys) will be conducted by a qualified environmental monitor prior to the start of construction activities. If an active nest is found, Algonquin will consult with the SKMOE to identify appropriate mitigation measures, such as species-specific setback distances and activity timing restrictions as outlined by the SKMOE.
- Adjustments to temporary workspaces will be made to avoid setbacks around identified sensitive features (including sharp-tailed grouse leks, northern leopard frog breeding pond, and rare plants; see Exhibits). Where this is not possible, alternative mitigation options will be developed in consultation with SKMOE.
- Hunting and trapping will be prohibited within the Project area for Project personnel.

7.10 INVASIVE SPECIES

Mitigation measures for invasive species will be implemented for the construction phase of the Project. In addition, the following procedures and mitigation measures will be used as directed by the Construction Manager/ Supervisor, to control invasive species:

- To reduce the potential for the introduction of invasive species, all equipment should arrive at the Project site free of soil or vegetative debris.
- Locations of noxious and prohibited weeds within the Project construction area will be documented and presented to the Contractor, and staked for avoidance.
- Access routes will avoid known prohibited and noxious weed populations.
- The Environmental Support Specialist will review proposed activities with the Construction Manager and will recommend site-specific invasive species management practices.
- Best management practices will be used during transportation activities, such as cleaning transportation vehicles between loads and tarping loads to reduce material falling from loads, etc. (Saskatchewan Forage Council 2011).
- The potential for growth of prohibited and noxious weeds in the disturbed areas along access road right-of-way will be reduced by revegetation efforts in these disturbed areas. Erosion control (straw matting or bales) and any plant material to be used for revegetation will be free of prohibited and noxious weeds identified in *The Weed Control Act*. Restricted seed lists and acceptable revegetation mixtures (preferably locally sourced native seed, gathered and applied utilizing specialized machinery).
- Marshalling and storage yards will be kept free of weeds.

If, despite best mitigation efforts outlined above, prohibited weeds are inadvertently introduced during construction onto private landowner property, Algonquin will commit to the following action plan.

- Notify the landowner immediately. In addition, the Ministries of Agriculture and Environment will be contacted.
- The area will be flagged by company personnel, with the landowner present or represented.
- Monitoring of the area will be conducted at an appropriate schedule and frequency by Algonquin and the landowner with results documented. Additional corrective action will be taken, if necessary.

7.11 HERITAGE RESOURCES

The following mitigation measures for heritage resources will be implemented during construction:

- A 200 m avoidance buffer for siting permanent Project infrastructure and a 100 m avoidance buffer for temporary construction activities will be established around heritage sites EbNs-2 and EbNt-6 by a professional archaeologist to protect them from construction vehicles and disturbance.
- A 15 m buffer will be staked around heritage site EbNs-3 by a professional archaeologist to prevent vehicle disturbance during construction.
- If new archaeological, paleontological or historic artifacts are discovered during construction, work will be suspended at those sites. Discovery of such sites will be communicated immediately to Algonquin and the Environmental Support Specialist. Work will not resume at those sites until advised by Algonquin, and consultation with the Environmental Support Specialist, who will contact the Heritage Conservation Branch of the Saskatchewan Ministry of Tourism, Parks Culture and Sport.

7.12 SPILL RESPONSE PLAN

The Contractor will develop a spill response plan and train employees on appropriate procedures. The Construction Manager will provide guidance on other procedures to be followed including:

- Before construction kick-off, the Contractor will be responsible for providing all spill response equipment and materials onsite or readily available to contain and recover fuels and other fluids associated with construction machinery.
- Locate fuel storage and equipment servicing areas a minimum distance of 100 m from any wetland/ waterbody. In the event that refueling takes place in areas less than 100 m away (e.g., refueling large crane), the Contractor will have secondary containment/spill prevention measures in place.
- Hazardous materials and industrial wastes will be stored at least 100 m from a wetland, watercourse or water body.
- At all times, the General Contractor will be required to have materials available at the construction sites to contain and recover fuel spills (in accordance with The Environmental Management and Protection Act (Government of Saskatchewan 2010))
- Project staff with waste management and hazardous materials responsibilities will be educated according to regulatory requirements specific to the Project.
- Personnel who will be handling waste materials will possess valid workplace hazardous materials information system training. All fuel truck drivers—and drivers transporting waste or chemicals—will have Transportation of Dangerous Goods certification. Procedures for safe loading and unloading of products will be followed.
- Report spills of fuels or other contaminants to the Saskatchewan Environment Spill Reporting Line at (800) 667-7525.

7.13 LAYDOWN AREAS

The following environmental protection measures or other measures as authorized by the Construction Manager in consultation with the Environmental Support Specialist will be used at marshalling yards:

- Locate fuel storage and equipment servicing areas a minimum distance of 100 meters from any wetland/ waterbody.
- At all times, the General Contractor will be required to have materials available at the construction sites to contain and recover fuel spills.
- All handling and storage of materials will conform to safety guidelines and regulatory requirements.
- Fuel / spill containment materials must be available at the site to contain and recover fuels and other fluids associated with construction machinery.
- Report spills of fuels or other contaminants to the Saskatchewan Environment Spill Reporting Line at (800) 667-7525.

7.14 MATERIAL HANDLING AND STORAGE

The following material handling and storage procedures or other measures as authorized by the Construction Manager in consultation with the Environmental Support Specialist will be followed:

- Potentially hazardous materials will be stored and handled at dedicated areas in accordance with all regulatory requirements. All fuel storage and equipment-servicing areas will be located a minimum of 100 m away from any wetland/ waterbody; all handling and storage of materials will conform to safety guidelines and regulatory requirements.
- All hazardous materials will be labeled in accordance with applicable regulatory requirements.

- Hazardous materials will be stored in appropriate containment in accordance with applicable regulations.
- The Environmental Support Specialist will inspect storage areas regularly.
- Hazardous materials will be transported in accordance with the *Dangerous Goods Handling and Transportation Act*.

7.15 WASTE MANAGEMENT

All domestic and construction waste will be disposed of at an approved landfill. All hazardous waste will be disposed of to an approved hazardous waste disposal facility. All sewage and seepage from on-site sanitary facilities will be disposed in accordance with the Provincial Regulations.

7.16 EMERGENCY RESPONSE

Should an emergency situation occur, emergency response procedures and contacts are provided in an Emergency Response Plan (Volume 3 of the EPP).

7.17 ENVIRONMENTAL PROTECTION FOR URBAN AREAS

No WTGs or other infrastructure will be located within urban areas. Thus environmental protection measures for urban areas are not required.

7.18 ENVIRONMENTAL MEASURES FOR AGRICULTURAL LANDS

The Construction Manager, in consultation with the Environmental Support Specialist, will confirm that construction is carried out in a manner that reduces the potential for disruption to agricultural practices. Landowners will be consulted to confirm that construction activities do not excessively affect agricultural activities.

7.19 MAINTENANCE PRACTICES

Throughout the construction phase of the Project, the Construction Manager will confirm that regular inspections and appropriate maintenance of construction vehicles and equipment is conducted.

8.0 PROJECT SITE INSPECTION

Regular project site inspections will occur throughout the lifetime of the Project to confirm that the Project is being constructed and operated in compliance with applicable environmental regulations, municipal bylaws and in accordance with the EPP.

8.1 PRE-CONSTRUCTION INSPECTION

The Environmental Support Specialist will perform an initial pre-construction inspection to identify the environmental issues at the site. The Environmental Support Specialist will inform Algonquin, who will then pass along this information to the Construction Manager of these issues prior to beginning construction.

8.2 CONSTRUCTION PHASE INSPECTION

The Environmental Support Specialist will conduct periodic visits to the Project site during construction and will advise the site manager and Construction Manager of any outstanding environmental issues.

8.3 POST-CONSTRUCTION INSPECTION

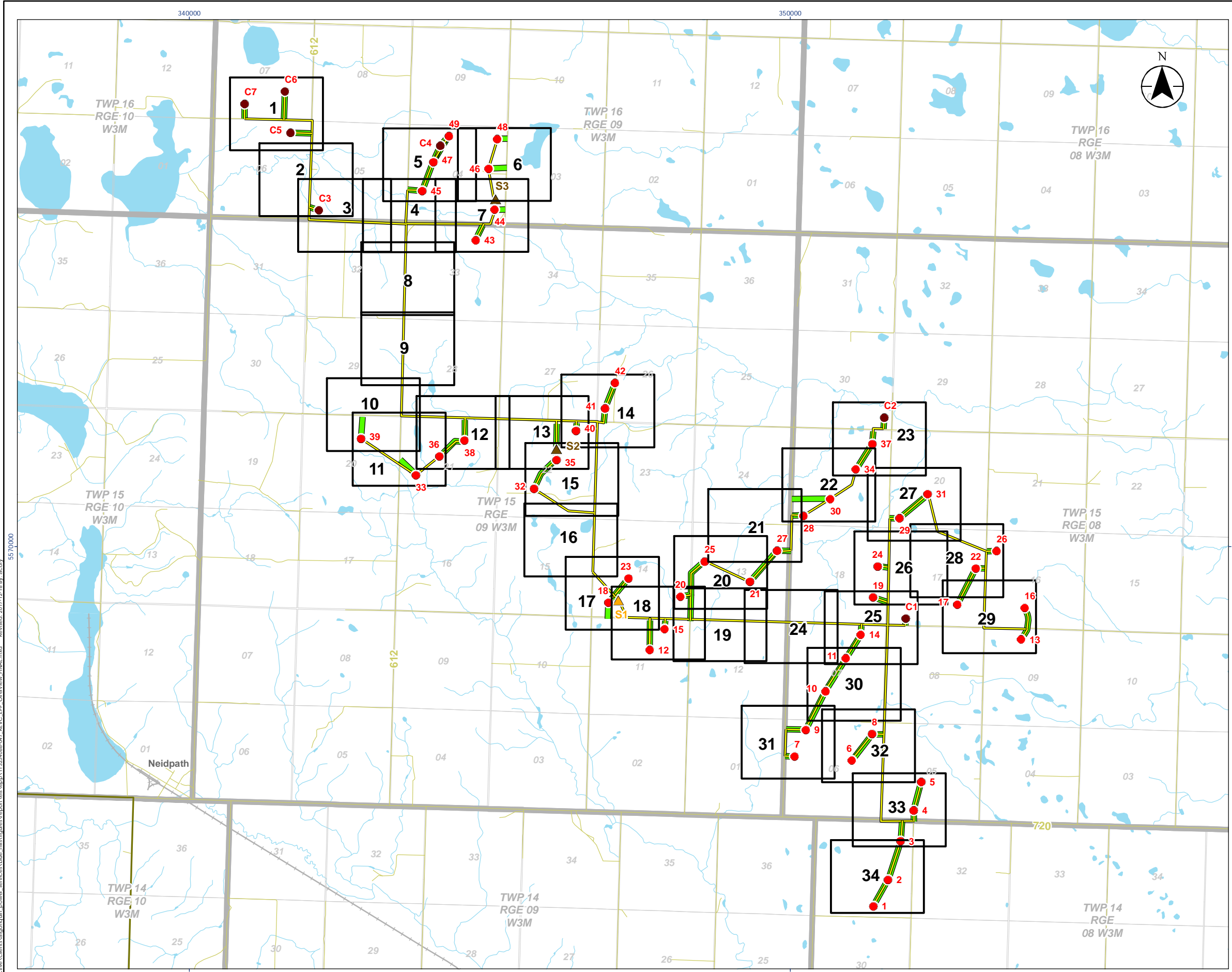
After construction is completed, the Environmental Support Specialist will conduct a post-construction inspection.

Activities that will be performed by the Environmental Support Specialist include, but may not be limited to:

- Inspection of permanent stream crossings (if required).
- Inspection of areas that were revegetated to confirm that revegetation is occurring
- Monitoring erosion prone areas to confirm that stabilization procedures are effective.
- The Environmental Support Specialist will identify any areas requiring further attention and advise the Construction Manager of these issues.

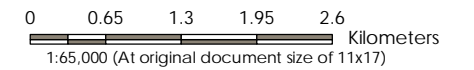
Exhibits

Note: The draft EPP figures included in this Exhibits section are based on the maximum 56 turbine layout and are intended to demonstrate the mapping scale and approach to addressing site-specific features during construction. The final set of EPP figures will be based on the approved layout (with reduced number of turbines, if applicable). It is normal practice to update the EPP figures before and during construction as more site-specific information becomes available.



- EPP Mapsheet
- Proposed Project Layout
 - Wind Turbine Generator
 - Contingency Wind Turbine Generator
 - ▲ Substation
 - ▲ Contingency Substation
 - New Build Permanent Access Road
 - New Electrical Collector Line
 - Major Road
 - Minor Road
 - Railway
 - Watercourse
 - Waterbody
 - Township
 - Section

Disclaimer: The Project layout will be subject to minor modifications as detailed engineering progresses to a finer scale. For example, further adjustments may occur such that access roads and collector lines overlap with existing truck-trails, existing cattle trails, property lines, etc., in order to further reduce potential effects.



- Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
 2. Base features produced under license with the Government of Saskatchewan and the Government of Canada
 3. Layout: Algonquin, Sept 06, 2017, V3



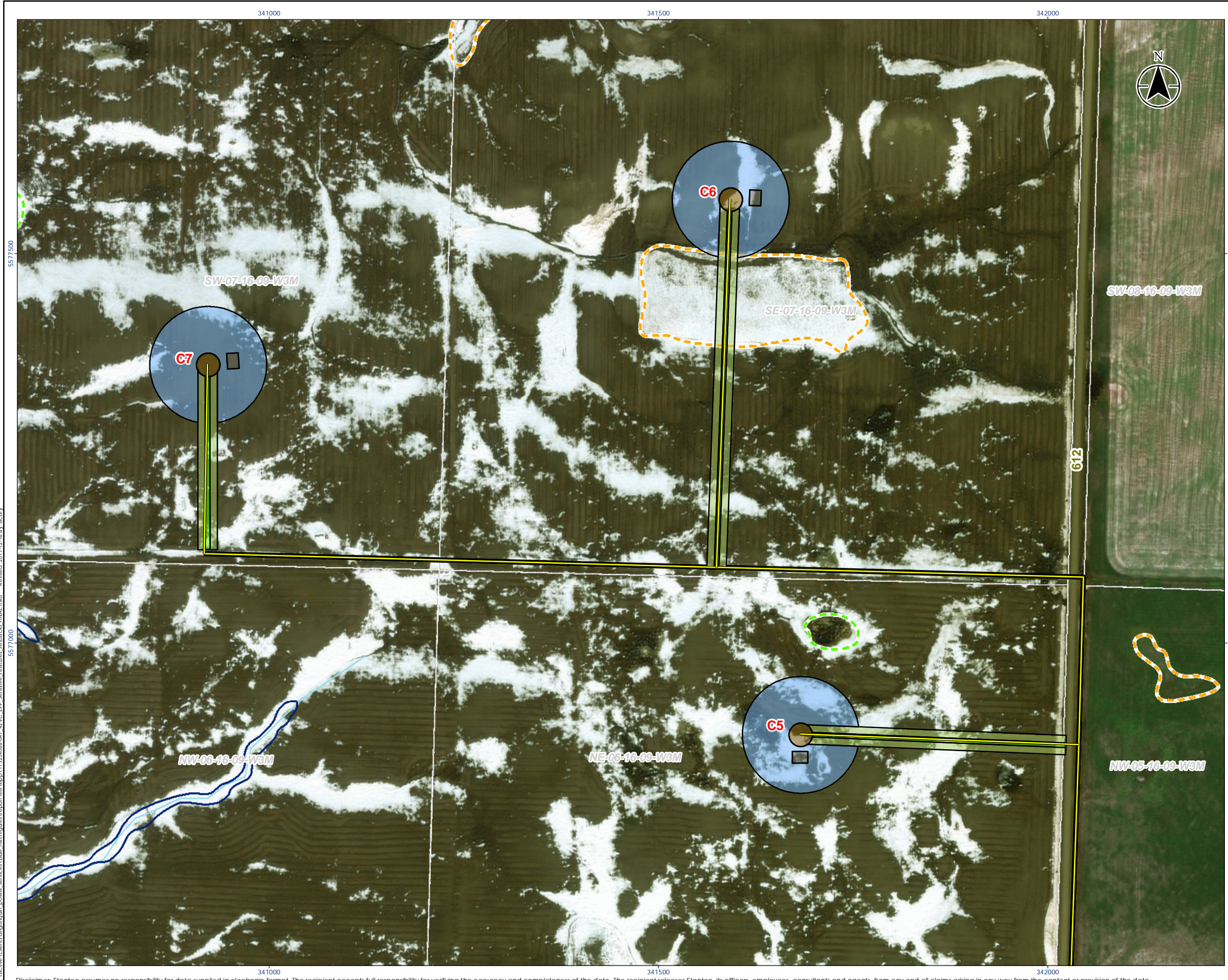
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acory on 2017-12-18
 Technical Review by celdem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - Overview

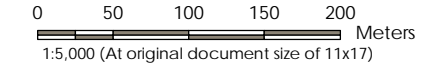
Title
 Environmental Protection Plan - Sensitive
 Features and Setbacks

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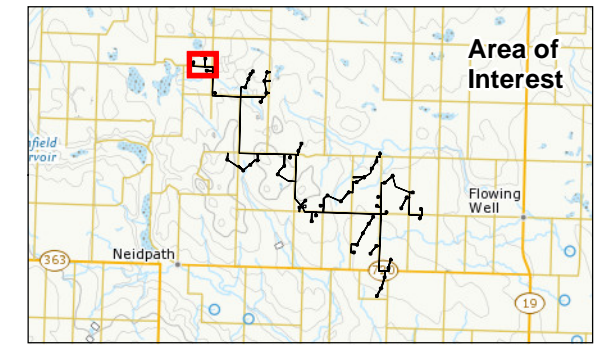


- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Drainage
- Watercourse
- Quarter Section

Disclaimer: The Project layout will be subject to minor modifications as detailed engineering progresses to a finer scale. For example, further adjustments may occur such that access roads and collector lines overlap with existing truck-trails, existing cattle trails, property lines, etc., in order to further reduce potential effects.



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 13N
 2. Base features produced under license with the Government of Saskatchewan and the Government of Canada
 3. Project Development Area base on layout from Algonquin, Sept 06, 2017, V3
 4. Imagery: ESRI World Imagery, June 2013.



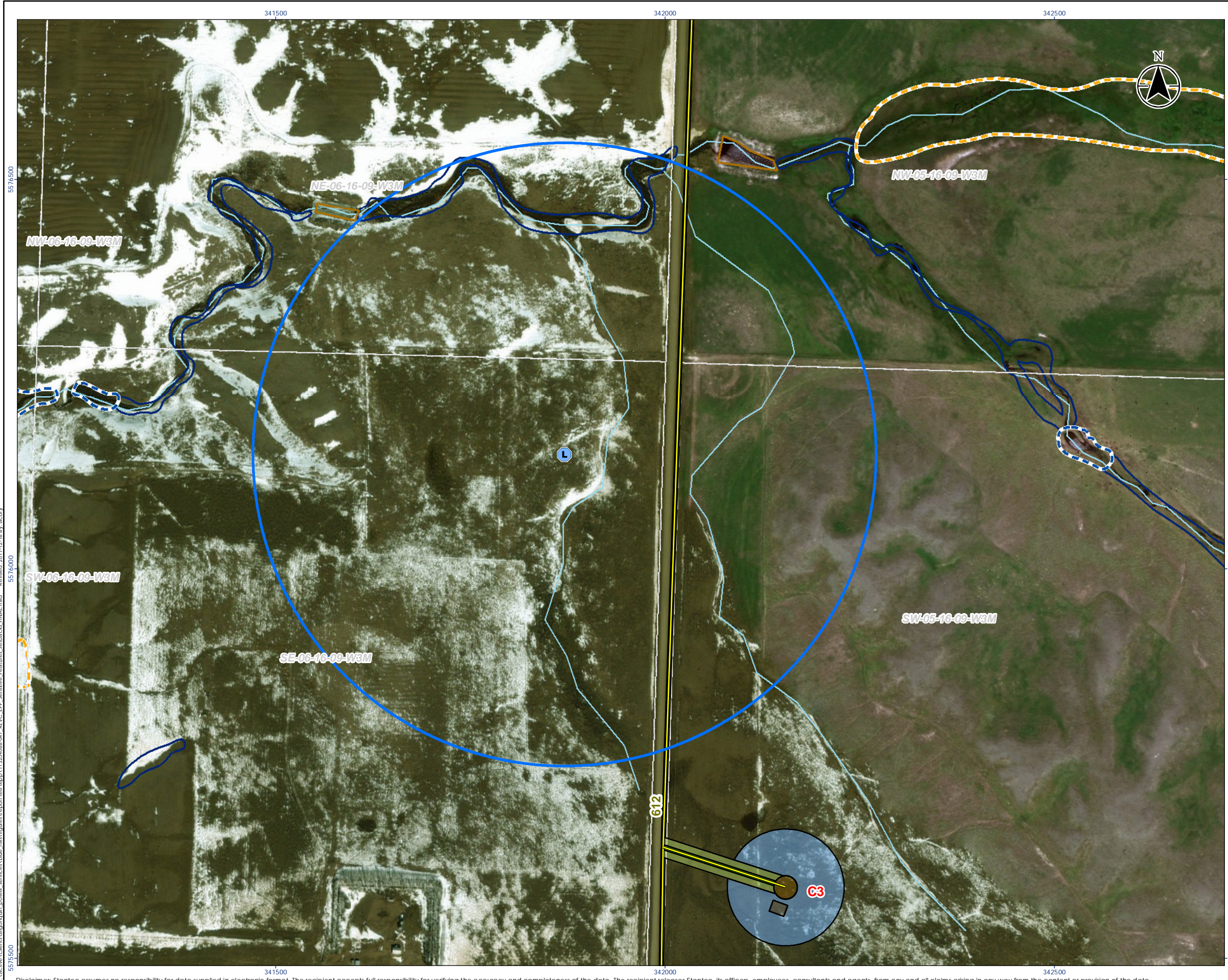
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 113254088-047 REV C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 1

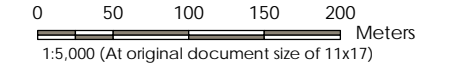
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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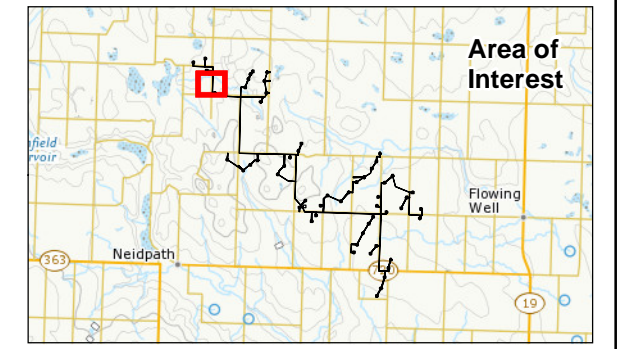


- Sharp-tailed Grouse Lek
- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 5 - Permanent Wetland
- Dugout
- Drainage
- Watercourse
- Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.

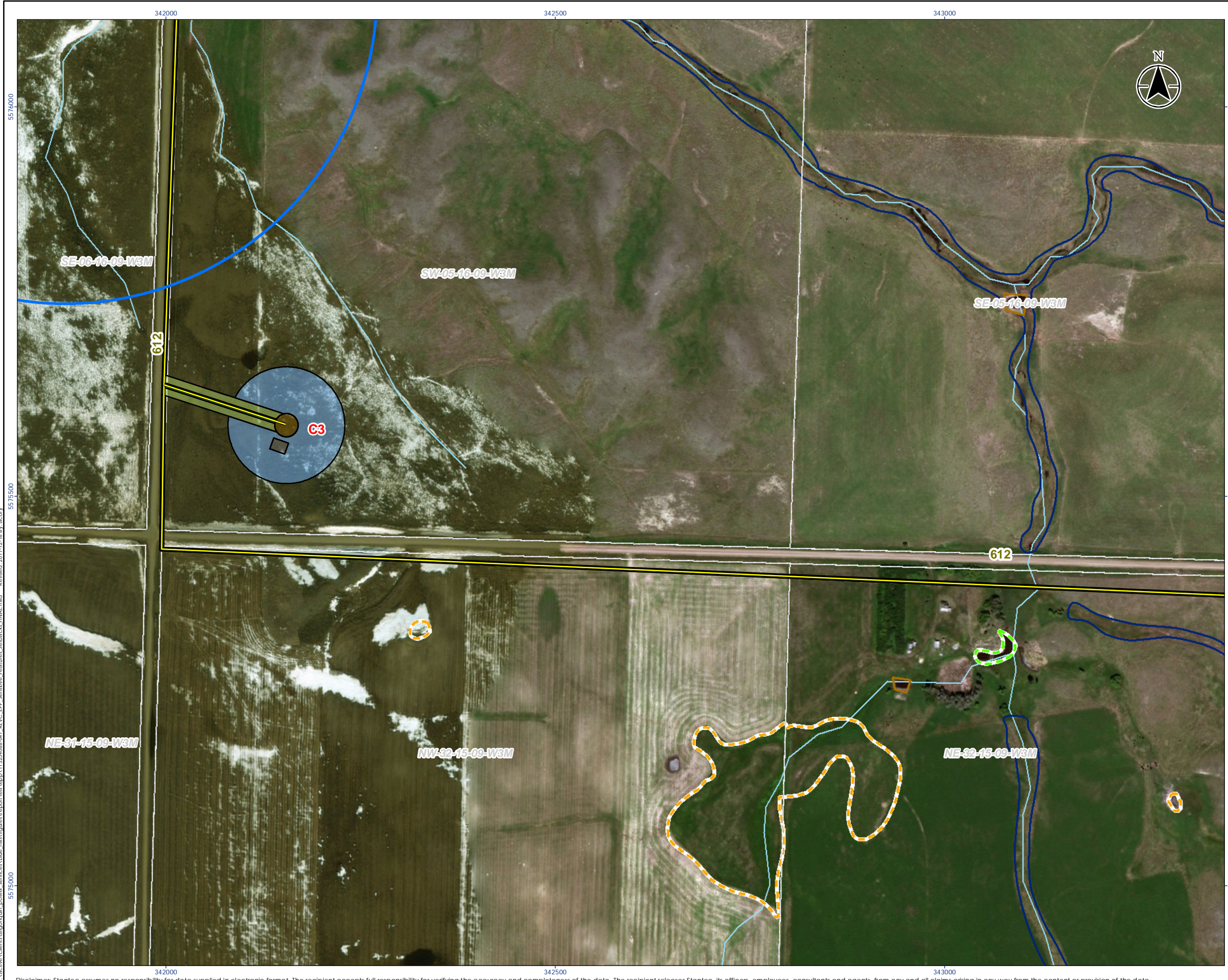


Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 2
 Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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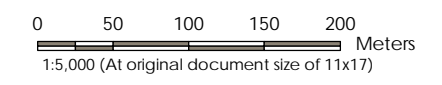


Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)

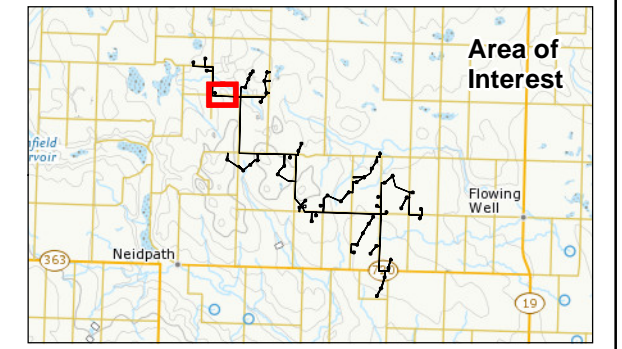
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace

- Wetland/Drainage**
- Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Dugout
 - Drainage
 - Watercourse
 - Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.



Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

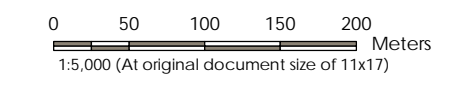
Client/Project:
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.:
 EPP - 3
 Title:
 Environmental Protection Plan - Sensitive Features and Setbacks

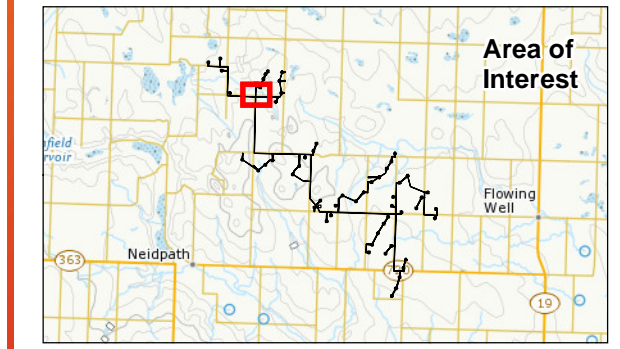


- Sharp-tailed Grouse Lek
- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Class 4 - Semi-Permanent Wetland
- Dugout
- Drainage
- Watercourse
- Quarter Section

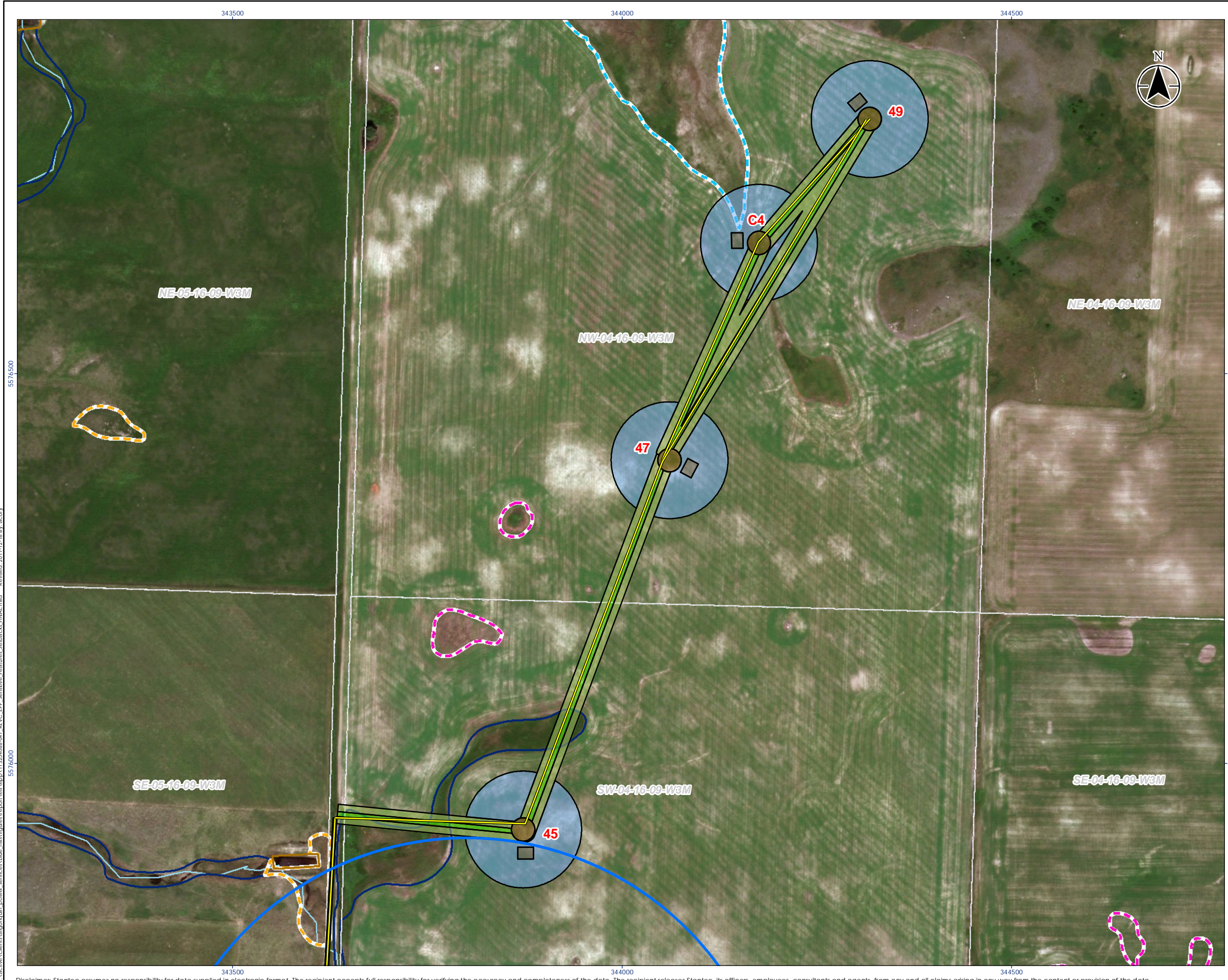
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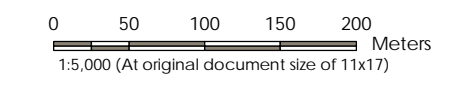


Project Location: Near Herbert, SK
 Client/Project: Algonquin Power Co. Blue Hill Wind Energy Project
 Figure No.: EPP - 4
 Title: Environmental Protection Plan - Sensitive Features and Setbacks

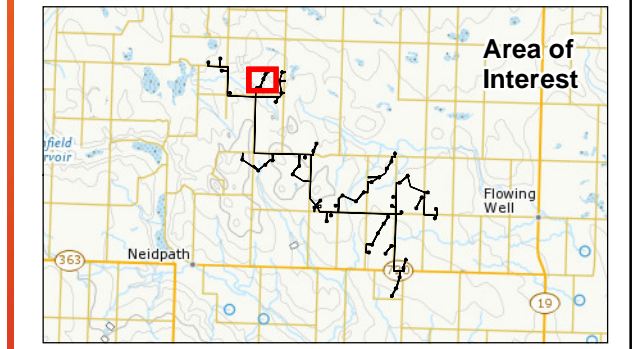


- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 1 - Ephemeral Wetland
- Class 2 - Temporary Wetland
- Class 4 - Semi-Permanent Wetland
- Dugout
- Drainage
- Watercourse
- Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.



Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co., Blue Hill Wind Energy Project

Figure No.: EPP - 5

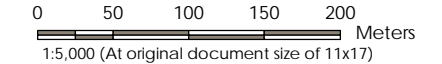
Title: Environmental Protection Plan - Sensitive Features and Setbacks

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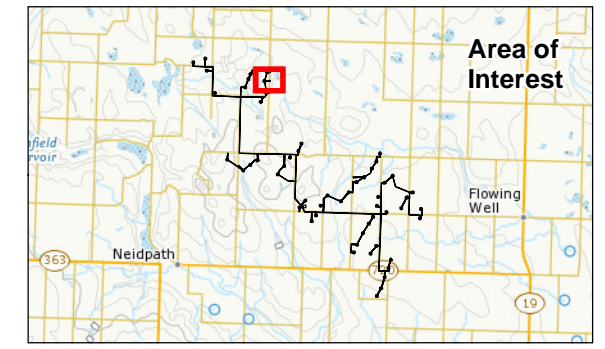


- ▲ Contingency Substation
 - Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
 - Temporary Workspace
- Wetland/Drainage
- Class 1 - Ephemeral Wetland
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Class 5 - Permanent Wetland
 - Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by celdem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 6

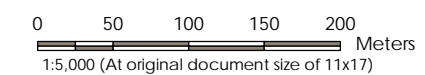
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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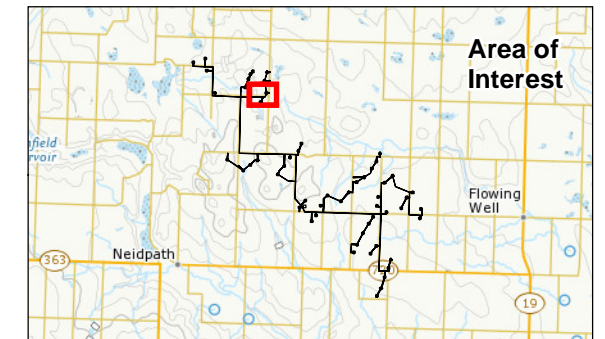


- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
 - ▲ Contingency Substation
 - Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
 - Temporary Workspace
- Wetland/Drainage**
- Class 1 - Ephemeral Wetland
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Class 4 - Semi-Permanent Wetland
 - Dugout
 - Drainage
 - Watercourse
 - Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

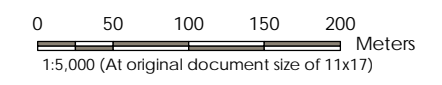
Client/Project: Algonquin Power Co., Blue Hill Wind Energy Project

Figure No.: EPP - 7
 Title: Environmental Protection Plan - Sensitive Features and Setbacks

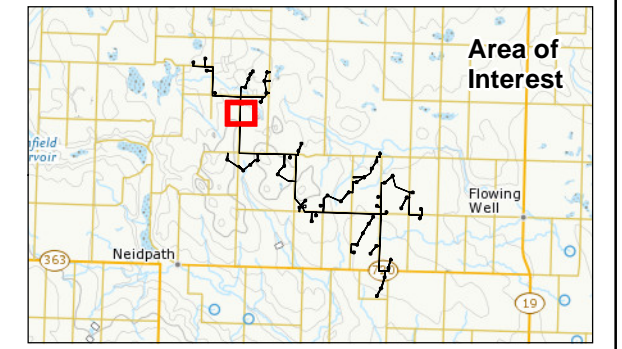


- Project Development Area
- New Electrical Collector Line
- Wetland/Drainage
 - Class 2 - Temporary Wetland
 - Dugout
 - Drainage
 - Watercourse
 - Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REV.C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 8

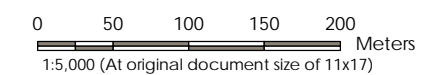
Title
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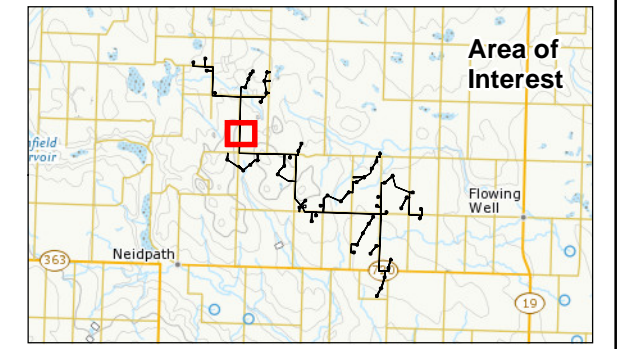


- Project Development Area
- New Electrical Collector Line
- Wetland/Drainage
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Dugout
 - Drainage
 - Watercourse
 - Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 9

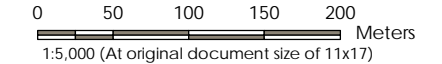
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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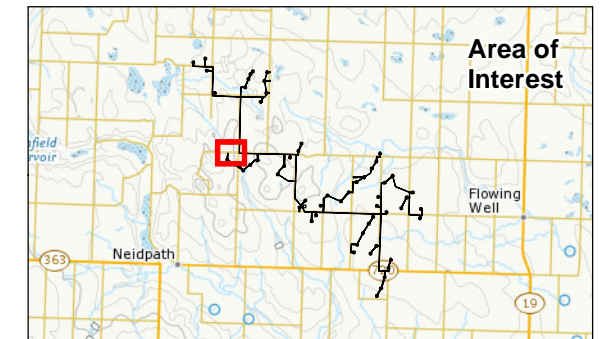


- Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
 - Temporary Workspace
- Wetland/Drainage
- Class 2 - Temporary Wetland
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 - Drainage
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 - Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by celdem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 10

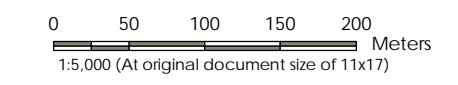
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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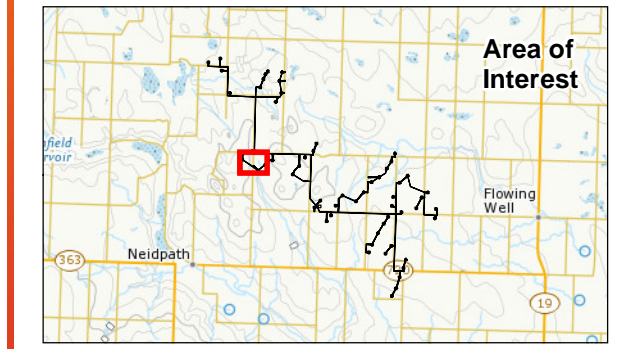


- Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
 - Temporary Workspace
- Wetland/Drainage
- Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
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 - Drainage
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 - Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 11

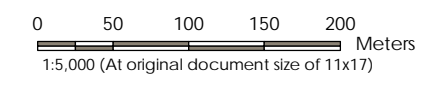
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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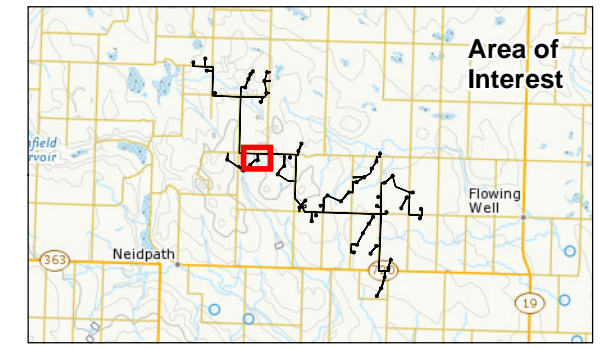


- ✘ Rare Plant
- Rare Plant Setback (30 m)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Dugout
- Drainage
- Watercourse
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Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 12

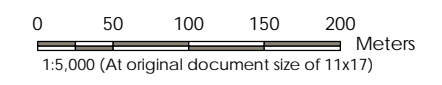
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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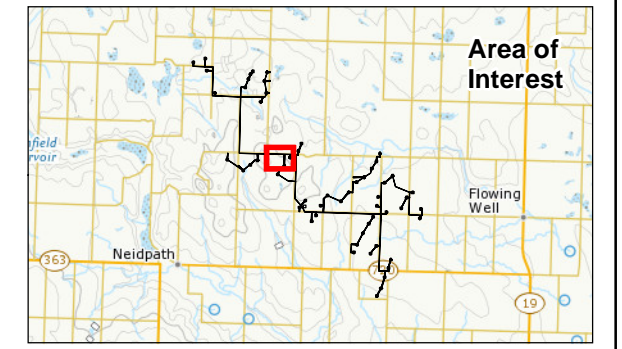


- ▲ Contingency Substation
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage
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Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 13

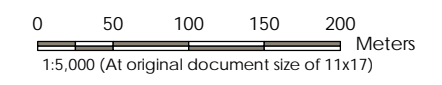
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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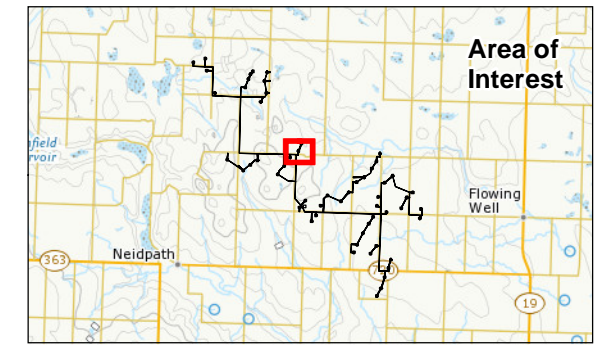


- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Dugout
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Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co., Blue Hill Wind Energy Project

Figure No.: EPP - 14

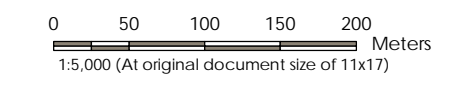
Title: Environmental Protection Plan - Sensitive Features and Setbacks

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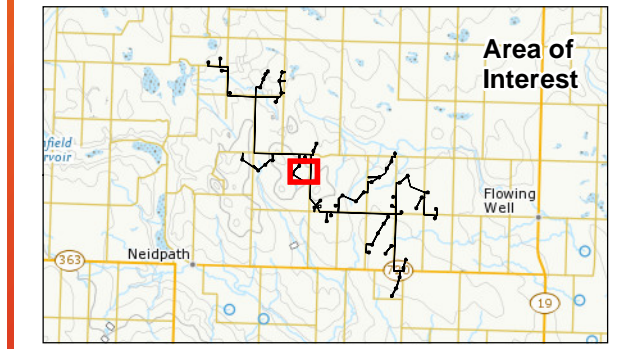


- ▲ Contingency Substation
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage
- Class 2 - Temporary Wetland
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- Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.



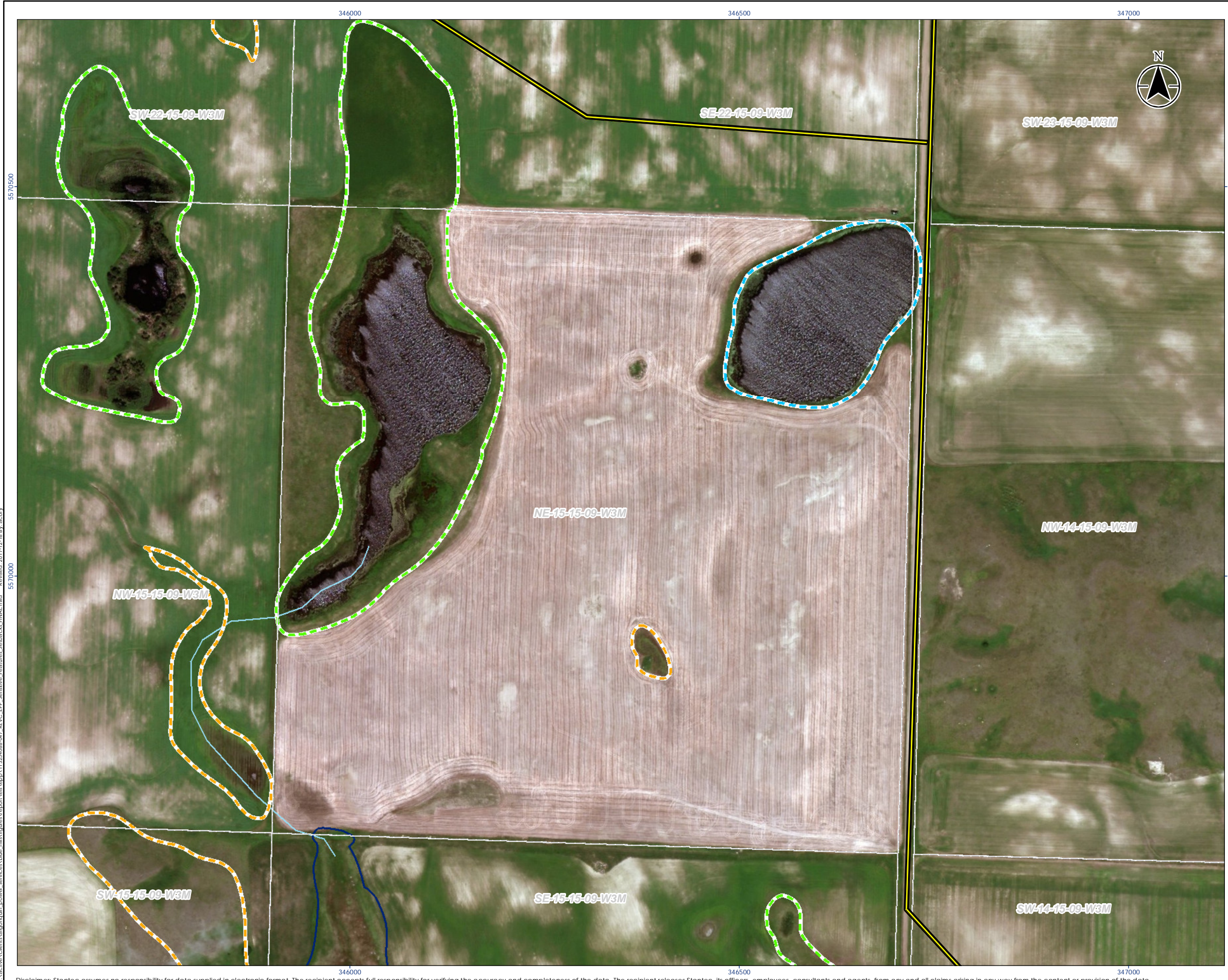
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co. Blue Hill Wind Energy Project

Figure No.: EPP - 15

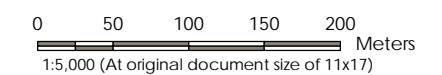
Title: Environmental Protection Plan - Sensitive Features and Setbacks

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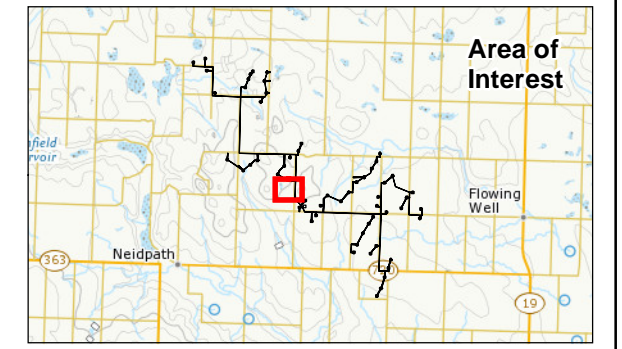


- Project Development Area
- New Electrical Collector Line
- Wetland/Drainage
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Class 4 - Semi-Permanent Wetland
 - Drainage
 - Watercourse
 - Quarter Section

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 3. Project Development Area base on layout from Algonquin, Sept 06, 2017, V3
 4. Imagery: ESRI World Imagery, June 2013.



Project Location: Near Herbert, SK
 113254088-047 REV.C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

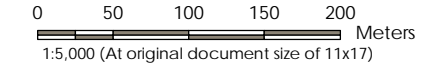
Figure No.
 EPP - 16
 Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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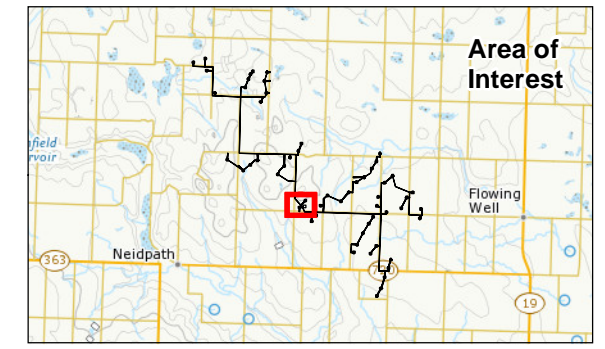


- Substation
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- Substation - Main
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Drainage
- Watercourse
- Quarter Section

Disclaimer: The Project layout will be subject to minor modifications as detailed engineering progresses to a finer scale. For example, further adjustments may occur such that access roads and collector lines overlap with existing truck-trails, existing cattle trails, property lines, etc., in order to further reduce potential effects.



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 3. Project Development Area base on layout from Algonquin, Sept 06, 2017, V3
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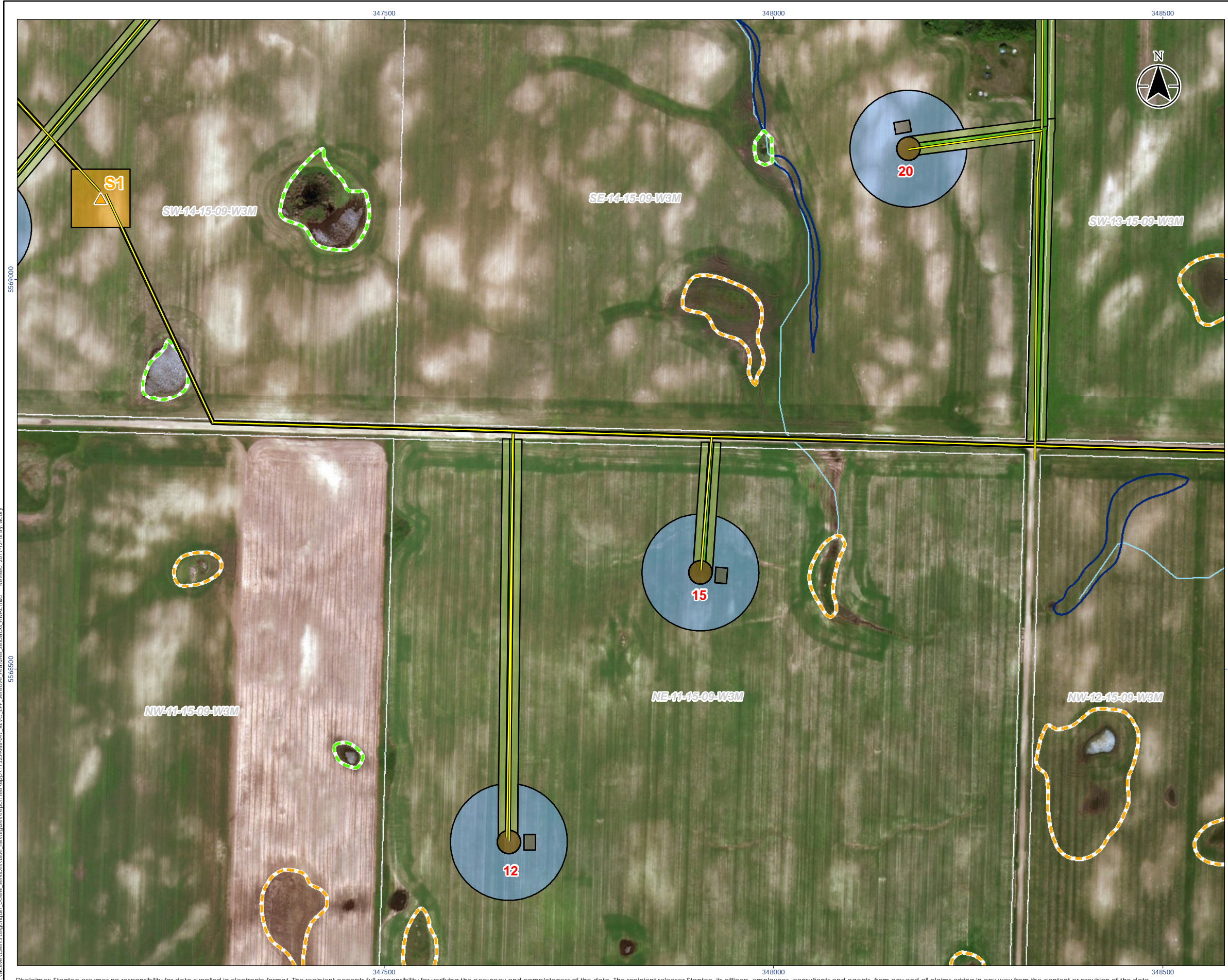
Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acory on 2017-12-18
 Technical Review by celdem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 17

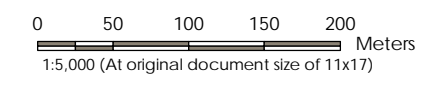
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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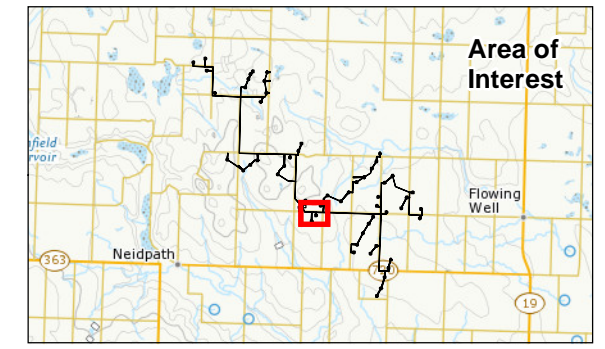


- ▲ Substation
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- Substation - Main
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Drainage
 - Watercourse
 - Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.



Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 18

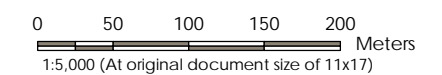
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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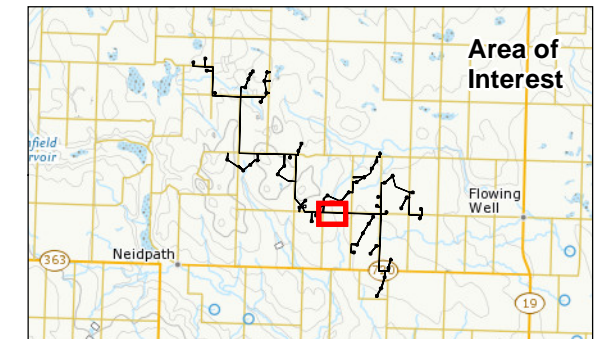


- Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
 - Temporary Workspace
- Wetland/Drainage
- Class 1 - Ephemeral Wetland
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Dugout
 - Drainage
 - Watercourse
 - Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.



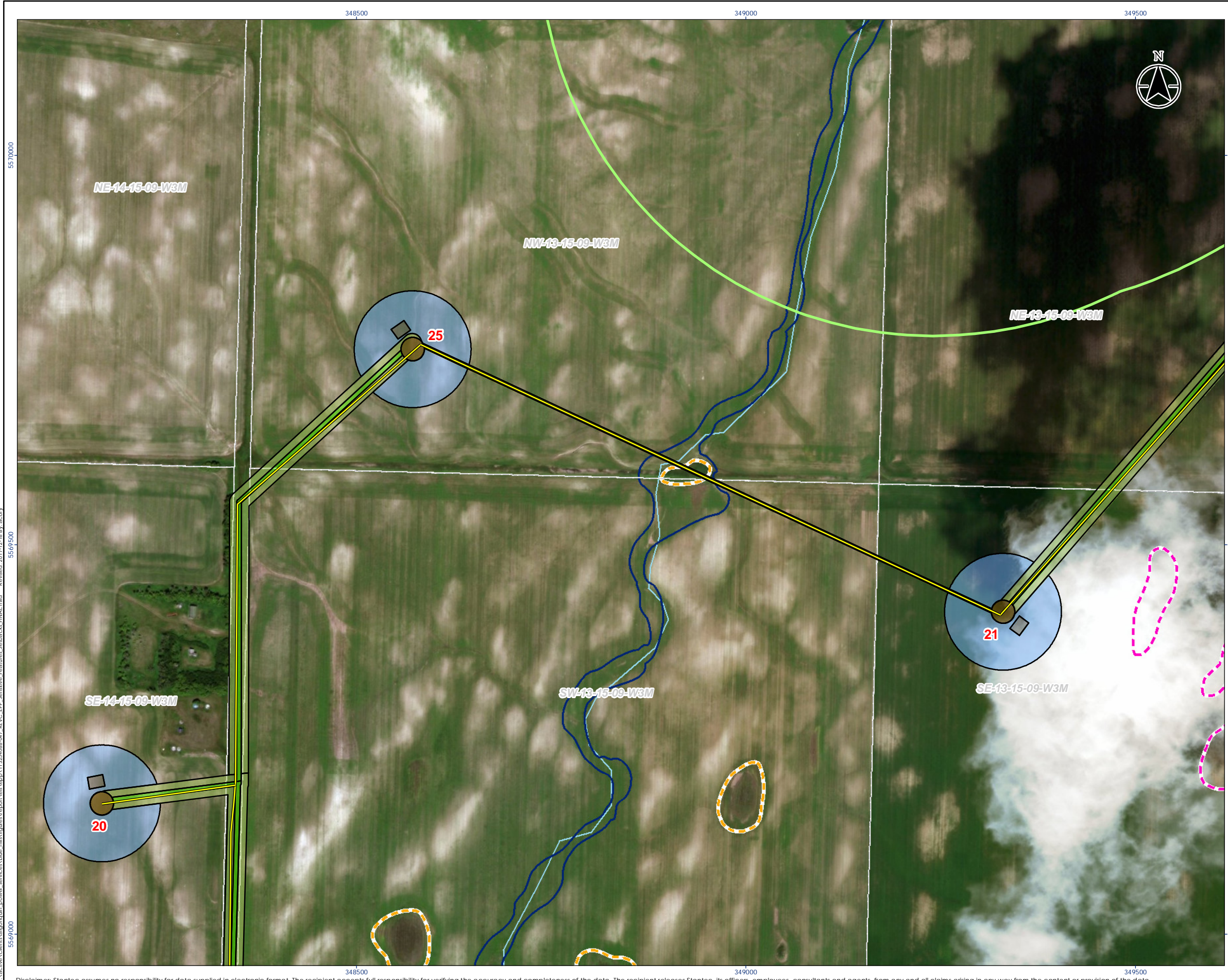
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co., Blue Hill Wind Energy Project

Figure No.: EPP - 19

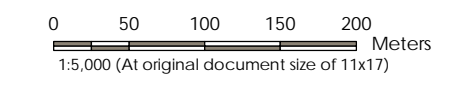
Title: Environmental Protection Plan - Sensitive Features and Setbacks

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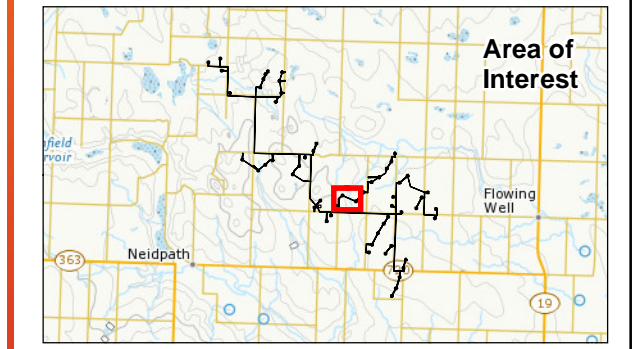


- Northern Leopard Frog Breeding Pond Setback (500 m, Year round)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 1 - Ephemeral Wetland
- Class 2 - Temporary Wetland
- Drainage
- Watercourse
- Quarter Section

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Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project:
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.:
 EPP - 20

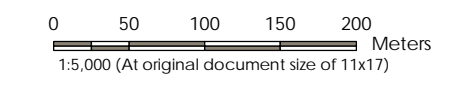
Title:
 Environmental Protection Plan - Sensitive Features and Setbacks

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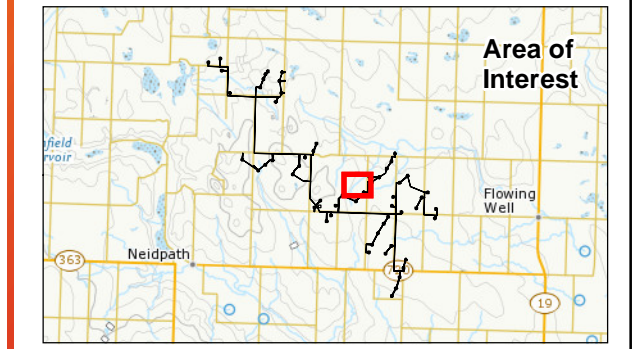


- Northern Leopard Frog Breeding Pond Setback (500 m, Year round)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 3 - Seasonal Wetland
- Class 4 - Semi-Permanent Wetland
- Dugout
- Drainage
- Watercourse
- Quarter Section

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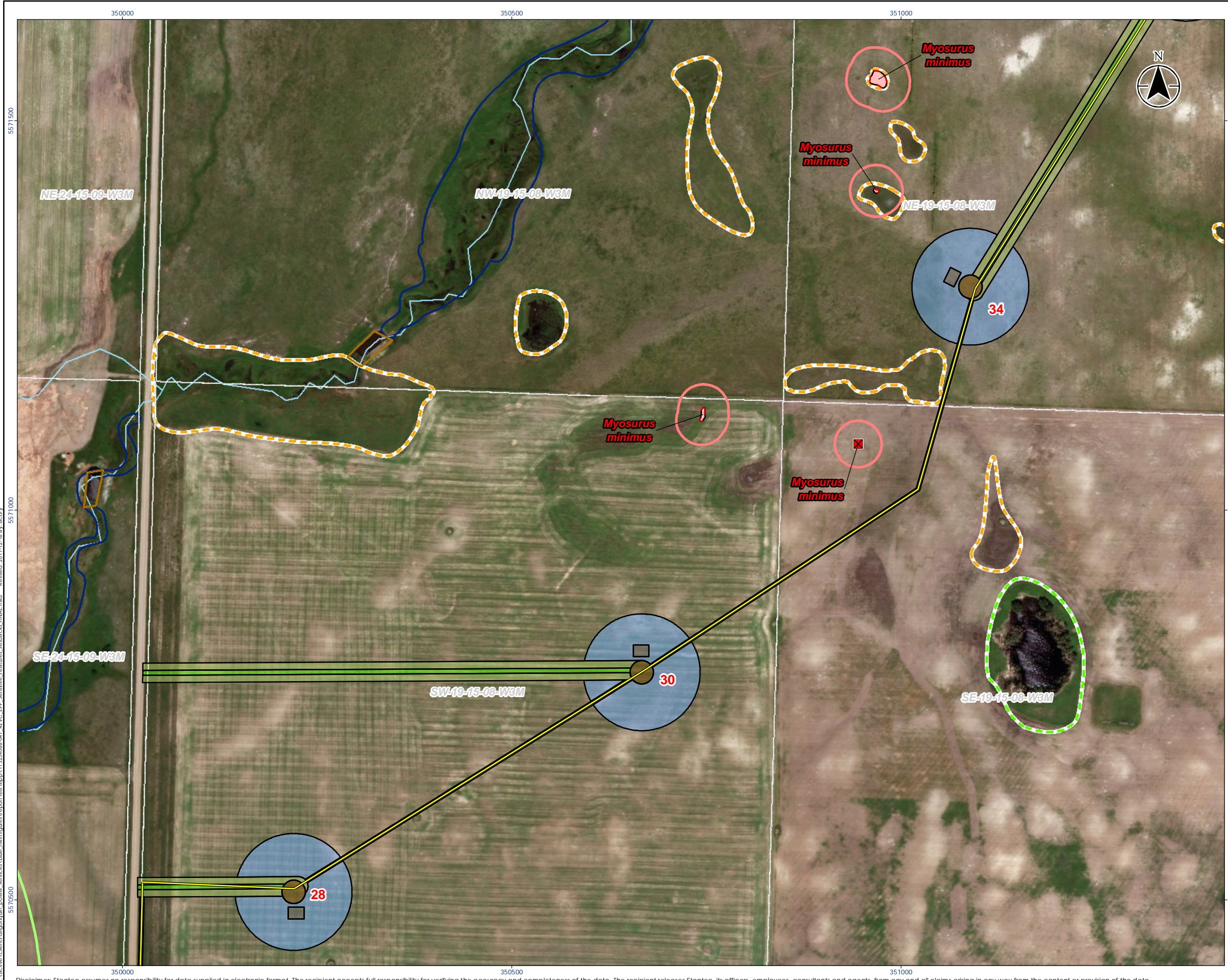
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co. Blue Hill Wind Energy Project

Figure No.: EPP - 21

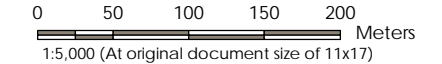
Title: Environmental Protection Plan - Sensitive Features and Setbacks

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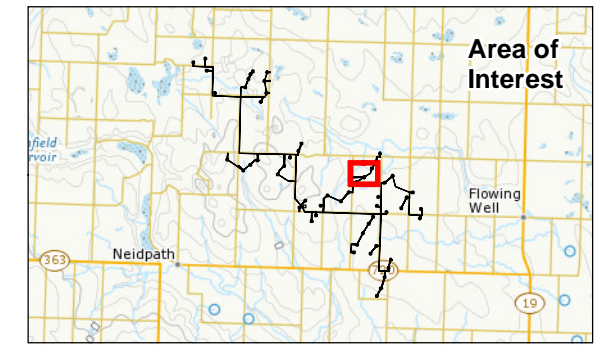


- ❑ Rare Plant
- Rare Plant Area
- Northern Leopard Frog Breeding Pond Setback (500 m, Year round)
- Rare Plant Setback (30 m)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Dugout
- Drainage
- Watercourse
- Quarter Section

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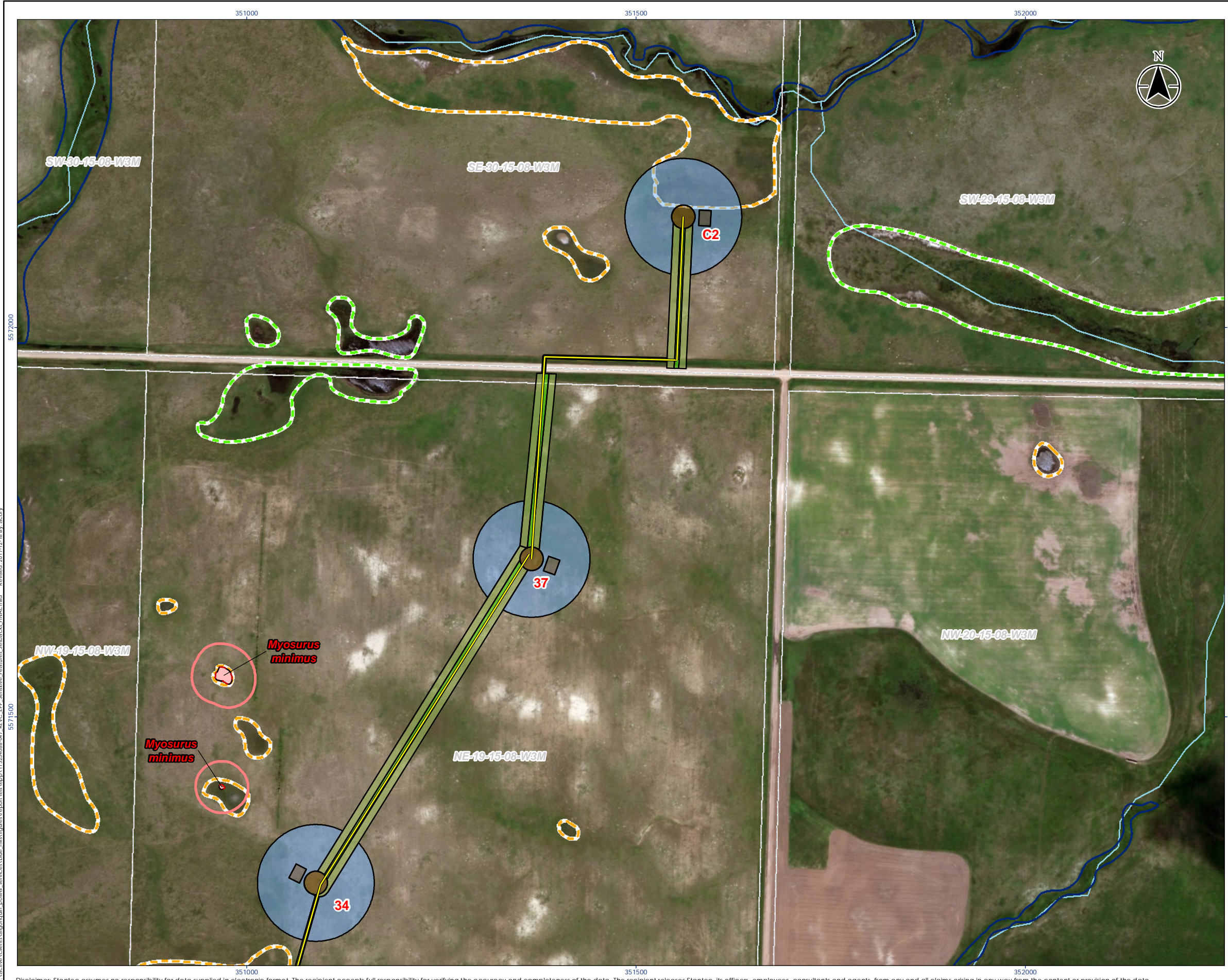


Project Location: Near Herbert, SK
 113254088-047 REVC
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

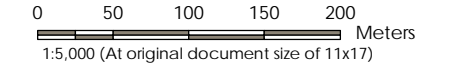
Figure No.
 EPP - 22
 Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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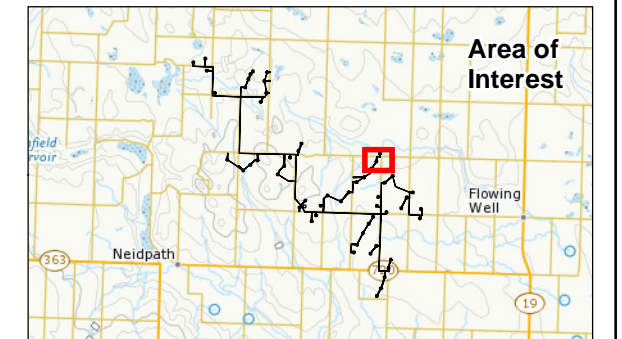


- Rare Plant Area
- Rare Plant Setback (30 m)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Drainage
- Watercourse
- Quarter Section

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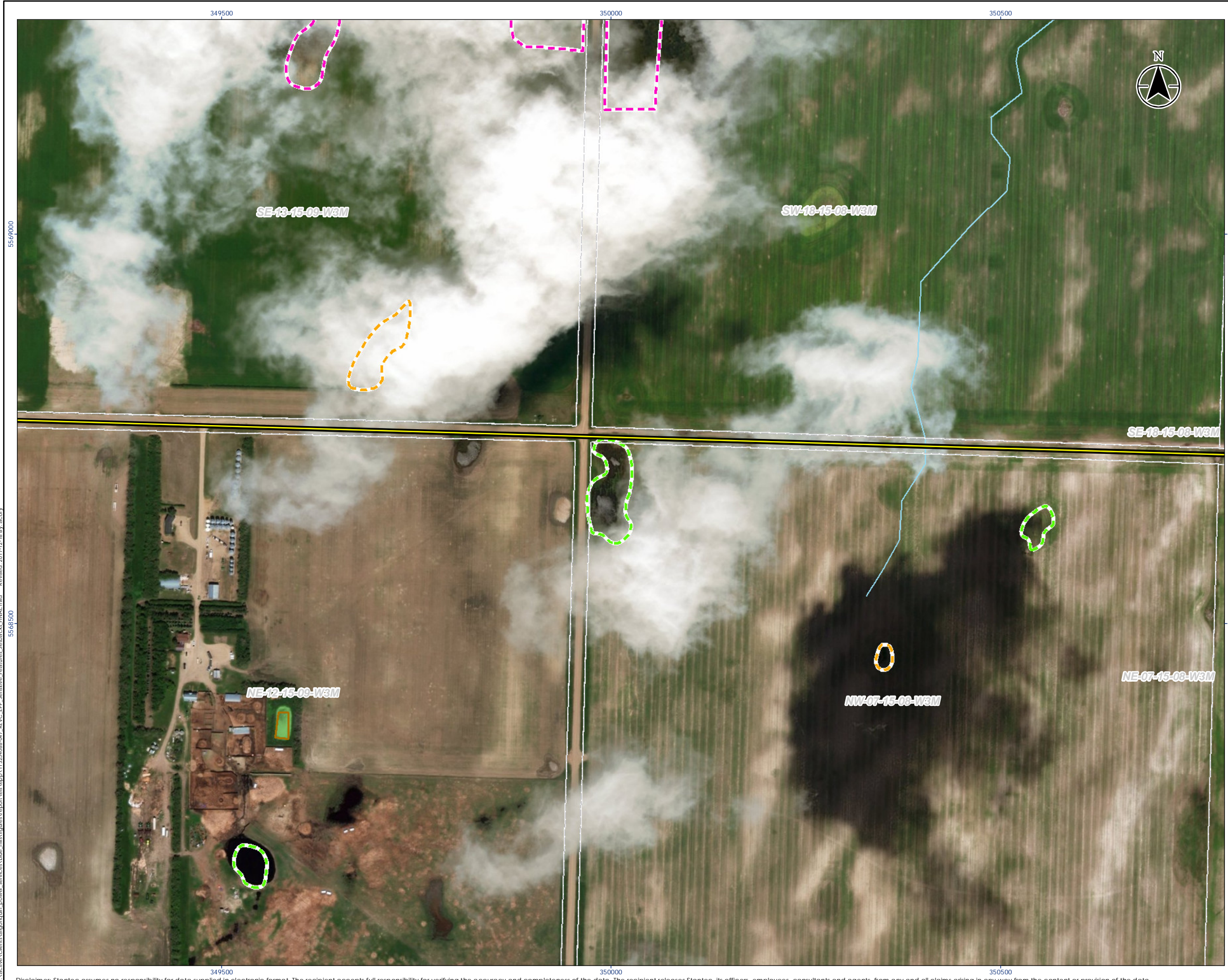
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 23

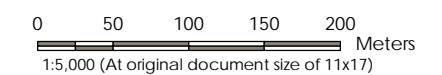
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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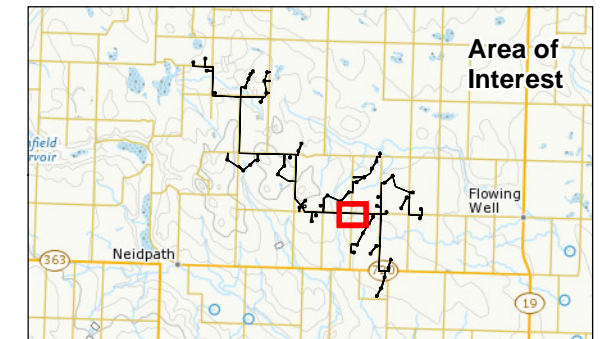


- Project Development Area
- New Electrical Collector Line
- Wetland/Drainage
 - Class 1 - Ephemeral Wetland
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Dugout
 - Watercourse
 - Quarter Section

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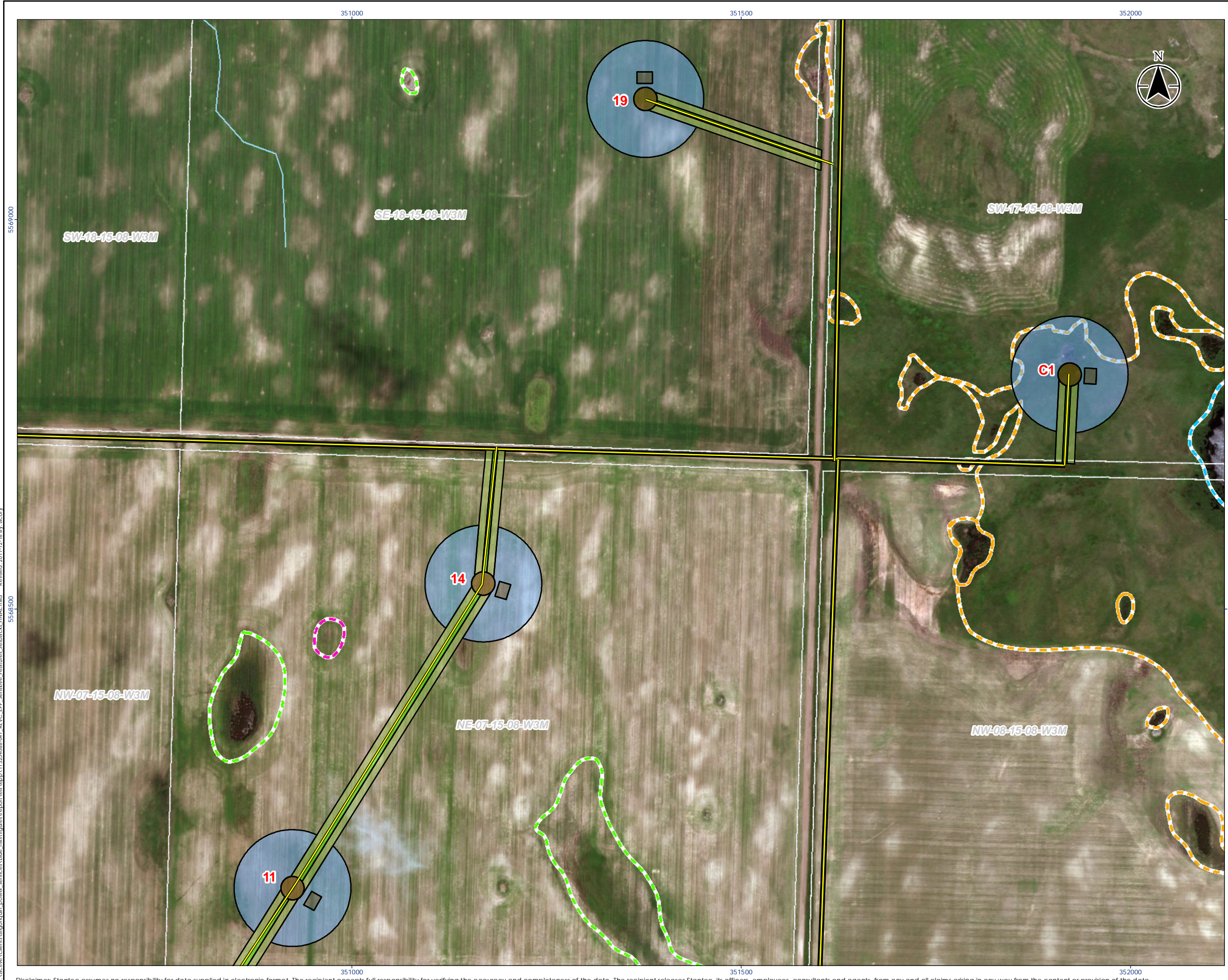
Project Location: Near Herbert, SK
 113254088-047 REV.C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 24

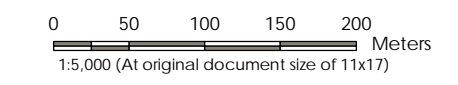
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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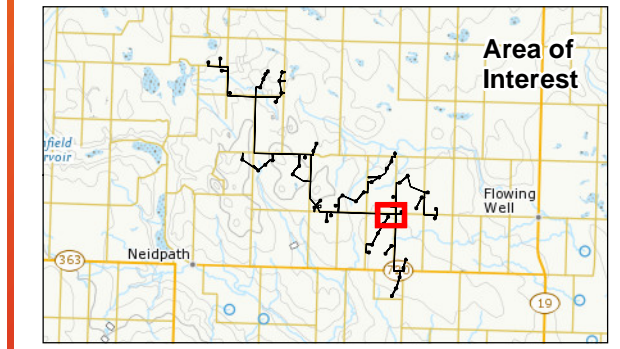


- Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
 - Temporary Workspace
- Wetland/Drainage**
- Class 1 - Ephemeral Wetland
 - Class 2 - Temporary Wetland
 - Class 3 - Seasonal Wetland
 - Class 4 - Semi-Permanent Wetland
 - Watercourse
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Project Location: Near Herbert, SK
 113254088-047 REV.C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project:
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.:
 EPP - 25

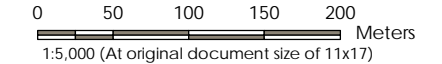
Title:
 Environmental Protection Plan - Sensitive Features and Setbacks

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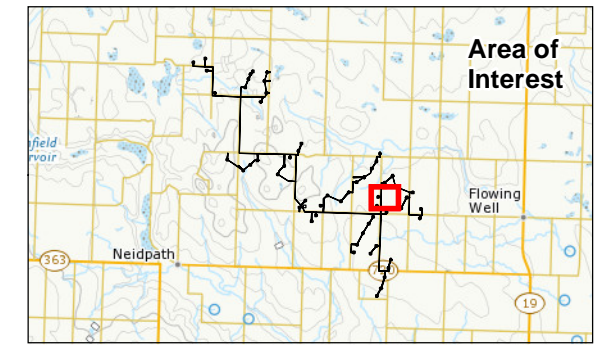


- Sharp-tailed Grouse Lek
- Rare Plant
- Rare Plant Area
- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
- Rare Plant Setback (30 m)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
- New Access Road - Temporary (Construction)
- New Electrical Collector Line
- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Drainage
- Quarter Section

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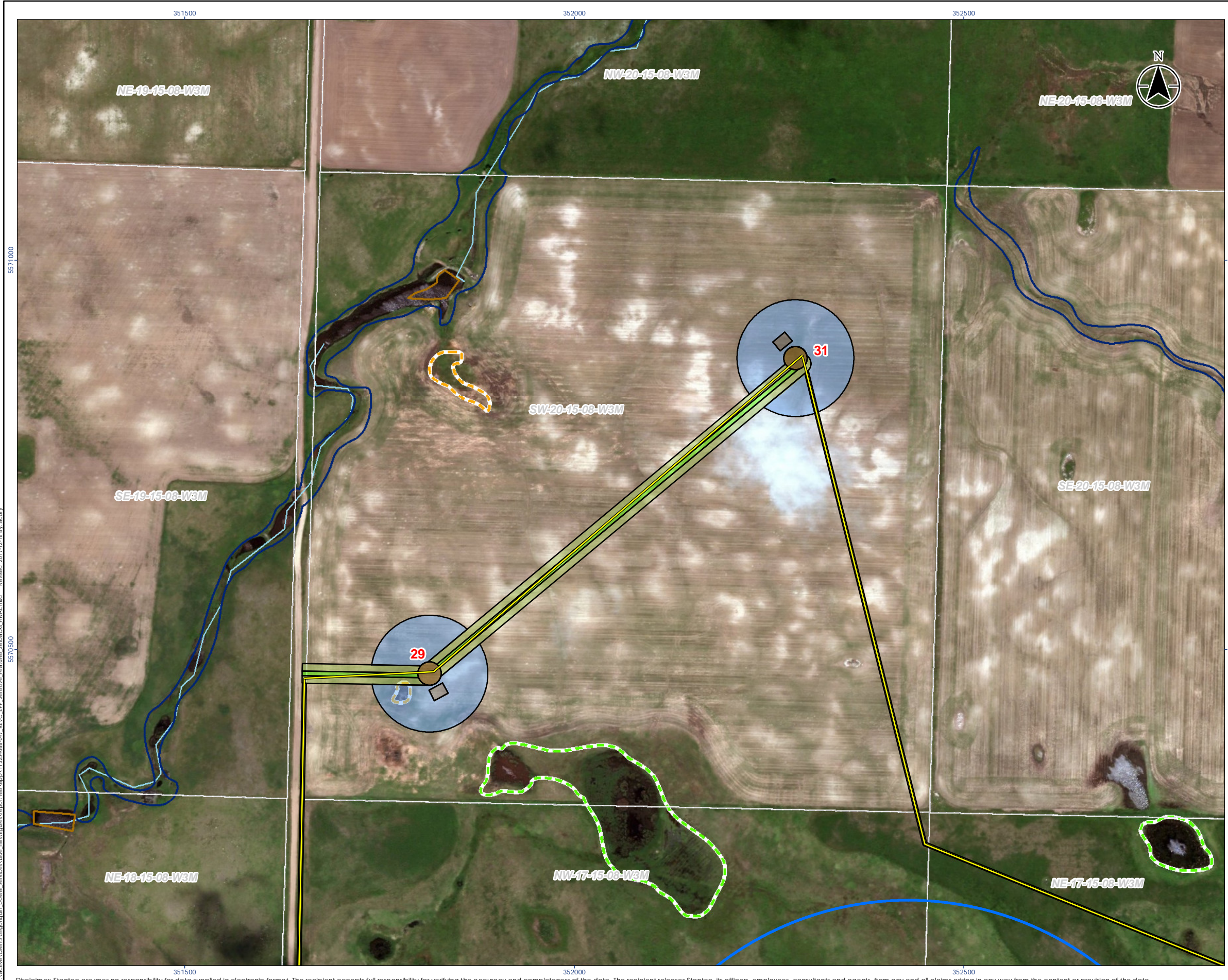


Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co. Blue Hill Wind Energy Project

Figure No.: EPP - 26
 Title: Environmental Protection Plan - Sensitive Features and Setbacks

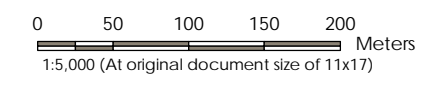
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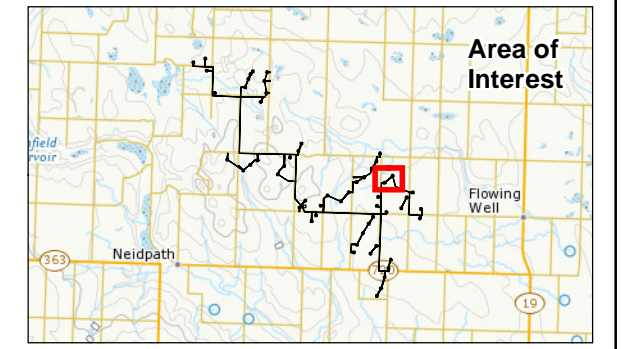
Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)

- Project Development Area
 - Turbine Foundation
 - Crane Pad - Permanent
 - New Access Road - Permanent (Operation)
 - New Access Road - Temporary (Construction)
 - New Electrical Collector Line
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- Wetland/Drainage
- Class 2 - Temporary Wetland
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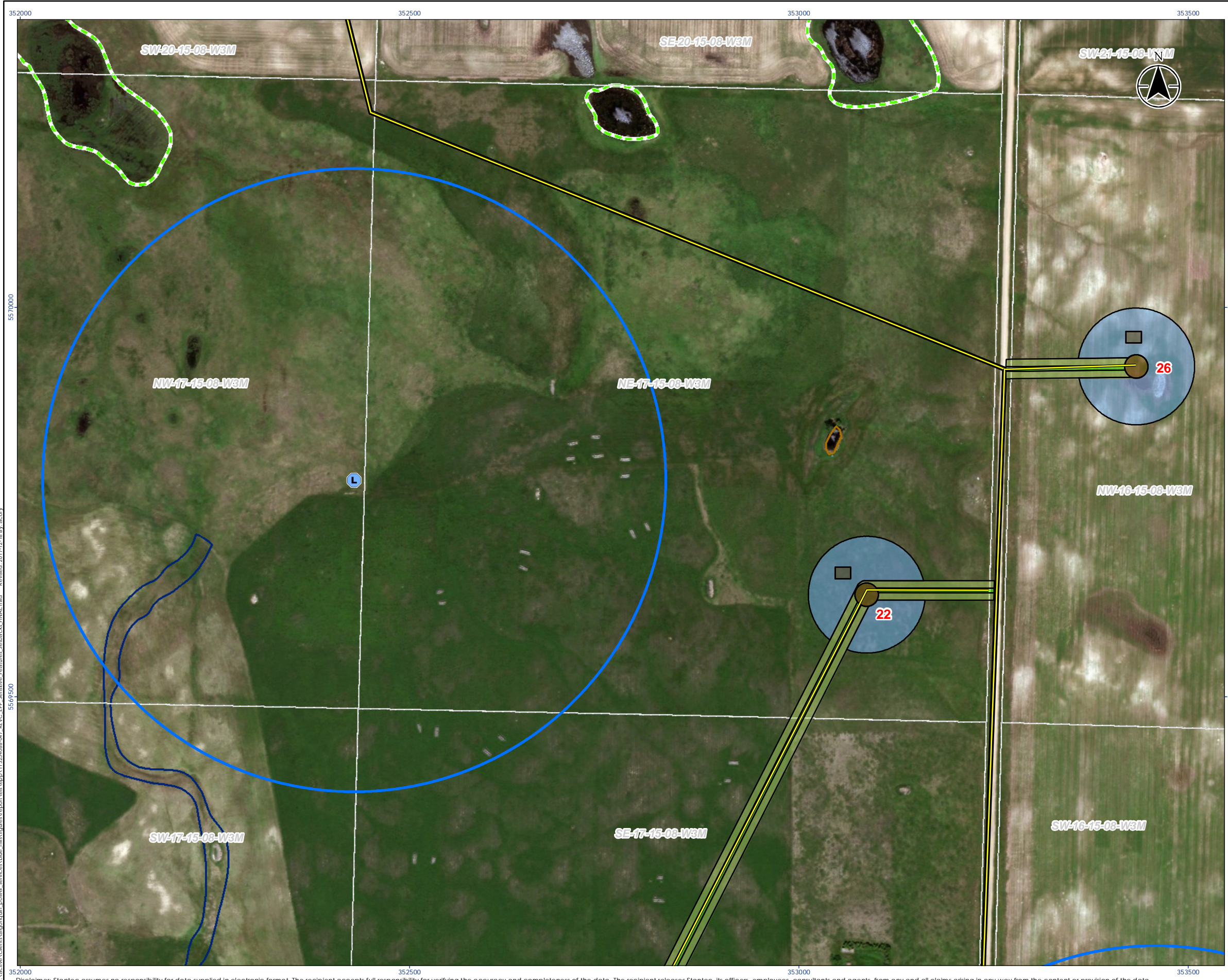
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 27

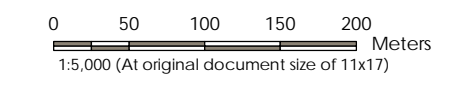
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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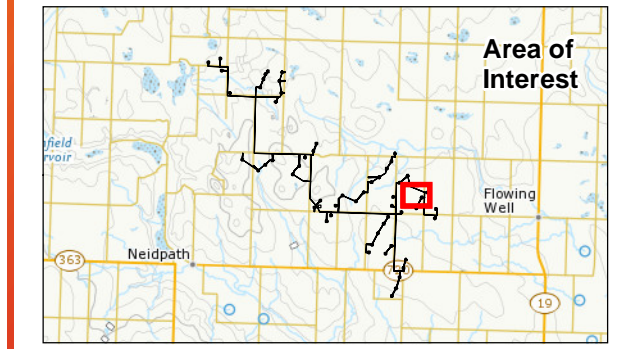


- Sharp-tailed Grouse Lek
- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
- New Access Road - Permanent (Operation)
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- Temporary Workspace
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 4. Imagery: ESRI World Imagery, June 2013.



Project Location: Near Herbert, SK
 113254088-047 REV.C
 Prepared by acory on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 28

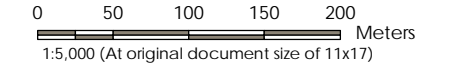
Title
 Environmental Protection Plan - Sensitive Features and Setbacks

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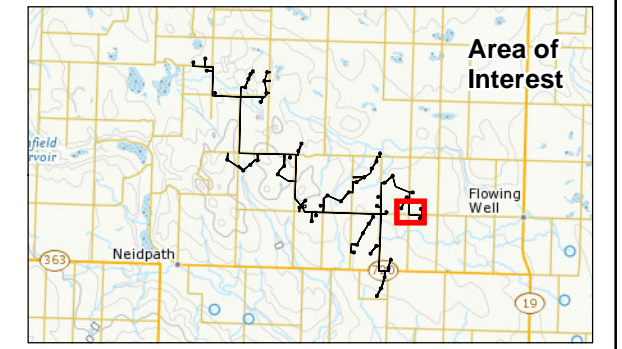


- Sharp-tailed Grouse Lek
- Rare Plant
- Sharp-tailed Grouse Lek Setback (400 m, March 15 to May 15)
- Rare Plant Setback (30 m)
- Project Development Area
- Turbine Foundation
- Crane Pad - Permanent
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- Temporary Workspace
- Wetland/Drainage**
- Class 2 - Temporary Wetland
- Class 3 - Seasonal Wetland
- Watercourse
- Quarter Section

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 4. Imagery: ESRI World Imagery, June 2013.



Project Location: Near Herbert, SK
 113254088-047 REV.C
 Prepared by acroy on 2017-12-18
 Technical Review by ceidem on 2017-12-18

Client/Project: Algonquin Power Co., Blue Hill Wind Energy Project

Figure No.: EPP - 29

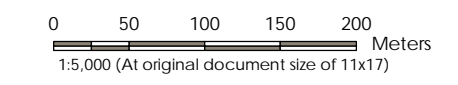
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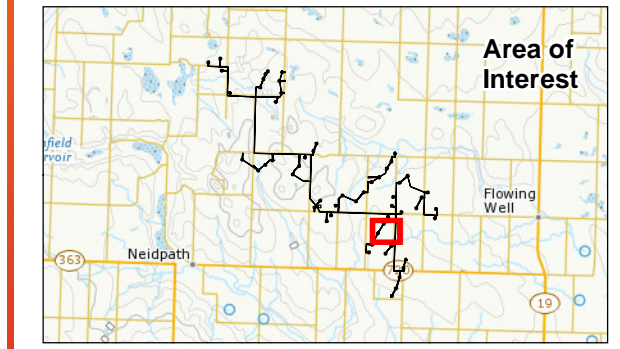


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Client/Project
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 Blue Hill Wind Energy Project

Figure No.
 EPP - 30

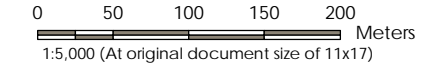
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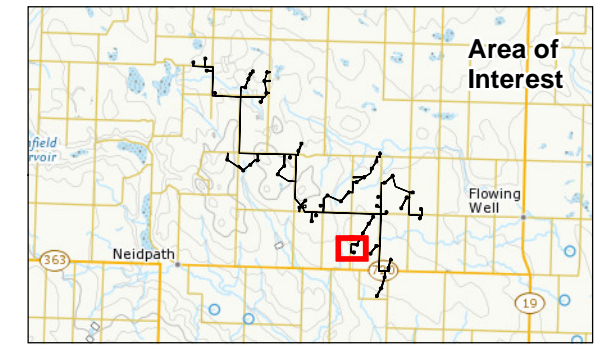


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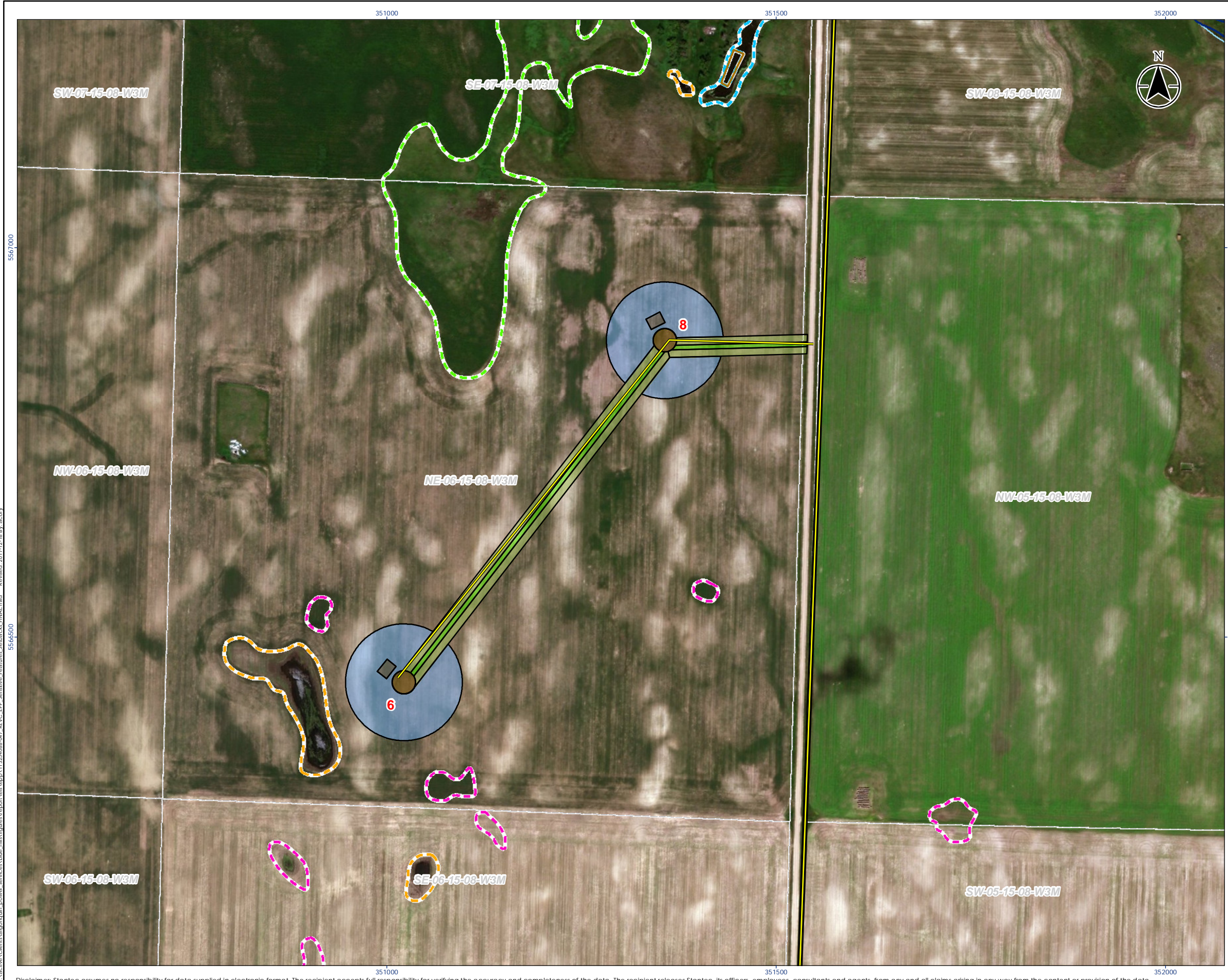
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Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 31

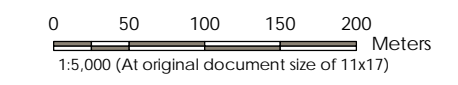
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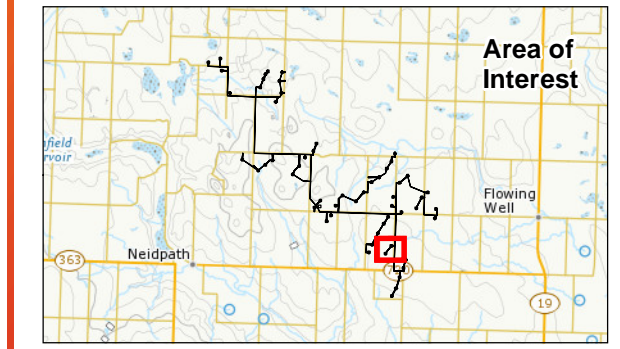


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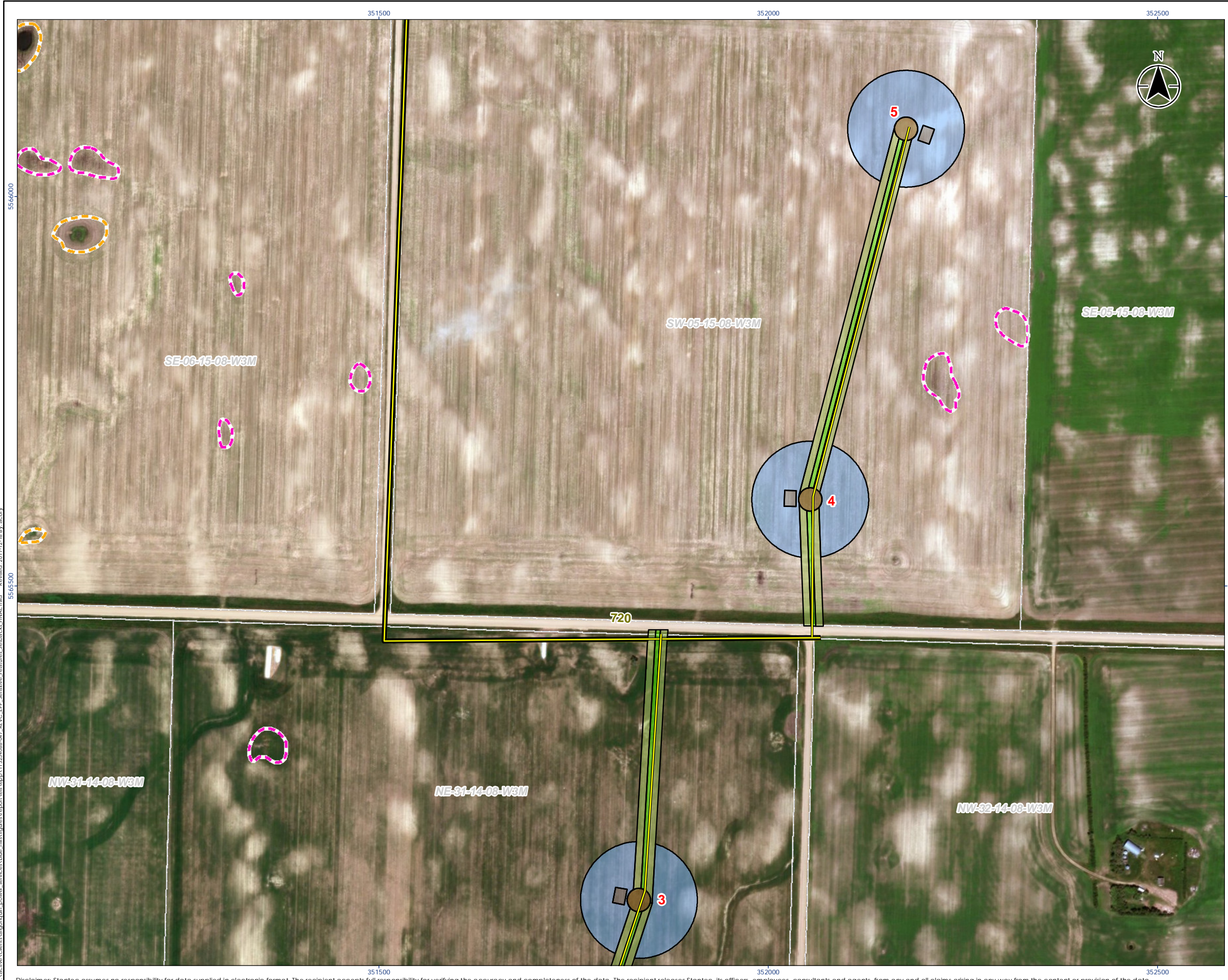


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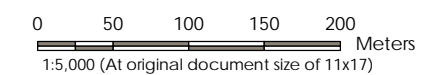
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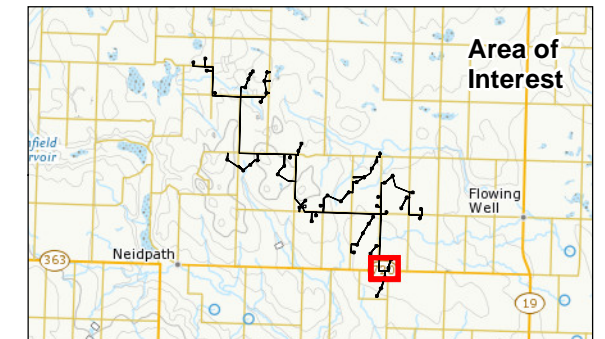


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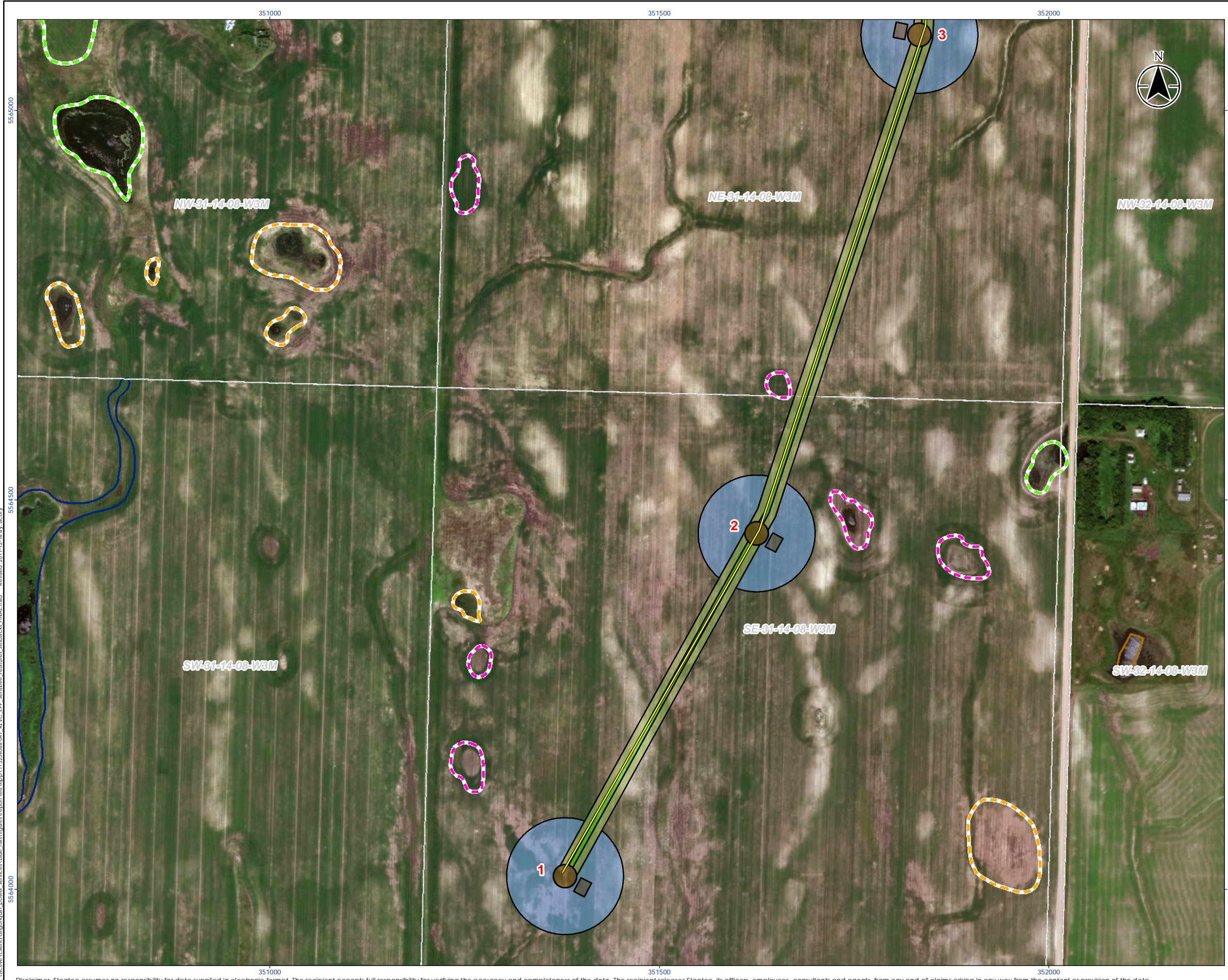
Project Location: Near Herbert, SK
 113254088-047 REV C
 Prepared by acroy on 2017-12-18
 Technical Review by celdem on 2017-12-18

Client/Project
 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.
 EPP - 33

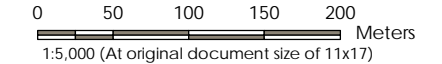
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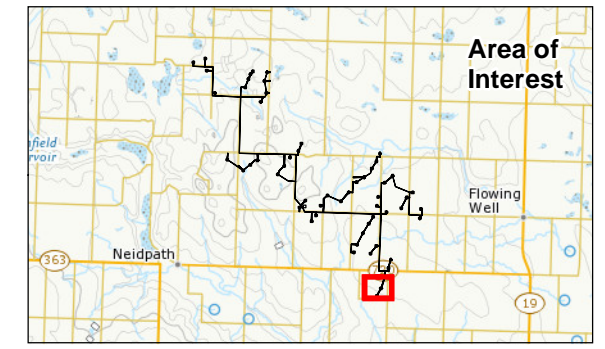


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 Algonquin Power Co.
 Blue Hill Wind Energy Project

Figure No.:
 EPP - 34
 Title:
 Environmental Protection Plan - Sensitive Features and Setbacks

Appendix A

Efforts will be made to schedule construction in areas of native land cover and perennial cropland outside the migratory bird nesting period (April 26 to August 15; ECCC 2017) as per Environment and Climate Change Canada guidance. This will avoid the primary migratory bird breeding period (when >10% of breeding activity occurs) for open habitat (ECCC 2017), and, in addition, will avoid sensitive periods for other wildlife species. When timing of construction in suitable wildlife habitat cannot avoid this sensitive period, pre-construction surveys will be conducted to identify site-specific sensitive features (e.g., bird nests, plant SOMC) and for which appropriate and reasonable prescriptive mitigation measures may be implemented during construction and operation and maintenance.

The schedule for construction is dependent on receipt of Ministerial approval; however, a high-level proposed schedule of Project activities for the construction phase is listed below:

- 2019/2020 Civil & Roads,
- 2020 Foundations,
- 2020 Turbine Erection,
- 2020 Commissioning
- 2020 Target Commercial Operation Date

Appendix B

Contacts and Reporting Matrix

Should heritage resources be discovered during construction, the following calls must be made to:

1. On-Site Algonquin Construction Manager – To Be Determined
2. Saskatchewan Heritage Resource Branch – 306 787-2817

Emergency Contact List	
Organization	Telephone #
EXTERNAL	
ALL LOCAL EMERGENCY SERVICES - FIRE, POLICE, AMBULANCE	911
Saskatchewan Environment Spill Line	1-800-667-7525
INTERNAL ON-SITE	
On-Site Algonquin Construction Manager	TBD
Operations Manager	TBD
INTERNAL OFF-SITE	
Project Manager - Brandon Moore	O: 905-829-6372

Blue Hill Wind Energy Project

Environmental Protection Plan

Volume 2 - Adaptive Management Plan



December 2017

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1.0 Introduction

As part of the Environmental Impact Statement (EIS) for the Blue Hill Wind Energy Project (the Project), Algonquin Power Co. (Algonquin) has committed to the development of an Environmental Protection Plan (EPP) to summarize Algonquin's corporate commitments and regulatory requirements for the Project's environmental management. The EPP is divided into 3 Volumes and a map atlas (included in the Exhibits section) outlining site-specific information.

Volume 2 of this EPP presents the adaptive management plan for the Project and is intended to outline Algonquin's commitments to post-construction monitoring to support the implementation of appropriate site-specific environmental protection measures.

1.1 PURPOSE OF THE ADAPTIVE MANAGEMENT PLAN

The adaptive management process is a science-based process to address uncertainties in the potential effects of a project on valued components (VCs) of the environment, while allowing projects to proceed with development. This process starts at project conception to reduce and avoid potential effects on VCs of the environment. This process follows a stepwise approach where each of the following steps further refines a project design:

1. Project area selection: identifying a location on the landscape that meets large-scale avoidances of environmental features that could result in greater effects on VCs (e.g., siting a project outside avoidance zones)
2. Desktop analysis and fatal flaw assessment: using existing information about a potential project area allows for a more detailed understanding of the potential environmental constraints that could be affected by a project. This may include, but is not limited to:
 - a. Existing land cover (e.g., the proportion of native prairie)
 - b. Sensitive environmental features (e.g., migratory bird concentration sites)
 - c. Historical occurrences of sensitive species (e.g., nesting locations of ferruginous hawks)
3. Field surveys: characterizing the existing environment of a proposed project area and to identifying current sensitive features on the landscape that have constraints allows for a better understanding of the potential effects of a project and to refine a project design to reduce or avoid those effects

Detailed information about these initial steps in the adaptive management process are provided in the Blue Hill Wind Energy Project Environmental Impact Statement (see Section 2.2). Following these pre-construction steps in the adaptive management process, this adaptive management plan (AMP) has been prepared to address adverse environmental effects that may result from the execution of the Project. The AMP must set out:

- Performance objectives in respect of the adverse environmental effects;
- Mitigation measures to assist in achieving the performance objectives; and
- A program for monitoring adverse environmental effects for the duration of the time that the Project is in operation, including a contingency plan to be implemented if any mitigation measures fail.

The Province of Saskatchewan is currently finalizing their Adaptive Management Guidelines for Wind Energy Projects (AM Guidelines), which are currently in their second draft form. These AM Guidelines form the basis of this AMP; however, other wind energy project guidelines were also considered in the development of the AMP where specific information was not provided in the AM Guidelines, and include:

- *Bats and Bat Habitats: Guidelines for Wind Power Projects (OMNR 2011a)*
- *Birds and Bird Habitats: Guidelines for Wind Power Projects (OMNR 2011b)*
- *Wildlife Guidelines for Alberta Wind Energy Project (2011)*
- *Alberta Bat Mitigation Framework for Wind Power Development (2013)*
- *Environment Canada (CWS) Protocols for Monitoring Impacts of Wind Turbines on Birds (2007)*

As well, the Project team has used their extensive experience and knowledge of industry precedent to develop this AMP. Note that this AMP may be amended based on the final SKMOE Adaptive Management Guidelines, however, these program adjustments must be reasonable. Discussions with the SKMOE would occur prior to any changes.

2.0 Post-Construction Monitoring of Bird and Bat Fatality

Post-construction fatality surveys at wind power projects can be used to assess the level of impact from operation of the facility, confirm the predictions of the environmental assessment are correct, and indicate if alterations or additional mitigation measures are required.

2.1 FATALITY THRESHOLDS

Most jurisdictions use a threshold approach to set performance objectives for operation of wind power facilities. Where bird or bat fatality rates do not meet these performance objectives (i.e., are above the threshold), mitigation steps are required.

The current draft AM Guidelines identifies three tiers (tier 1, 2 and 3) of management triggers based on fatality rates for wind energy projects (WEPs) in Saskatchewan (Figure 1). The fatality levels in each tier are based on fatality rates in post-construction monitoring reports from Alberta and from data presented in Erickson et al. (2014) for jurisdictions with similar ecoregions. Each tier has specific implications for reporting and management responses that follow through the AM process.

These tiers are based on a basis of fatalities per megawatt (MW), which enables wind developers to modify project designs (e.g., selecting fewer large turbines) to meet their power purchase agreement without being constrained by fatality tiers fixed on a per turbine basis. SaskPower awards power purchase contracts for wind projects on a per MW basis. As such, applying a threshold on a per MW basis would allow the province to determine potential cumulative impacts while issuing contracts. As requested by the Saskatchewan Ministry of Environment (SKMOE), bird and bat fatality monitoring results will be reported on a per MW and per turbine basis for comparison against other facilities and thresholds.

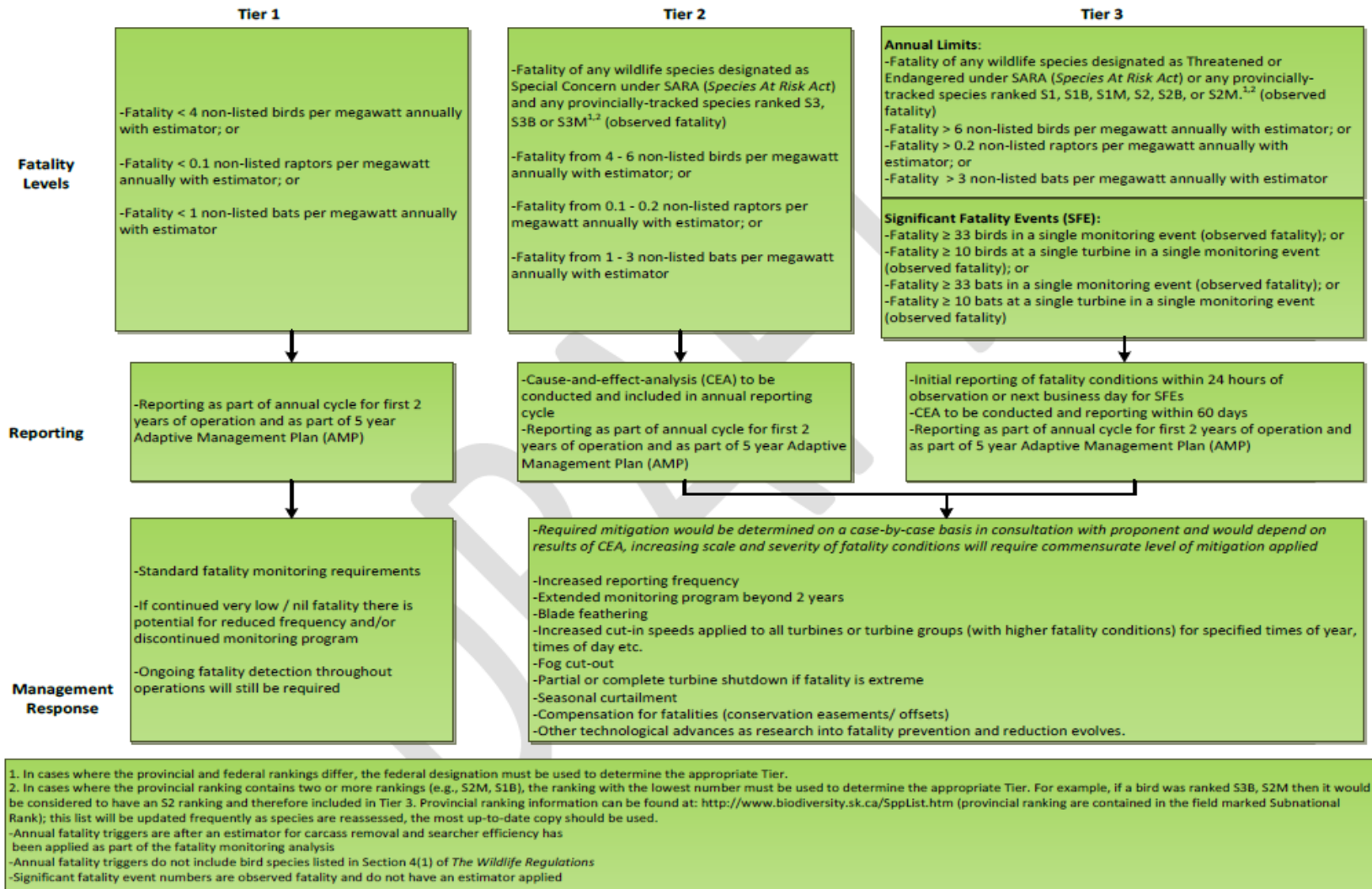


Figure 1 Draft Management Triggers for Bird and Bat Fatalities at WEPs in Saskatchewan (from SKMOE 2017)

2.2 POST-CONSTRUCTION MONITORING METHODS

Post construction bird and bat fatality surveys estimate bird and bat fatality from wind turbines and may identify species and specific periods with high fatality. This knowledge can be used to evaluate the success of mitigation measures, establish protocols for operational mitigation, and inform adaptive management.

Bird and bat fatality surveys identify the number of birds or bats killed per turbine over a known period of time (expressed as birds/turbine/year or bats/turbine/year). This value represents an estimate of bird and bat fatality adjusted for carcass removal rates, observer efficiency, and percent area searched. Standard methods for fatality surveys are identified below. Using the generating capacity of the turbines in the Project, these values are then converted to a per MW basis to compare against the management triggers identified in Figure 1 to determine if a cause-effect analysis (CEA) is required and if management responses are warranted.

Fatality monitoring also allows for the identification of significant fatality events (SFEs) as defined in the management triggers (Figure 1). Should a SFE occur, the reporting and other adaptive management steps will be completed under the guidance of the SKMOE.

Fatalities of birds and bats primarily occur during the period when migratory birds and bats are passing through the Project area and when resident bats are active. For Saskatchewan, this period will be the 26-week period between April 1st and October 3rd of each monitoring year (SKMOE 2017). To capture sufficient information on the Project's effects on bird and bat fatality, Algonquin will monitor for a minimum of two years following commissioning of the Project, with a potential to monitor one year at five-year intervals starting on year 5 to understand long-term changes in fatality rates, if required.

Parameters related to the fatality monitoring program, as well as the carcass removal trials and observer efficiency trials required to calculate corrected fatality estimates, are provided in Table 1, and further described in Section 2.2.1.

Table 1 Summary of Parameters for the Post-Construction Fatality Monitoring Program Components

Monitoring Component	Monitoring Parameter	Value	Comment
Fatality Monitoring	Duration (years)	2 to 6	SKMOE draft guidelines require monitoring on years 1 and 2, then possibly on years 5, 10, 15, 20; assuming a 25-year lifespan
	Number of turbines	15 to 19	Based on 30% of 49 to 56 turbines; same ones surveyed every time and every year
	Areal extent (m)	85	Half of turbine height (ground to blade tip), or 85 m, whichever is greater
	Transect spacing (m)	5	Distance between concentric circular transects
	Monitoring speed (km/hr)	2.4	Speed of observer walking
	Frequency (days)	7	Days between surveys of same turbines
	Number of weeks	26	Based on April 1 to Oct 3
Carcass Removal Trials	Turbines	-	One turbine in each land cover type that they are found
	Number of trials	3	One per season (spring, summer, fall)
	Number of carcasses	10 to 30	10 carcasses per visibility class (easy, moderate, difficult) max of 3 carcasses per turbine
	Duration (max days)	20	Check each week until gone or up to 20 days
Observer Efficiency Trials	Number of turbines	-	At least one trial in each habitat class; three carcasses per turbine
	Number of carcasses	20	Per observer
	Number of trials	3	One per season (spring, summer, fall)

2.2.1 Bird and Bat Fatality Monitoring

Requirements for post-construction fatality monitoring at the Project include:

- Post-construction monitoring (including fatality surveys, carcass removal and observer efficiency trials) will be conducted during the 26-week period when bats are active and when migratory birds are most abundant (April 1 – October 3) for the first 2 years of wind turbine operation, then possibly at five-year intervals starting on year 5 depending on the fatality rates observed in the first two years.
- Fatality surveys will be conducted at each monitored turbine once per week (7 day intervals) from April 1 – October 3, for a total of 26 survey visits.
- Bat and bird fatality surveys will occur at a sub-sample of at least 30% of turbines (minimum of 10).
- Turbines selected for monitoring will be representative of the different land cover types and the distribution of the turbine array within the PDA, and will be the same turbines monitored in all years for consistency. Wind turbines will be selected through a scientifically defensible approach (e.g., stratified-random selection).
- Should significant annual bird or bat fatality occur at the Project, a CEA will be conducted and additional mitigation options considered. Should additional operational mitigation measures be required, the initial monitoring period may be extended beyond the initial 2 years after discussion with SKMOE, but will not extend beyond an additional 2 years to assess the effectiveness of additional mitigation measures. In the case where an additional 2 years of monitoring be required to determine the effectiveness of adaptive mitigation measures (i.e., years 3 and 4 of operation), then the scheduled monitoring on year 5 of the long-term periodic monitoring will not be conducted.
- Between 15 and 19 turbines (30% of the 49 to 56 turbines that will be constructed) will be selected to cover representative areas throughout the Project location. The start date of the post-construction monitoring will be dependent on the commercial operation date of the facility. If full Project commissioning is delayed, post-construction monitoring of the partially completed Project will not be delayed for longer than 1 year.
- Each surveyed turbine will have a search area of 85 m radius or half the height of the blade-tip height, whichever is greater.
- Monitoring will be conducted, to the extent possible, between one hour after sunrise to one hour before sunset, in conditions of light breeze and no precipitation.
- Circular transects spaced 5 m apart will be walked by observers at a pace of approximately 2.4 km/hr
- The search area of each turbine will be mapped into visibility classes according to Table 2. Where the majority of the search area would not be searchable due to vegetation cover or other impediments (e.g., Visibility Class 4), these turbines will not be included in the sub-sample of monitored turbines.

Table 2 Visibility Classes and Defining Characteristics

Visibility Class	%Vegetation Cover	Vegetation Height
Class 1 (Easy)	≥90% bare ground	≤15cm tall
Class 2 (Moderate)	≥90% bare ground ≥25%	≤15cm tall
Class 3 (Difficult)	≤25% bare ground	≤25% > 30cm tall
Class 4 (Very Difficult)	Little to no bare ground	≥25% > 30cm tall

2.2.2 Carcass Data Collection

During the fatality monitoring program, the following data on detected bird and bat carcasses will be collected:

- All carcasses found will be photographed and recorded/labeled with species, sex (if possible), date, time, location (UTM coordinate), carcass condition, observer, injuries, ground cover, visibility class, and distance and direction to nearest turbine.
- Weather conditions including wind speed and precipitation.
- The estimated number of days since death, and condition of each carcass collected will be recorded in one of the following categories:
 - Fresh
 - Early decomposition
 - Moderate decomposition
 - Advanced decomposition
 - Complete decomposition
 - Scavenged
- Bird carcasses found during fatality monitoring will be collected and stored in a freezer and used in carcass removal or observer efficiency trials, assuming they are in reasonable condition.
- Carcasses of the following species found during bat fatality searches will be stored in a freezer and used in carcass removal or observer efficiency trials, assuming they are in reasonable condition:
 - *Lasiomycteris noctivagans* (Silver-haired Bat)
 - *Lasiurus cinereus* (Hoary Bat)
 - *Lasiurus borealis* (Eastern Red Bat)
- Bird and bat carcasses will be collected under an SKMOE research permit, acquired prior to a given post-construction monitoring year.

2.2.3 Carcass Removal Trials

The level of carcass scavenging must be determined through carcass removal trials each year, as it varies from one project site to another depending on the scavenger community and abundance. The average carcass persistence time is a factor in determining the estimated bat or bird fatality rates.

Below are some important considerations for conducting carcass removal rate trials:

- Carcass removal trials will be conducted at least once a season (spring, summer, and fall) during the same period as the fatality surveys.
- A minimum of 10 carcasses per visibility class (see Table 2) will be used for each trial with a maximum of 3 carcasses per turbine, if possible.
- Carcasses will be monitored every 7 days in conjunction with carcass searches.
- To the extent possible, carcass removal trials will be conducted at turbines that are not part of the carcass search sub-sample.
- Carcasses will be placed before dusk and observers will wear gloves and clean rubber boots to avoid imparting human smell that might bias trial results (e.g., attract scavengers, etc.).
- Trials will continue until all carcasses are removed or to a maximum of 20 days (i.e., on the third carcass search visit).
- To avoid confusion with turbine related fatalities, trial carcasses will be discretely marked (e.g., clipping of ear, wing, fur; hole punching ear; etc.) with a unique identification so they can be identified as trial carcasses if they are moved by scavengers but not consumed, and GPS locations will be recorded.

- Carcasses used will be as fresh as possible since frozen or decomposed carcasses are less attractive to scavengers. If frozen carcasses are used, they will be thawed prior to beginning carcass removal trials.
- To the extent possible, bat carcasses will be used for at least one third of the carcass removal trials, and bird carcasses will comprise another third of the trial carcasses. Trials using other small brown mammal or bird carcasses (e.g., mice, brown chicks) may also be used when bird and bat carcasses are not available.

2.2.4 Observer Efficiency Trials

Observer efficiency is another important factor in creating an estimate of total bird and bat fatality. Observer efficiency trials require a known number of discretely marked carcasses to be placed around a wind turbine. Observers examine the wind turbine area, and the number of carcasses that they find is compared to the number of carcasses placed. Observer efficiency can vary considerably for each observer and from one site to another (varying by vegetation cover, terrain and season), and will be conducted as part of post-construction monitoring in each year of monitoring and for each person involved in carcasses searches during the year.

Below are some important considerations for conducting observer efficiency trials:

- Observer efficiency trials will be conducted at least once a season (spring, summer, and fall) during the same period as the bat fatality surveys.
- An independent ‘tester’ will control the trials and return to collect marked trial carcasses at the completion of the trials to determine the number of carcasses remaining and if any carcasses were scavenged or removed during the trial.
- Observer efficiency trials are to be conducted for each individual observer or team involved in searching for carcasses. The observer will not be notified when they are participating in an efficiency trial to avoid potential search efficiency biases.
- 20 carcasses per observer per season will be placed across all applicable visibility classes (see Table 2). The weighted average by proportion of visibility class per observer will be used for calculations.
- Trial carcasses will be placed prior to the regularly scheduled carcass observer.
- Trial carcasses are placed for one search period only and then removed and recorded by the ‘tester’.
- Trial carcasses will be randomly placed within the search area and location (GPS coordinates) recorded so that they can be retrieved if they are not found during the trial.
- Trial carcasses will be discreetly marked (e.g., clipping of ear, wing, leg, fur; hole-punching ear; etc.) with a unique identification so that they can be verified as a trial carcass by the tester.
- To the extent possible, bat carcasses will be used for at least one third of the carcass removal trials, and bird carcasses will comprise the remaining trial carcasses. Trials using other small brown mammal or bird carcasses (e.g., mice, brown chicks) may also be used when bird and bat carcasses are not available.
- If frozen carcasses are used, they will be thawed prior to beginning observer efficiency trials.

2.2.5 Proportion Area Searched

Based on AM Guidelines, the search area will be a minimum 85 m or half the height of the blade tip, whichever is greater, from a wind turbine base. Since it may not always be possible to search the entire 85 m radius (because of the presence of thick or tall vegetation, steep slopes, active cultivation, etc.), the actual area searched during the fatality surveys will be calculated at each turbine, using a GPS. A map of the actual search area for each turbine searched, and a description of areas deemed to be unsearchable (e.g., vegetation height, type, slope, etc.) will be provided in the fatality report.

2.2.6 Calculation of Fatality Estimates

The corrected fatality estimates will be calculated using the Huso (2011) estimator and will include correction factors for scavenger removal, observer efficiency and the proportion of area searched. These correction factors are described below.

Scavenger Correction Factor

The following formula will be used to calculate the overall scavenger correction (S_c) factors based on the proportion of carcasses remaining after each search interval are pooled:

$$S_c = \frac{n_{\text{visit}1} + n_{\text{visit}2} + n_{\text{visit}3}}{n_{\text{visit}0} + n_{\text{visit}1} + n_{\text{visit}2}}$$

Where,

S_c is the proportion of carcasses not removed by scavengers over the search period
 $n_{\text{visit}0}$ is the total number of carcasses placed
 $n_{\text{visit}1} - n_{\text{visit}3} \dots$ are the numbers of carcasses on visits 1 through 3

Observer Efficiency

Observer efficiency (S_e) will be calculated for each observer as follows:

$$S_e = \frac{\text{number of test carcasses found}}{\text{number of test carcasses placed} - \text{number of carcasses scavenged}}$$

The number of turbines that each individual searches will vary so it will be necessary to calculate a weighted average that reflects the proportion of turbines each observer searched. The weighted average or overall observer efficiency will be calculated as follows:

$$S_{e0} = S_{e1}(n_1/T) + S_{e2}(n_2/T) + S_{e3}(n_3/T) \dots$$

Where,

S_{e0} is the overall observer efficiency
 S_{e1} and S_{e2} and $S_{e3} \dots$ are individual observer efficiency ratings
 N_1 and N_2 and $N_3 \dots$ are number of turbines searched by each observer
 T is the total number of turbines searched by all observers

Proportion Area Searched

Proportion area searched (P_s) is calculated as follows:

$$P_s = \frac{\text{actual area searched}}{\pi r^2}$$

Where $r = 85$ m (or half the height of the blade tip, whichever is greater)

Corrected Fatality Estimates

The estimated bird and bat fatality (C) is calculated as follows:

$$C = c / (S_{e0} \times S_c \times P_s)$$

Where,

- C is the corrected number of fatalities
c is the number of carcasses found
 S_{e0} is the weighted proportion of carcasses expected to be found by observers (overall observer efficiency)
 S_c is the proportion of carcasses not removed by scavengers over the search period
 P_s is the proportion of the area searched

2.2.7 Other Considerations

- The above calculations will be presented in corrected number of birds/MW/year and bats/MW/year as well as birds/turbine/year and bats/turbine/year.
- Carcasses may be discovered incidental to formal searches. These carcasses will be processed (i.e., collected and recorded, etc.) and fatality data will be included with the calculation of fatality rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be reported separately.

2.2.8 Worker Training and Monitoring

A site-specific worker environmental training plan will be developed and implemented throughout the Project's operating life. All employees and contractors working in the field will be required to attend the environmental training session prior to working on site. This training will include information regarding the sensitive biological resources, restrictions, protection measures (including minimizing light pollution), individual responsibilities associated with the Project, and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet documenting their participation.

Of particular importance is continued monitoring of the site during operation by workers, especially during years when fatality monitoring programs are not executed. Well-trained workers are an excellent source of information and "boots on the ground" to record any fatality events, particularly for species at risk. Personnel will be trained to identify and report fatality events. Additionally, road-killed animals or other carcasses (excluding species at risk, bats and migratory birds; see below) detected by personnel on or near roads within the Project area will be removed promptly. This measure reduces the attraction of raptors and other avian scavengers to the Project area.

In the event of a SFE occurring or listed species carcass being found by a Project employee, the SKMOE will be notified within 24 hours (or the next business day) of the observation and a CEA will be completed.

2.3 OPERATIONAL MITIGATION

Operational mitigation refers to adjustments made to the operation of wind turbines to help mitigate potential adverse environmental effects on bird and bats (i.e., significant fatality). The AMP for the Project identifies that implementation of operational mitigation may be required at any given time during the operational phase of the Project, should an SFE occur, or fatalities of listed species (see Figure 1) and discussion of the CEA with SKMOE result in the need to do so. Operational mitigation may be applied to one or more turbines or turbine clusters that are identified in the CEA.

In the absence of a SFE, operational mitigation may be considered during a review by SKMOE of the annual monitoring report with corrected fatality estimates, if those estimates exceed management triggers in tier 2 or tier 3 (see Figure 1). A tier 2 or 3 fatality rate would also require a CEA to assist in determining the options and need to implement operational mitigation.

Where operational mitigation is applied, an additional 2 years of effectiveness monitoring may be implemented. Monitoring the effectiveness of any adaptive mitigation techniques will help to evaluate the success of this mitigation. Note that if adaptive mitigation is applied prior to the second year of operation, the second year of the standard fatality monitoring program will also serve as the first year of mitigation effectiveness monitoring.

Specific adaptive mitigation options that will be considered to reduce bird and bat fatality rates of the Project which may include blade feathering, increased cut-in speeds, operational curtailment, fog cut-out, partial or complete turbine shutdown, and seasonal curtailment.

As additional mitigation options are developed and tested for WEPs, these options will also be considered. The specific adaptive mitigation measures prescribed to the Project will be identified through the CEA and discussions with SKMOE. Note that these mitigation options are considered for both listed and non-listed species of birds and bats.

3.0 Post-reclamation Monitoring

3.1 OBJECTIVE

The objective of the post-reclamation monitoring program is to quantify changes in the native plant community surrounding Project infrastructure and to identify and detect the presence of any prohibited, noxious and nuisance plant species, as identified in the *Weed Control Act* (2010). Post-reclamation monitoring will begin within the first few months after construction is completed to identify invasive species or problematic areas to reclaim.

3.2 NON-NATIVE INVASIVE PLANT MONITORING

passive monitoring of prohibited, noxious and nuisance plant species will occur for the life of the Project through training of maintenance personnel to examine areas adjacent to Project infrastructure for the presence of species listed in the *Weed Control Act* (2010). Similar to the reporting approach of bird and bat fatalities by workers, a documenting and reporting protocol will be developed for listed weed species.

3.3 POST-RECLAMATION MITIGATION

Approaches to weed control are described in Volume 1 of the EPP.

4.0 Reporting Requirements

Reporting requirements for the operation monitoring program varies according to the specific components described in this volume. A SFE or detection of a listed species carcass (see Figure 1 for species categories included) will be reported to SKMOE within 24 hours or the next business day. In the event of a SFE requiring a CEA, the CEA report will be prepared and submitted to SKMOE within 60 days of the reported event.

Data collected as a result of the post-construction monitoring programs will be submitted in accordance with SKMOE research permit requirements (e.g., loadforms).

Annual post-construction monitoring reports will be prepared and submitted by February 1 of the following year, and will include the following information as identified in the draft AM Guidelines:

4. Methodology and rationale for any ministry-approved deviations from this guidance document.
5. Description of any turbine habitat type classes and identification of representative monitoring turbines. Turbine habitat type classes can be considered equivalent to Treatment Groups as defined in the Wind Energy Bird and Bat Monitoring Database.
6. Results of carcass removal trials and observer efficiency trials.
7. Calculation of the carcass removal and observer efficiency using the Huso estimator.
8. Corrected, summarized fatality rate for:
 - a. non-raptor birds per turbine and per MW, by season (April-May, June-July, August-October) and by year;
 - b. raptors per turbine and per MW, by season and by year;
 - c. bats per turbine and per MW, by season and by year; and
 - d. corrected, summarized fatality rate excludes bird species listed in Section 4(1) of the Wildlife Regulations (Government of Saskatchewan 1981).
9. Results of any BACI studies or other population surveys that may have been required.
10. GIS shapefile indicating which turbines are being monitored and GPS locations of the individuals detected in the fatality monitoring.
11. Digital photograph of each carcass found in fatality monitoring in situ.
12. Digital copy of the monitoring data that was submitted to ENV.researchpermit@gov.sk.ca in accordance with the Research Permit submission requirements.
13. Fatality monitoring data per monitoring event per turbine including:
 - a. turbine number and location;
 - b. date and time the turbine is surveyed;
 - c. weather conditions, including wind strength and direction;
 - d. vegetation surrounding the turbine;
 - e. observer identity (consistent name or number for each observer); and
 - f. for each individual detected record:
 - i. location (UTM coordinates);
 - ii. species;
 - iii. sex;
 - iv. age class (if apparent);
 - v. state of decomposition; and
 - vi. apparent injuries and signs of scavenging.

5.0 References

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Blue Hill Wind Energy Project

Environmental Protection Plan

Volume 3 - Emergency Response Plan



December 2017

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1.0 INTRODUCTION

As part of the Environmental Impact Statement (EIS) for the Blue Hill Wind Energy Project (the Project), Algonquin Power Co. (Algonquin) has committed to the development of an Environmental Protection Plan (EPP) to summarize Algonquin's corporate commitments and regulatory requirements for the Project's environmental management. The EPP is divided into 3 Volumes and a map atlas (included in the Exhibits section) outlining site-specific information.

Volume 3 of the EPP presents of the Emergency Response Plan (ERP) for the Project and is intended to advise on-site personnel, contractors and landowners on the procedures they must follow in the event of an emergency situation during the construction and initial operations phase (pre-commissioning) of the Project.

1.1 EMERGENCY RESPONSE POLICY

The Blue Hill Energy Wind Project is committed to protecting people, property and the environment from impact resulting from emergency situations arising at the Project through the implementation of an emergency preparedness and response program. The Manager will develop, implement, and maintain this Plan for Project construction and initial operation in compliance with applicable laws and standards to ensure a timely and appropriate response to emergencies.

2.0 REGULATORY FRAMEWORK

The following regulations, licenses, standards and guidelines provide key elements of the framework for the Emergency Response Plan:

- *The Environmental Assessment Act*
- *The Environmental Management and Protection Act, 2010*
 - *Hazardous Substances and Waste Dangerous Goods Regulations* (E-10.2 Reg 3)
- *The Dangerous Goods Transportation Act*
 - *Dangerous Goods Transportation Regulations* (D-1.2 Reg 1)
- *The Saskatchewan Employment Act*
 - *Occupational Health and Safety Regulations, 1996* (O-1.1 Reg 1)
- *The Fire Safety Act, 2015*
 - *Saskatchewan Fire Code Regulations* (F-15.11 Reg 1)
- *The Canadian Environmental Protection Act, 1999* (1999, c. 33)
 - *Environmental Emergency Regulations* (SOR/2003-307)
- Canadian Standards Association Z731-03 Emergency Planning for Industry

3.0 POTENTIAL EMERGENCY SCENARIOS

On the basis of relevant experience and best professional judgment, the Manager believes that the emergencies that could occur at the Project may include: ice throw (from revolving rotor blades), fires, worker electrocutions, lightning strikes, lost blades, worker falls, planes crashing into towers or the transmission line, spills of hazardous materials and excavation cave-ins.

Industry-wide statistics on the frequency of occurrence of fires at wind farms are not available; however, the likelihood of fires occurring at the Project is low.

The hazardous materials used during construction will primarily consist of diesel and gasoline fuels for re-fuelling of equipment. During operations, only small amounts of hazardous materials are used. For this reason, the probability of a spill occurring is expected to be low.

The other types of potential emergencies include excavation cave-ins and equipment malfunctions. Any Project excavations will be for underground electrical, communication lines and turbine foundations. The buried electrical and communication lines will not be buried any more than 4 feet deep, so the possibility of a serious situation arising from an excavation cave-in is low. During construction of the foundations, all provincial safety regulations will be followed to prevent excavation cave-in.

The severity of the potential emergency scenarios on people, property and the environment was evaluated using rating criteria for determining severity of potential emergency situations (Table 3-1). The hazard analysis for the wind-energy site is shown in Table 3-2. Based on this analysis, the most important credible worst-case scenarios are those that have the potential to result in loss of life, which includes a major fire, electrocution, lightning strike, lost blade, and plane crashes.

3.1 CONSTRUCTION

The most probable emergencies that may occur during the construction phase of the Project are likely to involve spills of petroleum products used in construction equipment, excavation cave-ins and equipment malfunctions during construction. The worst-case credible scenario is a major spill of hazardous materials.

3.2 OPERATION

The most probable emergencies that could occur during the operational phase include ice throw, fire, electrocution, lightning strike, lost blade, falls, plane crash and equipment malfunctions during operations. The worst-case credible scenarios are fire, electrocution, lost blade, falls or plane crashes that result in loss of life.

4.0 EMERGENCY PROCEDURES

4.1 CONSTRUCTION - ROLES AND RESPONSIBILITIES

- The Contractor On-Site Construction Manager is designated as the “Emergency Response Coordinator” during an emergency situation and will be responsible for ensuring that all contractors, staff, on-site visitors and others adhere to the appropriate emergency response procedures as stated in this Plan and to the environmental protection measures stated in the Blue Hill Wind Energy Project EPP for the Project.
- Any visitor present at the site must report to the Contractor On-Site Construction Manager. In the event of an emergency, the Herbert Fire Department will arrange to provide fire-fighting and other resources as required. The resources of the Fire Department are shown in Table 4-1
- In the event of an emergency, contractors, landowners, and others who may be present at the site are responsible for **immediately calling 9-1-1** and then notifying the Contractor On-Site Construction Manager.

4.1.1 Emergency Procedures

The following emergency procedures shall be followed in the event of an emergency that occurs during construction of the Project:

- To prevent or minimize the occurrence of an emergency, the appropriate preventative measures outlined in the Project’s EPP will be used at all times.
- Immediately upon being notified of an emergency situation, the Contractor On-Site Construction Manager will evaluate the situation by considering:
 - the nature of the emergency;
 - potential risks of injury to persons at or near the site;
 - potential risks to the environment;
 - potential risks to property; and
 - need for personnel and other resources to respond to the emergency.
- The Emergency Response Coordinator will notify on-site personnel, including any visitors, of the emergency via an alarm system such as by telephone, two-way radio or sirens, **then call 9-1-1**.
- The Herbert Fire Department will specify the location of the Incident Command Centre.
- The Emergency Response Coordinator will notify Algonquin Power’s site manager and the Operator (contact info in Table 4-2) of the emergency according to the reporting form specified in Attachment A of this Plan.
- If required to prevent potential injury to human life, the Emergency Response Coordinator will evacuate the Project. The reception centre will be located at the Herbert Lions Club, Railway Avenue, Herbert, SK. The Emergency Response Coordinator will designate a person to conduct a “head-count” at the reception centre.
- The Emergency Response Coordinator will contact or designate a person to contact all other required resources (i.e., hazardous waste company).
- The Emergency Response Coordinator must report the emergency using the form stated in Attachment A of this plan.
- The Emergency Response Coordinator will identify any need for security measures at the Project during the emergency and designate one person to implement these measures.

4.2 INITIAL OPERATIONS

As construction of the Project proceeds, testing of Project operations will occur prior to final commissioning and commencement of the full Operation Phase of the Project. This is the ‘initial operations’ of the Project. The following emergency response procedures will apply during initial operations of the Project and are considered part of the Construction Phase of the Project.

4.2.1 Roles and Responsibilities

- The Contractor On-Site Construction Manager is designated as the Emergency Response Coordinator during any emergency situation that occurs during initial operation of the Project and will be responsible for ensuring that all contractors, staff, landowners on-site visitors and others adhere to appropriate emergency response procedures stated in this Plan and the environmental protection measures stated in the EPP. Additionally, the Operations Manager may be on-site at any time during initial operations. The Construction Manager will also report all emergency situations to the Operations Manager.
- Any visitors present on the site must report to the Contractor On-Site Construction Manager.
- In the event of an emergency situation, the Herbert Fire Department will arrange to provide fire-fighting and other resources as required. The resources of the Fire Department are shown in Table 4-1.
- In the event of an emergency situation, contractors, landowners and others who may be present at the Project are responsible for **immediately calling 9-1-1** and then notifying the Construction Manager.

4.2.2 General Emergency Procedures

The following emergency response procedures will be followed in the event of an emergency that occurs during the initial operation of the Project:

- To prevent or minimize the occurrence of an emergency the appropriate preventative measures outlined in the site Environmental Protection Plan will be used at all times.
- Immediately upon being notified of an emergency situation, the Contractor On-Site Construction Manager will evaluate the situation by considering:
 - the nature of the emergency
 - potential risks of injury to persons at or near the site
 - potential risks to property
 - potential risks to the environment
 - need for personnel and other resources to respond to the emergency
- The Emergency Response Coordinator will notify on-site personnel, including any visitors, of the nature of the emergency via an alarm system such as by telephone, two-way radio or sirens, then **call 9-1-1**.
- The Herbert Fire Department will specify the location of the Incident Command Centre.
- The Emergency Response Coordinator will notify Algonquin Power head office, the Operator and Algonquin Power of the emergency using the contact information provided in Table 4-2.
- If required to prevent potential injury to human life, the Emergency Response Coordinator will evacuate the Project. The reception centre will be located at the project construction office. If this is not possible, then the reception centre will be the Herbert Lions Club, Railway Avenue, Herbert, SK. The Emergency Response Coordinator will designate a person to conduct a “head-count” at the reception centre to ensure that all persons have been safely evacuated.
- The Emergency Response Coordinator will contact or designate a person to contact all other required resources (e.g., hazardous waste company).

- The Emergency Response Coordinator should report the emergency using the form stated in Attachment A.
- The Emergency Response Coordinator will identify any need for security measures at the Project during the emergency and designate one person to implement these measures.

4.3 CONTINGENCY EMERGENCY RESPONSE PROCEDURES

4.3.1 Contingency Procedures – Spills and Spill Prevention

- Take care to prevent the spill from entering into any waterways.
- Locate fuel storage and equipment servicing areas a minimum distance of 100m from any wetland/waterbody.
- Ensure that at all times during the construction phase, substance appropriate spill absorption materials for containing and recovering spills are readily available.
- In the event of a spill, and only if it is safe to do so, contain the spill either by constructing containment dikes, by using spill absorption materials or by other appropriate methods.
- Properly contain all absorbent materials used to absorb and clean-up spill as a hazardous waste.
- Arrange for proper disposal of all collected waste materials.
- Should a spill occur, contact the Saskatchewan Environment spill response center at 1-800-667-7525 and the Herbert Fire Department by calling 9-1-1.

4.3.2 Contingency Procedures – Safety

To prevent emergency situations, the following safety measures must be followed by all persons present at the Project at all times:

- Never lock a WTG tower access door from the inside, or otherwise inhibit a WTG emergency-response entry.
- Ensure that only one person at a time is allowed on any one ladder section (between platforms) when climbing a tower or in the WTG.
- Ensure that debris or obstacles are not placed in roadways, walkways, aisles, or otherwise obstruct travel routes.
- Ensure that only ANSI (CSA) approved fall arrest systems (safety harnesses, anchorage connectors, lanyards and safety cable devices) are used.
- Prevent all use of clothing made of acetate, polyester, rayon, or nylon by electrical workers.
- Ensure that no burning, welding, or other sources of ignition are applied to any enclosed tank or vessel, with or without openings, until it has been determined by the proper authority that no possibility of explosion exists.
- Follow all fire prevention measures, including a Hot Work Permit, when performing hot work such as cutting and welding. If out of doors, wet the surrounding area prior to the task. Use shields.
- Employ a fire watch if welding, burning, or grinding must be performed in an area where combustibles or flammables are present - the fire watch shall be equipped with proper fire extinguishing devices (fire extinguishers, water truck, etc.) - combustibles shall be moved or carefully protected from sparks.
- Ensure use of fire blankets when carrying out work with a risk of fire.
- Follow safe practices when refueling vehicles or equipment - do not leave vehicles unattended or tamper with fuel tank or gas pump.
- Prevent parking of vehicles where the exhaust system might ignite dry grass, weeds, or farm swathes.
- Control weeds and brush from growing up around site structures.

- Prohibit smoking inside the WTG. If permitted on the site, smoking should be restricted to designated areas and enforced. Extinguished smoking materials must be contained and disposed of properly.
- Prior to beginning any work, all workers will assess their work environment noting the possibility of a fire occurring, the proximity of firefighting equipment, and a safe escape route in the event of a fire.
- Conspicuously locate and label all firefighting equipment. Ensure it is easily accessible and that it will be inspected and maintained on a regularly scheduled basis. Replace fire extinguishers as necessary.
- Situate internal combustion engine powered equipment (e.g.: portable generators), such that the exhausts are clear of any combustible materials.
- Use only approved cleaning agents; do not use gasoline or other flammable liquids for cleaning.
- Store flammable substances in cabinets designed for flammables, and away from sources of ignition.
- Collect all oily rags in covered metal containers labelled as “Oily Rags - Do Not Discard” - oily rags shall not be discarded in regular rubbish bins, nor will oily rags be allowed to accumulate.
- To prevent fire or accident hazards, neatly collect and schedule for removal all scrap materials and/or rubbish - rags, packing materials, sawdust and other trash must be collected and placed in appropriately marked receptacles.
- Report all incidents, including near misses, to a supervisor or a safety representative so that reporting can commence and corrective measures can be taken to prevent recurrence.
- Ensure that all personnel attend the regularly scheduled site safety meetings with their employers.

4.3.3 Contingency Procedures – Fire

- On-site Project staff will be available 24 hours a day and must assist local fire departments with access to the WTGs in the unlikely event of fire or other disaster.
- The first person to observe a fire should:
 - Immediately sound the alarm to announce the emergency and then call 9-1-1.
 - Report the fire to the On-Site Construction Manager.
 - Evacuate and isolate the area (close doors), if possible.
 - Only if the person has been properly trained and feels it is safe to proceed - use available fire extinguishers to extinguish or contain the fire. If the fire is fueled by gas, the gas supply should be shut off prior to extinguishing the fire. Isolate area to contain the fire.
 - Immediately evacuate the area should initial firefighting attempts fail. (Failure to evacuate during a fire alarm may be justification for disciplinary action).
- The WTG main switch or switch gear must be tripped instantly. If this is not possible from the site, immediately request the local grid supervisor to break the connection.
- If the fire is inside a WTG, **call 9-1-1**, then attempt to extinguish it with a fire extinguisher if the person has been trained in fire-extinguishing and if it is safe to do so. If the fire is uncontrollable, **call 9-1-1**, evacuate the WTG immediately and set up a barrier to prevent others from entering.
- If the fire is outside a WTG, call **9-1-1** then, attempt to fight the fire if possible, but without taking personal risk - keep a clear escape path at all times.
- The Project may require instruction from local fire-protection personnel on proper methods and equipment for fighting site field fires.
- If fire-fighting attempts fail, no employee shall place his/her life in danger and should immediately evacuate the area.

4.4 REPORTING

4.4.1 Procedures

The following procedures must be followed for reporting all Project emergencies:

- Any person who identifies an emergency situation **must immediately call 9-1-1**, and then report it to the Emergency Response Coordinator or their designate. The Contractor On-Site Construction Manager will activate the ERP.
- The Emergency Response Coordinator will obtain immediate emergency response assistance, if required, by **calling 9-1-1**.
- The Emergency Response Coordinator or their designate are the only persons authorized to speak to outside agencies (police, fire department,) during an emergency situation.
- In the event of a spill of a hazardous material in excess of reportable limits, the spill must be reported to the Saskatchewan Environment Emergency Reporting Line at (800) 667-7525. Hazardous materials on site are likely to be flammable liquids (e.g. oil, gasoline, paints, and solvents) and thus, spills in excess of 100L must be reported.
- In the event of an emergency during construction, the Emergency Response Coordinator must immediately notify Algonquin Power using the emergency callout system and the telephone contact names and telephone numbers stated in Table 4-2.
- In the event of an emergency during initial operations, the Operations Manager will immediately notify Algonquin Power and the Operator using the telephone number stated in Table 4-2.
- The Emergency Response Coordinator will immediately notify any potentially affected landowners of the emergency using the telephone numbers stated in Table 4-3.
- After the emergency incident is under control, the Emergency Response Coordinator will complete the Emergency Reporting Form (Attachment A) and forward it to Algonquin Power and the General Contractor.
- In the event of media coverage of an emergency event, the Algonquin On-Site Manager will be the primary contact with the media, through consultation with Algonquin's Head Office (Director of Investor Relations). Any information shared with the media should be factual and succinct and should not speculate on the emergency situation.

4.4.2 Contact Telephone List

The contact telephone list for emergency reporting is attached in Table 4-2.

5.0 TRAINING

All contractors, employees and landowners who will be present on the Project must be aware of this Emergency Response Plan. The Contractor On-Site Construction Manager or the Operations Manager or their designate will conduct training sessions, informational events, or tailgate meetings to ensure that all persons are familiar with the ERP and are also aware of their duties and responsibilities as stated in the ERP. Training in Emergency First Aid, CPR and fire extinguisher use is suggested for on-site staff. All persons shall acknowledge understanding of and agree to comply with the Emergency Response Plan by signing the form attached as Table 5-1.

6.0 PLAN REVISION

This Plan will be reviewed on a regular basis, no less than annually, and also after any emergency event has occurred and will be revised and reissued as needed. The revisions and redistributions shall be recorded in Table 6-1.

Table & Forms

Table 3-1 Rating Criteria for Determining Severity of Potential Emergency Situations

	Catastrophic	Critical	Marginal	Negligible
People	Death or fatal injury	Permanent disability, severe injury or illness	Injury or illness not resulting in disability, major quality of life loss or perceived illness	Treatable first aid injury
Environment	A major hazardous spill that is uncontained	A minor hazardous chemical spill that is uncontained	A major hazardous materials spill which is contained	A minor hazardous chemical spill which is contained
Property	More than 50% of property located in the proximity of the impact is severely damaged	More than 25% of property located in the proximity of the mishap is severely damaged	More than 10% of property located in the proximity of the mishap is severely damaged	No more than 1% of property located in the proximity of the impact is severely damaged

Source: MIAC Industrial Emergency Response Planning Guide. 1996.

Table 3-2 Hazard Analysis

Type of Emergency	Probability of Occurrence within the next year	Area and Severity of Potential Effects			Comments
		People ⁽¹⁾	Property ⁽¹⁾	Environment ⁽¹⁾	
Ice throw from a single blade	Low	Critical	Marginal	Negligible	The WTGs will experience ice accumulation on blades during the blades; however, the WTGs are equipped with blade vibration sensors and all WTGs are located a minimum of 500 m from any residential homes. If the WTG deviates from normal operating conditions, the safety system is triggered, shutting down the WTG.
Major fire in the WTG (oil-filled) gearbox at the top of the tower (assuming workers are present)	Low	Catastrophic	Catastrophic	Critical	Two multi-purpose dry chemical fire extinguishers certified by ULC will be placed in each WTG – one in the nacelle and one at the base of the tower.
Minor fire in the WTG or O&M Facility (assuming workers are present)	Low	Marginal	Marginal	Marginal	Two multi-purpose dry chemical fire extinguishers certified by ULC will be placed in each WTG – one in the nacelle and one at the base of the tower.
Electrocution of a worker in a WTG tower	Low	Catastrophic	Negligible	Negligible	For safety reasons, each WTG maintenance crew consist of two qualified wind smiths that act as backup to each other
Lightning strikes	Low	Catastrophic	Critical	Negligible	WTGs will be equipped with lightning conductors, so if lightning strikes any Facility WTG, the damage will be minimized.
Lost blade from a single wind WTG	Low	Catastrophic	Critical	Negligible	WTGs have been located at least 1000m away from residential property.
Fall or falling object resulting in injury of a person	Low	Catastrophic	Negligible	Negligible	
Plane crash into a WTG or transmission line	Low	Catastrophic	Catastrophic	Negligible	
Spill of hazardous materials during construction or operation having the potential to be deposited into a waterbody	Low	Negligible	Negligible	Critical	Materials for containing and cleaning up hazardous materials will be kept at the Facility.
Trench cave-ins	Low	Marginal	Negligible	Negligible	
Equipment malfunctions during construction	Unknown	Marginal	Negligible	Negligible	
Facilities malfunctions during operations	Unknown	Negligible	Critical	Negligible	Each WTG is equipped with an electronic controller that measures and controls it's operations. If the key parameters measured deviate from normal operating conditions, the safety system is triggered, shutting down the WTG.

1. Severity stated is the likely possible worst-case scenario

Table 4-1 Herbert Fire Department Available Resources

Fire Department	Location	Fire Chief	Resources
Herbert Fire Department	Herbert, SK		[two fire trucks, including one water truck for grass fires; jaws-of-life, shared with the Town of Morse]

**All Fire Departments can be contacted by Calling:
911**

**For Non-Emergency Fire Department Related Questions Please call:
The Town of Herbert Fire Department: 911**

Table 4-2 Emergency Contact Telephone List

Emergency Contact List	
Organization	Telephone #
EXTERNAL	
ALL LOCAL EMERGENCY SERVICES - FIRE, POLICE, AMBULANCE	911
Saskatchewan Environment Spill Line	1-800-667-7525
INTERNAL ON-SITE	
On-Site Algonquin Construction Manager	TBD
Operations Manager	TBD
INTERNAL OFF-SITE	
Project Manager - Brandon Moore	905-829-6372

Table 4-3 Landowner Telephone Numbers

Wind Turbine Name	Landowner	Telephone #
		Home: Cell:
		Home: Cell:
		Home: Cell:

Attachment A Blue Hill Wind Energy Project Emergency Reporting Form

This form must be completed by the Construction or Operations Manager following an Emergency Event

Date:

Time of Incident:

Briefly describe the emergency:

Describe the actions taken during the emergency:

Were there any injuries? Yes No, If yes describe:

Was there any damage to property? Yes No, If yes, describe:

If the emergency involved a spill of hazardous materials, please state the type and amount of material

Was the spill reported to the appropriate provincial authorities? Yes No

Describe the response to the spill:

Follow-up action required:

Other comments:
