



Lake Winnipeg East System Improvement Transmission Project

2017 Vegetation Biophysical Monitoring Report

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Aquatic, Terrestrial and Wetland Biologists

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1.0 Introduction

The Lake Winnipeg East System Improvement Transmission Project (LWESITP) herein referred to as the 'Project' is comprised of the construction, and operation and maintenance of the PQ95 Transmission Line and Manigotagan Corner Station Site. The transmission line spans approximately 70km with the majority of the project footprint occurring within boreal forest and wetland habitat. The transmission line is in close proximity to Provincial Road #304 which was utilized extensively by field staff to access various survey locations.

As part of Manitoba Hydro's Construction Environmental Protection Plan (CEnvPP) for the Project (Manitoba Hydro 2015), a biophysical monitoring program has been implemented to ensure that mitigation efforts are effective and adaptive management is applied where necessary.

The specific requirements for the vegetation monitoring component of this project were developed through the Environmental Assessment (EA), which includes the Vegetation Technical Report (Calyx Consulting 2012). The CEnvPP (Manitoba Hydro 2015) is the guiding document for the assessment of mitigation and effects relating to the construction of the Project.

Natural Resource Solutions Inc. (NRSI) was retained by Manitoba Hydro in September 2014 to develop and implement a Vegetation Biophysical Monitoring Plan (VBMP) for the Project. The VBMP is intended to quantify the effectiveness of the implemented construction mitigation measures and inform the need for any further mitigation as part of an adaptive management approach. With reference to the general and specific mitigation measures and annual monitoring results, the VBMP will confirm compliance with the regulatory requirements.

The monitoring methodology outlined in the VBMP is based on annual, repeated sampling of a select group of monitoring components. The Environmental Effects Monitoring Plan (EEMP) (Manitoba Hydro 2015) along with the Environmental Act License (Government of Manitoba 2015) outline the monitoring requirements to be

fulfilled during and following construction of the Project. The VBMP is a component of the EEMP. Monitoring is to occur annually throughout the construction phase and one year following the completion of construction. The clearing of vegetation along the right-of-way (RoW) occurred in the winter of 2015/2016. Vegetation surveys completed in 2017 constitute Year 2 During-construction and build on surveys conducted in 2016. Year 1 Post-construction monitoring will follow in 2018.

Given that the components to be monitored vary in nature from known populations of rare species to detection of invasive species and species important to First Nation and Métis communities, an adaptable, specific and measurable survey methodology is required.

This Vegetation Biophysical Monitoring Report summarizes all of the collected information from 2016 and 2017 monitoring activities. Map Set 1 indicates the location of each Environmentally Sensitive Site (ESS) which were informed partially by Valued Ecosystem Components (VECs) identified in the EA process. These ESSs include Species of Conservation Concern (SCC) and plant gathering areas. Specific locations of invasive non-native species monitoring are not indicated with weeds occurring sporadically throughout the project footprint with higher concentrations at road crossing locations. As no riparian buffers exceedances or areas requiring rehabilitation were identified as of July 2017, these components were not monitored during the 2017 surveys.

The vegetation survey data collected in 2017 informs changes which have occurred since the 2016 monitoring effort and also serves as a baseline for effects monitoring in the post-construction (operational) phase. This data will be analyzed to provide conclusions based upon quantitative results and complemented with qualitative field observations of site conditions. Any deficiencies in the applied mitigations have been identified with recommendations for further effort to protect the identified ESSs.

2.0 Background

2.1 Monitoring Requirements

The purpose of the EEMP (and VBMP) is to determine the effectiveness of implemented mitigation measures which are intended to minimize the impact of the development on any identified ESS within and adjacent to the preferred transmission RoW. The Environmental Act License (Government of Manitoba 2015) issued in accordance with The Environment Act (C.C.S.M. c. E125) stipulates a number of conditions which the Project must fulfill. The following conditions pertain to the development and implementation of the VBMP:

“1. The Licencee shall, in addition to any of the specifications, limits, terms and conditions specified in this Licence, upon the request of the Director:

- a. sample, monitor, analyse or investigate specific areas of concern regarding any segment, component or aspect of the Development for such duration and at such frequencies as may be specified;*
- b. determine the environmental impact associated from the Development; and*
- c. provide the Director, within such time as may be specified, with such reports, drawings, specifications, analytical data, descriptions of sampling and other information as may from time to time be requested.*

25. The Licencee shall, during construction and maintenance of the Development, prevent the introduction and spread of foreign biota (e.g., weeds, non-native species) on land and to surface waters. Monitoring for incursion of invasive plant species as a result of the project, and control programs for invasive plants, shall be conducted as described in the Proposal dated January 2, 2013.

33. The Licencee shall prepare a report on monitoring programs to be undertaken in relation to the mitigation measures outlined in the Proposal and supporting information. The report shall be submitted prior to the initiation of construction, for the approval of the Director, and shall:

- a. provide a description of the proposed activities for monitoring the physical, aquatic, and terrestrial environments for effects from construction and operation of the Development;*
- b. describe the parameters to be measured, the methodology and frequency of measurement, references to establish thresholds and sustainability indicators, where appropriate, and the protocol for reporting the results of monitoring of the environmental conditions affected by the Development to Manitoba Conservation and Water Stewardship; and*
- c. include descriptions of proposed programs developed in cooperation and consultation with the Wildlife Branch, which employ pre- and post-*

construction monitoring components and methodologies (design, data collection, analyses);

i. for the monitoring of the population status, distribution, and movements of moose in the vicinity of the transmission line right-of-way;

ii. for the monitoring of wolf movements, territories, distribution, and predation on moose in the vicinity of the transmission line right-of-way;

and

iii. for the monitoring of the occurrence and distribution of white-tailed deer in the vicinity of the transmission line right-of-way.

34. *The Licencee shall implement the monitoring programs as approved pursuant to Clause 33 of this Licence.*

35. *The Licencee shall provide the data, and report annually to the Director, on the results of monitoring programs as approved pursuant to Clause 33 of this Licence.*

36. *The Licencee shall consult annually with the Wildlife Branch on the progress of the monitoring programs approved pursuant to Clause 33 of this Licence, and on any proposal adjustments or amendments to the programs.”*

The CEnvPP (Manitoba Hydro 2015) also stipulates a number of conditions which the Project must fulfill. The CEnvPP acts as the key guiding document to verify the predicted effects outlined in the EA and to assess the observed effects relating to project construction. The assessment of the effects will be used to inform adaptive management where deficiencies in environmental protection are observed. The following conditions pertain to the development and implementation of the VBMP:

As noted in Section 3.3 of the EA, the implementation of the CEnvPP includes:

“Inspection – to oversee adherence to and implementation of the terms and conditions of Project approval during Project construction and operation;

Effects monitoring – to measure the environmental changes that can be attributed to Project construction and/or operation and check the effectiveness of mitigation measures;

Environmental auditing – to verify the implementation of terms and conditions, the accuracy of the predictions, the effectiveness of mitigation measures, and the compliance with regulatory requirements and standards”

The ESSs which were identified in the EA are identified in Maps 1-18 of the CEnvPP. A revised version of these maps is appended to this report. These maps include the newly

documented locations of SCC which were observed during 2016 surveys as well as plots which were monitored in 2016 and 2017 to monitor medicinal and edible plants.

2.2 Species of Conservation Concern

Species of Conservation Concern include species of plants that are listed by the Manitoba Conservation Data Centre (MBCDC). None of these species are protected under The Manitoba Endangered Species and Ecosystems Act or the federal Species at Risk Act. Pre-construction vegetation surveys (Calyx Consulting 2012) identified Hooker's Orchid (*Platanthera hookeri*) (S2S3), Sessile-fruited Arrowhead (*Sagittaria rigida*) (S2?), Dwarf Bilberry (*Vaccinium caespitosum*) (S3) and Swollen Sedge (*Carex intumescens*) (S3) to occur within the RoW. S2 indicates that a species is considered imperiled while S3 indicates that a species is considered vulnerable. These species had been noted to exist in low numbers, and have limited distribution within the project footprint.

The SCC listed above occur in four separate locations within the project footprint. All occurrences are within or in close proximity to the transmission line RoW and all less than 500m from a tower location.

Construction activities that can negatively affect plant SCC include the use of heavy equipment, clearing and grubbing of vegetation and competition from invasive species. While the transmission line overlaps the locations of these SCC, tower locations were selected to avoid direct impacts on these populations.

The following mitigation measures were identified in the CEnvPP:

- Identify and flag prior to start of work;
- Carry out construction activities on frozen or dry ground to minimize surface damage, rutting and erosion;
- Provide 5m vegetated (shrub and herbaceous) buffer around site;
- Remove trees by low disturbance methods;
- Confine vehicle traffic to established trails to the extent possible; and
- Implement additional mitigation from site investigation.

The EEMP outlines the following objectives for the known occurrences of SCC:

- Document SCC during pre-construction;
- Document presence of SCC during construction; and
- Verify the implementation and effectiveness of protection measures.

Monitoring of SCC occurred in July of 2016 and 2017 (during construction) and will also be conducted in 2018 (post-construction).

2.3 Plants/Communities Important to Indigenous People

A series of Aboriginal Traditional Knowledge (ATK) workshops identified ESSs where plants such as Blueberries or medicinal plants may be impacted by the construction and operation of the project. These areas are valued for their provision of resources used by First Nations and Métis including gathering of food and medicines. Information pertaining to plant gathering sites is provided in both the Cultural Resources Technical Report (NLHS 2012) and the Vegetation Technical Report (Calyx Consulting 2012). Manitoba Hydro worked with First Nation and Métis communities to further identify and map these sites and develop mitigation measures to minimize the effects of the project on them.

Clearing and construction of transmission line RoW as well as the creation of new access roads/trails for the Project can allow increased access by non-community members to sensitive areas that have been identified by First Nation and Métis communities and can result in the potential loss of important vegetation resources found at these sites.

The following mitigation measures were identified in the CEnvPP:

- Carry out construction activities on frozen or dry ground to minimize surface damage, rutting and erosion;
- Minimize surface disturbance around the site to the extent possible;
- No herbicide to be applied during construction;
- Confine vehicle traffic to established trails to the extent possible;
- Remove trees by low disturbance methods; and
- Implement additional mitigation from site investigation.

As berry harvesting was identified in the CEnvPP as an ESS which may be impacted, representative plot-based surveys were conducted to quantify the percentage cover of berry harvesting species. A plot-based approach was utilized for species such as Low Sweet Blueberry (*Vaccinium angustifolium*) and Velvet-leaf Blueberry (*V. myrtilloides*) which are widespread and abundant within the RoW. Methods employed for sampling are described in further detail in Section 3.0.

The EEMP outlines the following objectives for the sites which contain plants and communities important to aboriginal people:

- Document the composition and abundance of vegetation;
- Confirm project effects on vegetation; and
- Verify the implementation and effectiveness of protection measures.

The decision trigger and threshold for action includes:

- Measurable significant decrease of plant abundance within ESS

Monitoring of plants and communities important to aboriginal people occurred in July of 2016 and 2017 (during construction) and will also be conducted in 2018 (post-construction).

2.4 Invasive and Non-native Species

While the majority of clearing, geotechnical and construction work along the transmission line has occurred during the winter months, there is the potential for the introduction and spread of invasive non-native vegetation species. The introduction of these species is often the result of the movement of contaminated equipment and/or the introduction of fill or foreign plant materials to a site. Contaminated equipment may include seed or portions of rootstock which arrive to a site on dirty equipment. The presence of newly introduced non-native species may not be apparent until several years of growth and establishment have occurred. Once established, these species can become widespread through seed production and/or rhizomatous growth. The spread of these species has impacts on native vegetation through increased competition and displacement of sensitive natural species. Impacts to native vegetation can also impact wildlife which depend upon these natural habitats.

For all work occurring on agricultural lands in the vicinity of Pine Falls, Manitoba Hydro has implemented an Agricultural Biosecurity Policy which includes a Standard Operating Procedure (SOP). While cropland is restricted to a small portion of the study area, field staff of Manitoba Hydro are ensuring that contractors adhere to the policy which aims to prevent the spread of diseases, pests or invasive species. NRSI biologists were notified of the policy and provided with a copy of the SOP.

The CEnvPP identifies mitigations pertaining to rehabilitation and re-vegetation that stipulate that a Rehabilitation Plan will be developed for all sites which are significantly disturbed as a result of construction activities. The mitigation notes that regionally-appropriate grass mixtures will be incorporated into the Plan and seed mixtures will not contain any non-native or invasive species.

Consistent with the Environment Act License (No. 3120) (Government of Manitoba 2015), timber stockpiles were created to allow First Nations and Métis access to harvested wood in close proximity to all season access points. By locating stockpiles in centralized and easily accessible locations, the potential for spread of invasive species was minimized. One such site which was observed by NRSI biologists was located approximately 5km north of Pine Falls, in an existing cleared area and easily accessed from Provincial Road #304. At the time of the July 2017 surveys, all log stock piles had been removed

The Lake Winnipeg East System Improvement Project Environmental Assessment Report (EAR) (Manitoba Hydro 2012) identified mitigations to limit the introduction of foreign biota. Aggregate materials required for the project would be sourced from local suppliers to the extent possible. It was expected that the use of local aggregate materials would lower the possibility of introducing invasive and non-native species. In general, the project will require a limited amount of aggregate material for concrete batching and backfilling. The EAR also noted the potential for dirty equipment to introduce invasive and non-native species and identified that all equipment arriving and departing the site should be clean and free of soil and plant materials.

Lastly, the EAR identified that a containment/control program would be implemented for invasive and non-native plants which establish as a result of the project construction.

The EEMP outlines the following objectives for invasive and non-native species:

- Document the composition and abundance of invasive and non-native vegetation within the project footprint;
- Document the degree of invasive and non-native plant introduction and spread; and
- Recommend appropriate control and eradication programs, as required.

The decision trigger and threshold for action includes:

- Establishment and spread of invasive species along ROW

Monitoring of invasive and non-native plants during pre-construction occurred in July 2016 in the vicinity of Pine Falls. In 2017 monitoring was repeated in the vicinity of Pine Falls and also included an aerial survey of the entire transmission line including several investigations at areas of notable disturbance at tower locations. It was determined that the disturbance areas at some tower locations did not warrant seeding or intervention as these areas were re-vegetating with the adjacent native plant species. The scope of invasive and non-native vegetation monitoring which will occur in 2018 (post-construction) will reflect the 2017 survey.

2.5 Riparian Buffers

Section 2.3 of the CEnvPP provides details pertaining to the extent of riparian buffers and specific mitigation measures to be followed. Riparian buffers are a minimum of 30m in width from streams, rivers, lakes and wetlands within the project footprint and are increased based upon the percentage slope of the land adjacent to the feature as outlined in the CEnvPP Table 2-1. The riparian buffer is comprised of a Management Zone (of variable width depending on slope) in which limited construction disturbance may occur, and a 7m Machine Free Zone immediately adjacent to the feature.

Construction equipment may reach into the Machine Free Zone, but may not enter this area with the exception of trail crossings.

For any riparian buffer site which has been flagged by the Environmental Inspector as being disturbed during the installation of tower or guy wire anchor foundations, an assessment will be completed during the following season to determine if mitigation measures are required. Where the disturbance is noted by the NRSI biologist to be minimal it may be acceptable to allow for natural regeneration. Should the disturbance be significant or widespread, active rehabilitation measures (e.g., seeding and/or planting of woody species) would be recommended on a site-by-site basis.

The EEMP outlines the following objectives for riparian buffer exceedances:

- Assess each identified riparian buffer exceedance to determine an appropriate approach to rehabilitation;
- Oversee the implementation of passive or active rehabilitation; and
- Verify the implementation and effectiveness of rehabilitation measures.

The decision trigger(s) and threshold(s) for action include:

- Disturbance by construction equipment exceeds the stipulated minimum riparian buffer; and
- Rehabilitation efforts do not effectively re-vegetate the disturbed area to a satisfactory level.

No riparian buffer exceedance locations had been identified in 2017. As such, NRSI biologists did not assess or monitor any riparian buffer areas in 2017. In the event that construction does result in a riparian buffer exceedance, the assessment and monitoring process will be initiated (on an as-needed basis).

2.6 Rehabilitation

The CEnvPP outlines rehabilitation and re-vegetation mitigation measures under PA-9.01 through PA-9.06 (page 5-29). These mitigations stipulate that construction areas no longer required for the completion of the project (staging areas, construction camps and borrow sites) will be rehabilitated or re-vegetated according to the Manitoba Hydro Rehabilitation and Vegetation Management Plan. Rehabilitation of these sites restores wildlife habitat, prevents erosion and non-native species establishment and improves aesthetics. In assessing prospective rehabilitation sites, consideration will be given to

the concept of ecosystem resilience for sites which show a low degree of impact and are likely to return to a pre-construction state without intervention. For those sites which demonstrate a high degree of disturbance, NRSI will recommend an appropriate active rehabilitation approach.

In order to quantify the success of these mitigation efforts (passive or active), monitoring plots should be established at select, representative locations within rehabilitation and re-vegetation areas. Plot monitoring would follow the detailed methodology which is outlined in further detail below noting the re-vegetation or establishment of seeded/planted vegetation as well as the presence of non-native species on an annual basis.

The EEMP outlines the following objectives for rehabilitation monitoring:

- Verify the implementation and effectiveness of rehabilitation efforts guided by the Rehabilitation Plan;
- Oversee the implementation of passive or active rehabilitation; and
- Verify the implementation and effectiveness of rehabilitation measures.

The decision trigger(s) and threshold(s) for action include:

- Area prescribed for rehabilitation not meeting site specific rehabilitation targets

As of July 2017, no rehabilitation areas had been identified. Should rehabilitation areas be identified following the completion of construction, these locations will be monitored using the same methodology employed for Riparian Buffers.

3.0 Methods

3.1 Study Design

The components of the EEMP are listed below and include discussion of the monitoring effort and methodology required in order to effectively evaluate the success of mitigation measures. The respective methodology for each component reflects the spatial extent of the feature or circumstances which could impact the feature. A blanket approach of transect or plot based sampling is not justified in all instances and the methodology proposed for each reflects the nature of the feature.

All field data was collected according to the Data Management Protocol (DMP) established by Manitoba Hydro. All reports and accompanying files and documents were uploaded to the Environmental Protection Information Management System (EPIMS). NRSI is currently finalizing the geospatial datasets with metadata for survey work completed to date; these files will be uploaded to EPIMS upon completion.

Surveys conducted in 2017 included monitoring of identified point locations of Environmentally Sensitive Sites. This included 7 point locations of plant SCC and 17 point locations of gathering sites. Of the 17 point locations for gathering sites, 6 had been previously identified with the remaining 11 point locations established in 2016 within the 3 polygons encompassing large areas identified as plant gathering sites. All SCC occurrences and plant gathering survey plots are indicated in Map Set 1.

An exhaustive search for invasive species was conducted in the vicinity of Pine Falls in 2016 and was re-visited in 2017. Given the extent of disturbance within this section of the RoW, this area continues to be a focus for the establishment of invasive species. An aerial survey, which included touch down at disturbed areas in question, was conducted in July 2017 for the length of the transmission RoW between Pine Falls and the Manigotagan Corner Station.

All surveys were completed between July 18-21, 2017; a total of four consecutive days. Surveys were completed by two NRSI biologists (Patrick Deacon and Jeremy Bannon).

Kris Watts (Manitoba Hydro) and Maureen Forster (private consultant) accompanied Patrick Deacon during the July 20, 2017 aerial survey.

For the 2017 construction season, Black River First Nation and Hollow Water First nation were not able to provide any individuals that were interested in the community representative positions, which would have had the option to participate in summer fieldwork activities. An individual from Sagkeeng First Nation had filled the full-time community representative position for the 2017 season but had declined the opportunity to work with NRSI staff during the week that vegetation monitoring occurred in the summer.

Species of Conservation Concern

Plant SCC populations were surveyed at 7 locations. The original 4 locations had been provided to NRSI based upon observation made during pre-construction survey work with an additional 3 locations added during 2016 monitoring. The surveys carried out by NRSI involved locating the species occurrence (ESS Site), completing stem counts and evaluating the health of the plants (various parameters), site conditions, and noting the effectiveness of mitigation efforts. In order to align with peak bloom/fruited period for each species, surveys were conducted in mid-July.

Surveys are to occur for 3 years as follows:

- Survey 1 – July 2016 (First year during construction)
- Survey 2 – July 2017 (Second year during-construction)
- Survey 3 – July 2018 (First year post-construction)

Surveys in 2016 and 2017 documented the following details (data units are provided in brackets):

- Exhaustive count of all live stems within the population (numerical)
- Number of plants bearing bloom/fruit (numerical/percent)
- Average plant height (centimeters)
- Spatial extent of population (square meters and GIS polygon shapefile)
- Canopy cover (5-point densitometer reading averaged, converted to percent)
- Photographic record from established point (.jpeg file)

- Incidental observations of animal browse, disturbance, trampling (qualitative data)
- General area search for the establishment of satellite populations nearby (qualitative data, UTM coordinates, all of the above-mentioned parameters)

Invasive and Non-native Species

Invasive species monitoring was conducted as an area search of the southern extent of the transmission RoW in the vicinity of Pine Falls to assess the same area which had been monitored in 2016. The aerial survey involved observation of areas which had been flagged for inspection based upon aerial imagery and 2016 ground surveys. Several locations of interest which exhibited disturbed soils including soil piles at tower locations and excavated features were examined in detail for the potential establishment of invasive species.

In order to efficiently and representatively survey for invasive non-native species, the EEMP identifies a combination of both ground surveys (annual) and a fly-over survey which focuses on angle tower locations (2017 and 2018). As angle tower locations are likely to require an increased amount of heavy equipment and disturbance relating to foundation construction, these sites have higher potential for invasive species introduction. As supporting towers and the remainder of the 70km RoW may also present an opportunity for invasive species establishment, the helicopter fly-over of the transmission line is intended to identify any notable populations of invasive non-native species which are establishing. Should a population be identified during the fly-over, NRSI biologists would verify the observation on the ground, as feasible, and document all survey details as per the angle tower survey locations.

Due to the presence of human settlement and agriculture in the vicinity of Pine Falls, a ground survey was conducted in 2016 and 2017 between angle tower 3 and 13 (including the transmission line RoW) to document any existing non-native species which may not be attributed to project construction. Access to land parcels in this area was granted by the respective landowners with the exception of a large agricultural field located between angle tower 7 and angle tower 10. Due to biological contamination concerns and the unsuitable conditions for permanent invasive species establishment

(actively farmed row-crop), this length of the transmission line was not assessed and does not present a concern at this time.

Surveys will occur for 3 years as follows:

- Survey 1 – July 2016 (First year during construction, area of Pine Falls)
- Survey 2 – July 2017 (Second year during construction, all 20 angle towers)
- Survey 3 – July 2017 (Second year during construction, transmission line)
- Survey 4 – July 2018 (First year post-construction, all 20 angle towers)
- Survey 5 – July 2018 (First year post-construction, transmission line)

Comprehensive invasive and non-native species surveys commenced in 2017 as it was very unlikely that introduced species would be apparent in the summer of 2016 following the first winter of work.

Surveys in 2016 documented the following details (data units are provided in brackets):

- Presence/absence of invasive, non-native species at each angle tower location (Yes/No)
- All invasive, non-native species present (scientific name)
- Locational data (centroid UTM coordinates)
- Number of patches (numeric)
- Stem count (numeric)
- Number of plants bearing bloom/fruit (numeric)
- Spatial extent of population (square meters and GIS polygon shapefile)
- Photographic record (.jpeg file)

Plants/Communities Important to Indigenous People

The VBMP outlined the methodology for monitoring of plants and plant communities important to First Nations and Métis. As berry harvesting was identified in the CEnvPP as an ESS which may be impacted, surveys were conducted to document their response to clearing and construction within the RoW. A similar approach was taken for other plant species which have been identified as having traditional use.

Surveys will occur for 3 years as follows:

- Survey 1 – July 2016 (First year during construction)
- Survey 2 – July 2017 (Second year during-construction)
- Survey 3 – July 2018 (First year post-construction)

Surveys in 2016 and 2017 documented the following details (data units are provided in brackets):

- Presence/absence of the identified plant species at each identified location (Yes/No)
- Locational data (centroid UTM coordinates)
- Number of patches (numeric)
- Stem count (numeric)
- Number of plants bearing bloom/fruit (numeric)
- Spatial extent of population (square meters and GIS polygon shapefile)
- Photographic record (.jpeg file)

The 10x10m monitoring plots for gathering areas (food or medicinal) which were established in 2016 were re-visited in 2017. The details listed above were documented for each plot with general notes taken to assess the effectiveness of mitigation efforts. As those gathering areas which were identified as polygons cover large areas of the RoW, the plots are intended to be representative of the various plants which are gathered in these areas (predominantly Blueberry and Cranberry patches).

Individual stem counts were not feasible for Blueberry which typically grown in dense colonies consisting of thousands of matted stems or Cranberry which has a low, prostrate growth form which roots in multiple locations. As a result, these species are not easily distinguished on a plant-by-plant basis.

A GPS track was recorded for the NRSI biologists who worked in tandem walking transects as necessary. GPS points were documented for all photographs.

4.0 Results

4.1 Species of Conservation Concern

Similar to the survey results collected in 2016, monitoring of SCC in 2017 found most populations to be accounted for and in good health following the woody vegetation clearing which occurred during the winter of 2015/2016. Survey results suggest that some species may be benefitting from the RoW creation as a result of additional sunlight and reduced competition afforded to herbaceous plants.

Dwarf Bilberry

The population of Dwarf Bilberry (LWE-Eco-301) was not located in 2016 and could not be located during 2017 surveys. As noted in the 2016 report, the 5m vegetated buffer had not been implemented at this location during vegetation clearing. A thick layer of wood mulch which had been present in the vicinity of the occurrence in 2016 had been reduced in depth by the 2017 survey. The mulch depth in July 2016 had been 15-20cm which had been reduced to 5-10cm in the same location in July 2017. The reduction in mulch depth was recommended in the 2016 report as a means to improve conditions which would allow the species to return. Although the Bilberry has not been observed over the past 2 monitoring years, seed or root stock may remain viable in the soil.

The area has undergone dense re-growth of vegetation including numerous Trembling Aspen (*Populus tremuloides*), as well as Saskatoon (*Amelanchier* sp.), Red Raspberry (*Rubus idaeus*) and Hazel (*Corylus* sp.). The dense woody vegetation was somewhat limiting in allowing surveyors to thoroughly and effectively search the area for signs of Bilberry plants during the July 2017 surveys. This species, which grows to 30cm or less in height, has a preference for full sun to part shade conditions which will be maintained within the area of the occurrence through periodic vegetation management within the transmission corridor. Suitable habitat for the species is widespread throughout the Project and forest areas adjacent to the RoW.

Hooker's Orchid

The 2017 survey of the known Hooker's Orchid population (LWE-Eco-302) documented a total of 10 plants (11 had been observed in 2016). In general, conditions have

remained the same at the rocky opening which remains surrounded by a stand of conifers, outside of, but near the actual RoW. The plants occupy the same spatial extent and 3 flowering stems were documented in 2017, similar to 2016 surveys.

The 2 additional populations of Hooker's Orchid which were observed in 2016 (see Table 1), could not be re-located in 2017. The first location is within the RoW immediately west of the LWE-Eco-302 site, while a second population occurs within the RoW northwest of the Sagkeeng log stockpile yard, approximately 5km north of Pine Falls.

As noted for Dwarf Bilberry, the dense re-growth of Trembling Aspen has altered the open ground cover which was present in 2016 to a thicket of tree stems 1-2m in height. It is inferred that the plants are still present among the dense tree cover. In time, this tree cover will thin as individual stems begin to dominate. As well, periodic maintenance (vegetation control) within the RoW by Manitoba Hydro will re-instate the open ground cover from time to time. This species is found naturally in both full shade and part shade conditions and it is therefore unlikely that periodic variations in canopy cover would have a negative effect on the plants. As Hooker's Orchid has a preference for shallow substrates (often mosses or a thin layer of detritus over bedrock), the accumulation of wood mulch at these locations will likely have a negative effect on the plants. The recommendation to instate a 5m vegetated (shrub and herbaceous) buffer at these locations is outlined in Section 5.0.

Sessile-fruited Arrowhead

The population of Sessile-fruited Arrowhead located along the Sandy River has remained in excellent health with no visible signs of stress or impacts relating to the clearing of the transmission line. During the 2017 surveys it appeared that water levels were lower than those observed in July 2016 with many plants growing on mud flats and fewer growing in shallow waters. Plants still occur in long bands along the riverbank which is a reflection of the preferred water depth for the species.

Due to the large extent of the population and the location of plants within the river, an estimate count was conducted from the bank. The 2016 estimate of 2700 plants within

the RoW (north and south bank) remains accurate for 2017. Although only 10% of plants were in flower during the 2017 surveys (versus 20% in 2016), this is not perceived as a decrease in plant health or vigour and is likely a result of water level fluctuation. The population continues both upriver and downriver contiguous with those stands occurring within the RoW.

The riparian buffer at this crossing is intact with dense shrubs regenerating from the crest of the bank to the water edge where a flat area of riverine forbs and graminoids surround the stands of Arrowhead.

Swollen Sedge

Pre-construction surveys had identified 1 population of Swollen Sedge occurring within the RoW (LWE-Eco-304). Surveys conducted in 2017 found this population to exhibit a similar stem count (47 in 2016, 54 in 2017). The temporary log pile which had been among the plants in 2016 had been removed by July 2017. At this location, the re-growth of Trembling Aspen and Canada Bluejoint (*Calamagrostis canadensis*) are not competing with Swollen Sedge. To some extent, the open conditions observed in 2016 did not reflect the natural conditions which this species would be found within and the increase in canopy cover and herbaceous biomass is a natural and acceptable trend which will recur within the RoW following periodic vegetation management. Within the project area (and beyond), this species can be found in a variety of mesic to wet habitats including forest, swamp, marsh, wet meadow and trails which attests to the tolerance the species has to various environmental conditions.

During the 2016 surveys 7 additional populations were documented (see Table 1). Due to the widespread and abundant nature of Swollen Sedge within the RoW, these sites were not re-visited in 2017.

Table 1. Environmentally Sensitive Site - Species of Conservation Concern

ESS Identifier	Species	UTM Coordinate	Comments
LWE-Eco-301	Dwarf Bilberry (<i>Vaccinium caespitosum</i>)	Bilberry-001	2016: No plants observed
			2017: No plants observed
LWE-Eco-302	Hooker's Orchid (<i>Platanthera hookeri</i>)	Orchid-001	2016: 11 plants (3 fruiting, 8 basal leaves only)
			2017: 10 plants (3 fruiting, 7 basal leaves only)
New LWE-Eco*		Orchid-002	2016: 3 plants (2 fruiting, 1 basal leaves only)
			2017: not relocated due to dense woody growth
New LWE-Eco*		Orchid-003	2016: 2 plants (1 fruiting, 1 basal leaves only)
			2017: not relocated due to dense woody growth
LWE-Eco-303	Sessile-fruited Arrowhead (<i>Sagittaria rigida</i>)	Arrowhead-001	2016: 700 plants on north bank (approximate count), 20% fruiting
			2017: still approximately 700 plants, 10% fruiting
New LWE-Eco*		Arrowhead-002	2016: 2000 plants on south bank (approximate count) 20% fruiting
			2017: still approximately 2000 plants, 10% fruiting
LWE-Eco-304	Swollen Sedge (<i>Carex intumescens</i>)	Sedge-001	2016: 47 plants, log pile likely covering additional plants
			2017: 54 plants observed, log pile removed, no other Swollen Sedge sites monitored in 2017 due to widespread and abundant nature of species within RoW
New LWE-Eco*		Sedge-002	2016: 1 plant

New LWE-Eco*		Sedge-003	2016: 50 plants
New LWE-Eco*		Sedge-004	2016: 20 plants
New LWE-Eco*		Sedge-005	2016: 5 plants
New LWE-Eco*		Sedge-006	2016: 2 plants
New LWE-Eco*		Sedge-007	2016: 19 plants
New LWE-Eco*		Sedge-008	2016: 1 plant

An asterisk (*) denotes newly documented SCC from 2016 surveys, no new occurrences were documented in 2017.

The CEnvPP identifies the potential for direct loss of SCC vegetation due to vegetation clearing and construction activities. Specific mitigation measures to protect vegetation SCC, to be coordinated by the Environmental Monitor, are outlined in Table 2 below.

Table 2. Assessment of Mitigation Measures at Species of Conservation Concern Sites

Mitigation Measure	LWE-Eco-301	LWE-Eco-302	LWE-Eco-303	LWE-Eco-304
Identify and flag prior to start of work.	Y	Y	Y	Y
Carry out construction activities on frozen or dry ground to minimize surface damage, rutting and erosion.	Y	Y	Y	Y
Provide 5m vegetated (shrub and herbaceous) buffer around site.	N	Y	Y	N
Remove trees by low disturbance methods.	Y	Y	Y	Y
Confine vehicle traffic to established trails to the extent possible.	Y	*	*	Y
Implement additional mitigation from site investigation.	Y	-	-	Y

Note: Y/N (Yes/No) denotes whether mitigation measure was implemented.

A dash (-) indicates not applicable.

An asterisk (*) indicates that ESS feature is located within a river and thus vehicle traffic is not applicable.

Species of Conservation Concern sites were identified through pre-construction surveys and identified as ESSs. Contractors conducting vegetation clearing in 2015/2016 were supplied with map books outlining these locations and were responsible for flagging and buffering them appropriately. During their regular inspections of the project area, Manitoba Hydro staff did verify that some of these SCC locations had been flagged by contractors. It is unclear at this time if the LWE-Eco-301 site had been flagged in the field; however, full vegetation clearing occurred with no buffer retained.

The removal of trees using low disturbance methods was achieved in part through the mitigation of working on frozen ground. Angle towers were installed in the winter of 2016/2017 to utilize frozen ground conditions and to minimize disturbance to wildlife.

The disappearance of an SCC or its significant decline within an ESS is identified as a decision trigger and threshold for action. The inability to relocate Dwarf Bilberry within LWE-Eco-301 was likely a result of the thick covering of wood mulch acting to smother the plants. As of July 2017, the depth of mulch has been reduced but no plants were observed. At this time, no further mitigation measures are recommended and 2018 monitoring will aim to relocate the species in the vicinity of the provided point location.

4.2 Plants/Communities Important to Indigenous People

Surveys conducted in 2016 and 2017 indicate that plant species gathered by Indigenous People for food or medicine appear to have responded well to the clearing along the RoW. Blueberry is the most abundant gathering plant which was identified and both Low Sweet Blueberry and Velvet-leaf Blueberry are present in large swaths with many patches bearing abundant fruits at the time of the July surveys. As noted in the 2016 annual report, Blueberry prefers rocky outcrops and shallow soils and these areas generally lacked abundant tree cover and thus the accumulation of mulch at these sites is not a concern.

Similarly, both Large Cranberry (*Vaccinium macrocarpon*) and Small Cranberry (*V. oxycoccos*) show a preference for open or semi-open peatlands which generally lack abundant tree cover and have minimal (if any) wood mulch at these sites within the RoW.

Other edible or medicinal species including Highbush Cranberry (*Viburnum trilobum*), Wild Ginger (*Asarum canadense*), Sweetflag (*Acorus americana*), various Raspberry species (*Rubus* spp.), Wild Rice (*Zizania aquatic*), Beaked Hazel (*Corylus cornuta*) and Wild Plum (*Prunus americana*) were observed incidentally during the surveys and remain present in similar numbers.

Table 3 outlines the various sample plots which were established during 2016 and 2017 surveys and an overview of plant abundance and health within each of these plots.

Table 3. Environmentally Sensitive Site Codes – Food or Medicinal Plants

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
LWE-Ruse-200	Large berry picking area.	Blueberry-001	<p>Both Blueberry species present.</p> <p>Estimated cover: 35%</p> <p>Bearing fruit: 80%</p> <p>Plants are healthy, 30cm in height, thin layer of wood mulch is present but patchy.</p>	<p>Estimated cover: 10%</p> <p>Bearing fruit: 0%</p> <p>Plants are healthy, but cover has reduced and no plants are bearing fruit.</p> <p>The plot is adjacent to a recently erected tower with equipment tracks evident in the plot. The disturbance which occurred at this location is likely to have a temporary impact and plants will return to good health in the coming years.</p> <p>Additional swaths of Blueberries are present beyond the plot and appear to be in good health and fruiting.</p>
		Cranberry-001	<p>Both Cranberry species present.</p> <p>Estimated cover: 3%</p> <p>Bearing fruit: 5%</p> <p>Plants are healthy, growing among saturated peat hummocks.</p> <p>K. Guimond notes the presence of Cloudberry (<i>Rubus chamaemorus</i>)</p>	<p>Estimated cover: 5%</p> <p>Bearing fruit: 3%</p> <p>Plants are healthy, growing among saturated peat hummocks.</p> <p>Generally consistent with 2016 coverage and percent fruiting.</p>

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			and Labrador Tea (<i>Ledum groenlandicum</i>), other species gathered by First Nations and Métis.	
		Blueberry-002	Both Blueberry species present. Estimated cover: 20% Bearing fruit: 60% Plants are healthy, up to 40cm in height. Located on rocky outcrop with minimal wood mulch.	Estimated cover: 15% Bearing fruit: 60% Plants are healthy and similar to 2016. Plot is located beneath a guy wire and minor disturbance may have occurred during tower construction.
LWE-Ruse-201	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking, Sage gathering and ceremonial plants. North shore.	Sweetflag-001	A large stand of Sweetflag (Weekay) along Manigotagan River (UTM is central within the stand). 15 clumps were observed growing within the littoral zone. Additional plants upstream and downstream of RoW. Clumps range from 1m x1m to 2m x 15m. Plants healthy, above-water plant height of 1m. 75% of plants bearing fruit. No construction-related disturbance apparent.	50 clumps were observed growing within the littoral zone at the western extent of the RoW. This patch is approximately 10m by 3m in size and it appears the 2016 patches have merged to form a larger continuous patch. Additional plants remain present upstream and downstream of RoW. Plants are healthy with an above-water height of 1m. 30% of plants bearing fruit. Water levels appear lower than in 2016.

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			Wild Rice (<i>Zizania aquatica</i>) is present in outer littoral zone. 1% bearing fruit (early in season).	
LWE-Ruse-202	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking, Sage gathering and ceremonial plants. South shore.	Sweetflag-002	<p>A large stand of Sweetflag along Manigotagan River (UTM is central within the stand).</p> <p>Approximately 350 clumps were observed growing within the littoral zone. Additional plants upstream and downstream of RoW.</p> <p>Clumps are continuous across the entire span of the RoW.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>50% of plants bearing fruit.</p> <p>No construction-related disturbance apparent.</p> <p>Wild Rice (<i>Zizania aquatica</i>) is present in outer littoral zone. 1% bearing fruit (early in season).</p>	<p>Approximately 350 clumps were observed growing within the littoral zone (as in 2016).</p> <p>Additional plants remain present upstream and downstream of RoW.</p> <p>Water levels appear lower than in 2016 (possibly by as much as 50cm).</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>30% of plants bearing fruit.</p>
LWE-Ruse-203	Large berry picking area.	Blueberry-003	<p>Both Blueberry species present.</p> <p>Estimated cover: 45%</p> <p>Bearing fruit: 2%</p>	<p>Estimated cover: 45%</p> <p>Bearing fruit: 90%</p>

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			Plants are healthy, up to 30cm in height. Located on rocky outcrop with minimal wood mulch.	Plants are healthy, up to 30cm in height. A significant increase in percent fruiting is evident.
LWE-Ruse-204	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking, Sage gathering and ceremonial plants. North shore.	Sweetflag-003	<p>A large stand of Sweetflag along Sandy River (UTM is central within the stand).</p> <p>15 clumps were observed growing within the littoral zone. Additional plants upstream and downstream of RoW.</p> <p>Most clumps 1m x1m.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>40% of plants bearing fruit.</p> <p>No construction-related disturbance apparent.</p>	<p>The clumps of Sweetflag remain healthy and intermittent along the river edge.</p> <p>18 clumps were observed with additional plants upstream and downstream.</p> <p>Clumps remain approximately 1m x 1m and with an above-water height of 1m.</p> <p>50% of plants bearing fruit.</p>
LWE-Ruse-205	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking, Sage gathering and ceremonial plants. South shore.	Sweetflag-004	<p>A large stand of Sweetflag along Sandy River (UTM is central within the stand).</p> <p>13 clumps were observed growing within the littoral zone, in the western portion of the RoW. Additional plants upstream and downstream of RoW.</p> <p>Most clumps 1m x1m.</p>	<p>The clumps of Sweetflag remain healthy and intermittent along the river edge.</p> <p>14 clumps were observed with additional plants upstream and downstream.</p> <p>Clumps remain approximately 1m x 1m and with an above-water height of 1m.</p>

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			<p>Plants healthy, above-water plant height of 1m.</p> <p>30% of plants bearing fruit.</p> <p>No construction-related disturbance apparent.</p>	30% of plants bearing fruit.
LWE-Ruse-206	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking, Sage gathering and ceremonial plants. North shore.	Sweetflag-005	<p>A large stand of Sweetflag along Black River (UTM is central within the stand).</p> <p>200 clumps were observed growing within the littoral zone. Additional plants upstream of RoW.</p> <p>Most clumps 1m x1m.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>80% of plants bearing fruit.</p> <p>A downed tree within the stand of Sweetflag may be the result of vegetation clearing. It is not recommended that this log be removed as it will likely move during spring melt or would cause additional disturbance to remove it mechanically. This downed snag may also be naturally occurring as no indication of a saw cut was apparent on the stem.</p>	<p>It was estimated that 200 clumps of Sweetflag remained at this location in July 2017.</p> <p>Additional plants upstream of RoW.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>60% of plants bearing fruit.</p> <p>The downed log noted in 2016 has been removed from the site.</p>

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
LWE-Ruse-207	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking, Sage gathering and ceremonial plants. South shore.	Sweetflag-006	<p>A large stand of Sweetflag along Black River (UTM is central within the stand).</p> <p>1000 clumps were observed growing within the littoral zone. Additional plants upstream and downstream of RoW.</p> <p>Most clumps 1m x1m.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>80% of plants bearing fruit.</p> <p>No construction-related disturbance apparent.</p>	<p>It was estimated that 1000 clumps of Sweetflag remained at this location in July 2017.</p> <p>Additional plants upstream of RoW.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>50% of plants bearing fruit.</p>
LWE-Ruse-208	Large berry picking area. Berries (eg. Raspberries) used to be picked along the road under the hydro line from the intersection of the road to Black River then south to Pine Falls.	Ginger-001	<p>Wild Ginger (<i>Asarum canadense</i>) patch within RoW.</p> <p>Estimated cover: 1% (43 plants in plot)</p> <p>Bearing fruit: 21% (9 plants)</p> <p>Plants are healthy, growing up through 40cm deep mulch. The plants are likely to persist and spread; however, canopy will reduce sun scald to the benefit of the plants</p> <p>Other species which Indigenous People gather are present including</p>	<p>Estimated cover: 1% (8 plants in plot)</p> <p>Bearing fruit: 13% (1 plant)</p> <p>This patch appears to have been heavily impacted by tower construction with a reduction between 2016 and 2017.</p> <p>It is noted that suitable habitat remains in the forest to the west.</p> <p>This species is not tolerant of full sun and may have declined, in part, as a result of sun exposure.</p>

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			Highbush Cranberry (<i>Viburnum trilobum</i>), Dwarf Raspberry (<i>Rubus pubescens</i>), Beaked Hazel (<i>Corylus cornuta</i>) and Wild Plum (<i>Prunus americana</i>).	Re-growth of shrubs will enhance conditions for this species.
		Blueberry-004	Both Blueberry species present. Estimated cover: 3% Bearing fruit: 5% Plants are healthy, up to 20cm in height. Located on rocky outcrop with minimal wood mulch.	Estimated cover: 5% Bearing fruit: 50% A significant increase in percent fruiting from 2016. The regrowth of grasses and forbs is creating competition for the Blueberry plants.
		Cranberry-002	Small Cranberry present. Estimated cover: 3% Bearing fruit: 0% Plants are healthy, sprawling across peat hummocks. Wood mulch covers 50% of the plot and may have a small impact on Cranberry through suppressing plants.	Estimated cover: 5% Bearing fruit: 5% Plants are healthy. Wood mulch continues to cover a portion of the plot but will not impact the population long term.
		Blueberry-005	Both Blueberry species present. Estimated cover: 65% Bearing fruit: 10%	Estimated cover: 85% Bearing fruit: 75%

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			Plants are healthy, up to 30cm in height. Located on rocky outcrop with wood mulch covering 30% of the plot.	Plants are healthy, up to 30cm in height. Notable increase in cover and percent fruiting.
		Cranberry-003	<p>Small Cranberry present.</p> <p>Estimated cover: 65%</p> <p>Bearing fruit: 5%</p> <p>Plants are healthy, sprawling across peat hummocks. Wood mulch covers 50% of the plot and may have a small impact on Cranberry through suppressing plants.</p>	<p>Estimated cover: 65%</p> <p>Bearing fruit: 5%</p> <p>Plants are healthy with no disturbance apparent. No apparent change in cover or percent fruiting.</p>
		Blueberry-006	<p>Both Blueberry species present.</p> <p>Estimated cover: 35%</p> <p>Bearing fruit: 5%</p> <p>Plants are healthy, up to 30cm in height. Located on rocky outcrop with wood mulch covering 10% of the plot.</p>	<p>Estimated cover: 35%</p> <p>Bearing fruit: 30%</p> <p>Plants are healthy, up to 30cm in height. No apparent change in cover but noticeable increase in percent fruiting.</p>
New LWE-Ruse*	Newly documented in 2016.	Cranberry-004	<p>Small Cranberry present.</p> <p>Estimated cover: 0.5% (20 plants)</p> <p>Bearing fruit: 50%</p>	<p>Estimated cover: 2%</p> <p>Bearing fruit: 0%</p> <p>Plants are healthy but the peat seems dry, potentially a result of</p>

ESS Identifier	Description	Sample Plot Location	Survey Results	
			2016	2017
			Plants are healthy, sprawling across peat hummocks. Wood mulch covers 20% of the plot and may have a small impact on Cranberry through suppressing plants.	reduced precipitation or increased evaporation.

An asterisk (*) denotes newly documented food or medicinal plant from 2016 surveys.

A summary of the mitigation measures implemented at plant gathering sites is outlined in Table 4. The results of the 2017 surveys suggest that the cover and fruiting percentage of Blueberry and Cranberry plants has remained steady or in some cases increased. Two plots which were subject to disturbance during tower construction showed reductions in plant cover. It is anticipated that these plots would recover in time as the substrates remain suitable where the disturbance occurred.

Table 4. Assessment of Mitigation Measures at Plant Gathering Sites

Mitigation Measure	LWE-Ruse-201	LWE-Ruse-202	LWE-Ruse-204	LWE-Ruse-205	LWE-Ruse-206	LWE-Ruse-207	LWE-Ruse-200	LWE-Ruse-203	LWE-Ruse-208
Carry out construction activities on frozen or dry ground to minimize surface damage, rutting and erosion.	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimize surface disturbance around the site to the extent possible.	Y	Y	Y	Y	Y	Y	Y	Y	Y
No herbicide to be applied during construction.	Y	Y	Y	Y	Y	Y	Y	Y	Y
Confine vehicle traffic to established trails to the extent possible.	*	*	*	*	*	*	Y	Y	Y
Remove trees by low disturbance methods.	Y	Y	Y	Y	Y	Y			
Implement additional mitigation from site investigation.	-	-	-	-	Y	-			

Note: Y/N (Yes/No) denotes whether mitigation measure was implemented.

A dash (-) indicates not applicable.

An asterisk (*) indicates that ESS feature is located within a river and thus vehicle traffic is not applicable.

Examining the preferred habitats for these species (Blueberries on sparsely treed rocky outcrops and Cranberries within saturated peatlands), it appears that RoW tree clearing has not had a negative effect on these species with the exception of those locations where patches overlap the tower construction footprint. Generally speaking these

habitats did not become smothered in wood mulch or become rutted or disturbed as a result of equipment operation.

Riverine species such as Sweetflag and Wild Rice have shown no signs of impact and are essentially impacted only by annual water levels and the effects of inundation and drying out which are not impacts relating to the Project.

4.3 Invasive and Non-native Species

The section of RoW between the Pine Falls Generating Station and Broadlands Road was surveyed by foot in both 2016 and 2017 to assess the presence of invasive, non-native species. These surveys did not identify any notable populations or species which require management at this time.

Assessing the presence and extent of invasive, non-native species across the remaining portion of the RoW (approximately 70km to the Manigotagan Corner Station), involved a combination of on-the-ground surveys as well as an aerial survey along the entire transmission line. Although tower construction locations had been identified as potential sites for invasive species establishment and spread, these sites are generally very limited in non-native invasive species.

The locations which show the greatest extent of invasive species are those areas where the RoW crosses Provincial Road #304 and those areas where existing access trails perpendicular to Provincial road #304 intersect with the RoW.

To date, notable invasive, non-native species which have been observed within the RoW include:

- Canada Thistle (*Cirsium arvense*)
- Birdsfoot Trefoil (*Lotus corniculatus*)
- Wild Parsnip (*Pastinica sativa*)
- Timothy (*Phleum pratense*)
- Common Plantain (*Plantago major*)

- Field Sow Thistle (*Sonchus arvensis*)
- Ox-eye Daisy (*Leucanthemum vulgare*)
- Pineapple Weed (*Matricaria discoidea*)
- Red Clover (*Trifolium pratense*)
- Sweet White Clover (*Melilotus alba*)
- Sweet Yellow Clover (*Melilotus officinalis*)
- Black Medick (*Medicago lupulina*)

Of those species listed above, surveys in 2017 found White Sweet Clover, Canada Thistle and to a lesser extent Yellow Sweet Clover and Wild Parsnip, to be the most widespread and aggressive species within the RoW. The remaining species are very localized and typically not prone to outcompeting native vegetation. It was noted that invasive species are not establishing within wetland or rock outcrop areas within the RoW and most species show a preference for upland habitats with mesic soil conditions.

One example of a non-native species increase can be seen at LWE-Eco-304 (Swollen Sedge ESS), where a dense linear stand of White Sweet Clover extends from the roadway, down the center of the RoW for 200-300m. As vegetation clearing occurred as recently as winter 2015/2016, the size of this stand suggests that a seed bank was present prior to clearing and has responded positively to the disturbance.

As mentioned in the 2016 report, these species will thrive in the short-term due to the reduced woody species competition. The re-growth of a dense shrub layer will continually suppress and limit their spread within the project area. It is noted that although these species are aggressive in disturbed habitats, none are prone to establishing and proliferating within the adjacent forest, swamp, bog and marsh habitats.

Recommendations for mitigating invasive species establishment are discussed in further detail in the following section.

5.0 Mitigation Recommendations

Overall the 2017 field program was successful in collecting the data required to evaluate the effectiveness of the mitigation measures which were implemented.

Based upon the results of the surveys, the following actions are recommended:

General Mitigation

- Continue to perform any required clearing during winter months and on frozen ground conditions.
- The use of the existing access trails by equipment operating within the transmission corridor should be continued. That is, operation of equipment outside of the access trails should be minimized to the extent possible.

Species of Conservation Concern

- Ensure that any future vegetation clearing retain a 5m vegetated buffer for populations of Hooker's Orchid and Dwarf Bilberry which are located within the RoW. The buffer should be based upon the UTM coordinates provided in Table 1. These areas should be delineated prior to vegetation clearing by tall wooden stakes painted in blaze orange. The operator of the clearing machinery should be notified of these areas prior to commencing work. The 2 new populations of Hooker's Orchid should be afforded the mitigation measures identified in Table 2.
- In the event a Species of Conservation Concern area has vegetation clearing done within the vegetated buffer, it is critical to reduce the depth of wood mulch in a manner which does not further harm the plants (i.e. avoid scraping the native substrates should machinery be used to remove accumulated wood mulch).
- Retain low-growing shrubs to the extent possible to protect herbaceous species from sun scald and smothering by wood chips.

Invasive and Non-Native Species

- All construction and maintenance equipment and vehicles should arrive to the site clean and free of plant materials (including soil on tracks, buckets and blades, truck boxes, etc.). Similarly, all equipment and vehicles leaving the site should be clean and free of soil and plant materials.
- To the extent possible, equipment operating within the RoW should use any existing trails and stay out of intact, regenerating sections of the RoW. This applies as well to access trails from Provincial Road #304 in that no new access trails should be established and equipment operators should use only the existing access points.
- To the extent possible, allowing the re-growth of woody species will suppress or greatly reduced the number of invasive species present within the RoW. It can be expected that following periodic vegetation control these species will become more abundant and widespread, followed by periods where these species are less prevalent and producing fewer seeds.
- In general, the operation of equipment within the RoW between July and September presents the highest risk for dispersing viable seeds of invasive, non-native species. Where possible, completion of work outside of this timeframe will help to control the spread of invasive species.

Highway Crossing Locations

During the 2017 surveys, Manitoba Hydro staff requested that all locations where the transmission line crosses Provincial Road #304 be assessed for potential mitigation to enhance vegetation cover and reduce sight lines down the transmission line from the road. This activity was intended to identify a strategy to increase vegetation cover at road crossing locations to provide cover to wildlife, namely Moose (*Alces alces*), which can be easily spotted within the recently grubbed RoW under the current conditions. The RoW crosses Provincial Road #304 at 4 locations, the southern-most being near pine falls at Broadlands Road. At the 3 crossing locations to the north, the road elevation is typically 1-2m above the grade of the adjacent RoW. As a result, enhancing

shrub cover immediately at the roadside will be ineffective and any visual barriers of shrubs will need to extend down the RoW for some length in order to intercept sight lines.

The following recommendations should be considered as means to reduce sight lines and may be tailored on a crossing-by-crossing basis depending on existing topography, existing shrub cover, and the proximity of wetlands and rock outcrops which limit revegetation options:

- A buffer which includes all existing shrub vegetation (within the ROW and adjacent to Provincial Road #304) should be maintained and excluded from future transmission line clearing activities. The width of the buffer should be at least 50m from the road RoW and extending down the transmission line RoW. A larger buffer width will provide a more effective visual barrier and allowing a buffer of 100-250m (or more) would be ideal for this intent. Given the undulating topography at some of the crossing locations, the ability to establish shrub cover may be limited in areas of exposed bedrock (lacking soil) or within wetlands (aquatic areas). A larger buffer will help to account for some of these areas which cannot easily be revegetated by providing cover adjacent to these habitats.
- At highway crossings where machinery accesses the RoW, a 'diagonal' entry should be implemented to maintain a visual barrier of shrubs. In other words, equipment should avoid accessing the ROW in a route which is perpendicular to the highway which allows an open sight line down the ROW. Where a diagonal entry is not feasible, a narrow entry at the road edge of approximately 10m (or as required by maintenance equipment) should be considered. At a distance of 50-100m or more from the road this access trail may transition to an opening spanning the entire RoW. While a narrow access path may still allow for a sight line down the RoW from the road, it allows for a large proportion of shrub cover which limits sight lines.
- To the extent possible, re-vegetation should utilize the existing shrub re-growth within the RoW. Where additional shrub materials are required, the planting of Willow cuttings (various species) is likely to provide the best establishment (as opposed to relocation of existing willow clumps using an excavator or planting

potted stock). The planting of cuttings is preferred as it maintains local genetics and numerous cuttings could be planted in the time required to plant a similar number of stems from potted stock. Although donor material may be transplanted from the edge of the RoW, this results in increased machinery traffic, disturbed soils and survival of the transplanted materials may be highly variable. Cuttings of Dogwood may also be installed but are not likely to be as functional in providing the height which will provide a visual barrier from the highway.

- A variety of cutting sizes should be planted ranging from 1cm diameter up to 2-3cm diameter. Use of a rooting hormone should be considered (the base of each cutting dipped prior to planting). The most important consideration will be planting where there is good soil moisture and adequate soil depth to facilitate establishment. Cuttings will only effectively establish in low-lying areas where there is ample soil moisture to encourage roots to set. Willow stems should be cut fresh and kept damp/wet until planting using a bucket or tub of water or wetted burlap. The harvested cuttings should be planted within a day or two to avoid stem desiccation and die-back. In general, cuttings should be between 1m up to 3-4m, and maximize the length of stem planted into the ground (a minimum of 20-30cm but 40-50cm preferable if conditions allow). Those planting the cuttings may push each cutting into soft substrates by hand or use a spade shovel to pry open the soil, drop in 1-2 cuttings, then slide the shovel out and tamp the soil down by foot. Cuttings should be planted densely and account for the fact that a number of cuttings may not establish so overplanting is advisable. A target of 1 cutting per square meter (up to 5 per square meter), focusing on low-lying areas is ideal. Cuttings should be planted in early spring to avoid summer heat stress and lower soil moisture.
- Transplanting of existing Willows from the edge of the RoW by excavating clumps (or the planting of potted stock) may be a good option for areas which do not have moist soils conducive to establishing cover from cuttings. The limitation with this approach will be finding areas with suitable soil depth.

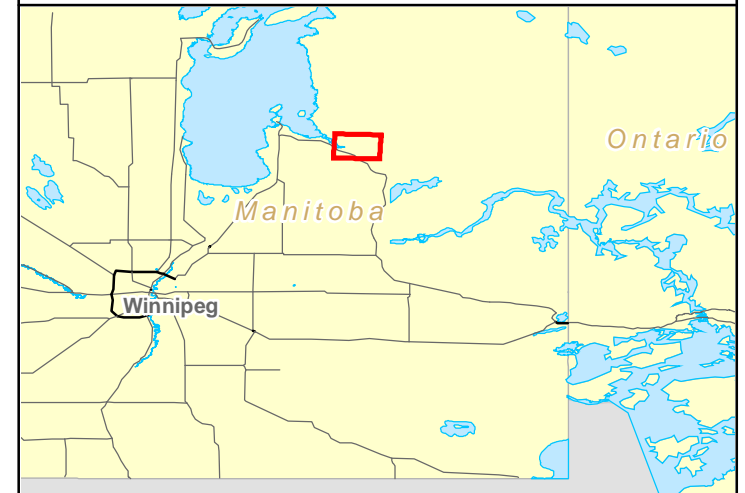
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MAPS

Lake Winnipeg East System Improvement Transmission Project

2016 Vegetation Biophysical Monitoring



Legend

- Plant Gathering Survey Plot (LWE-Ruse)
- Species of Conservation Concern (LWE-Eco)
- Berry Harvest
- Gathering Area
- Planned Infrastructure (Disturbance Area)

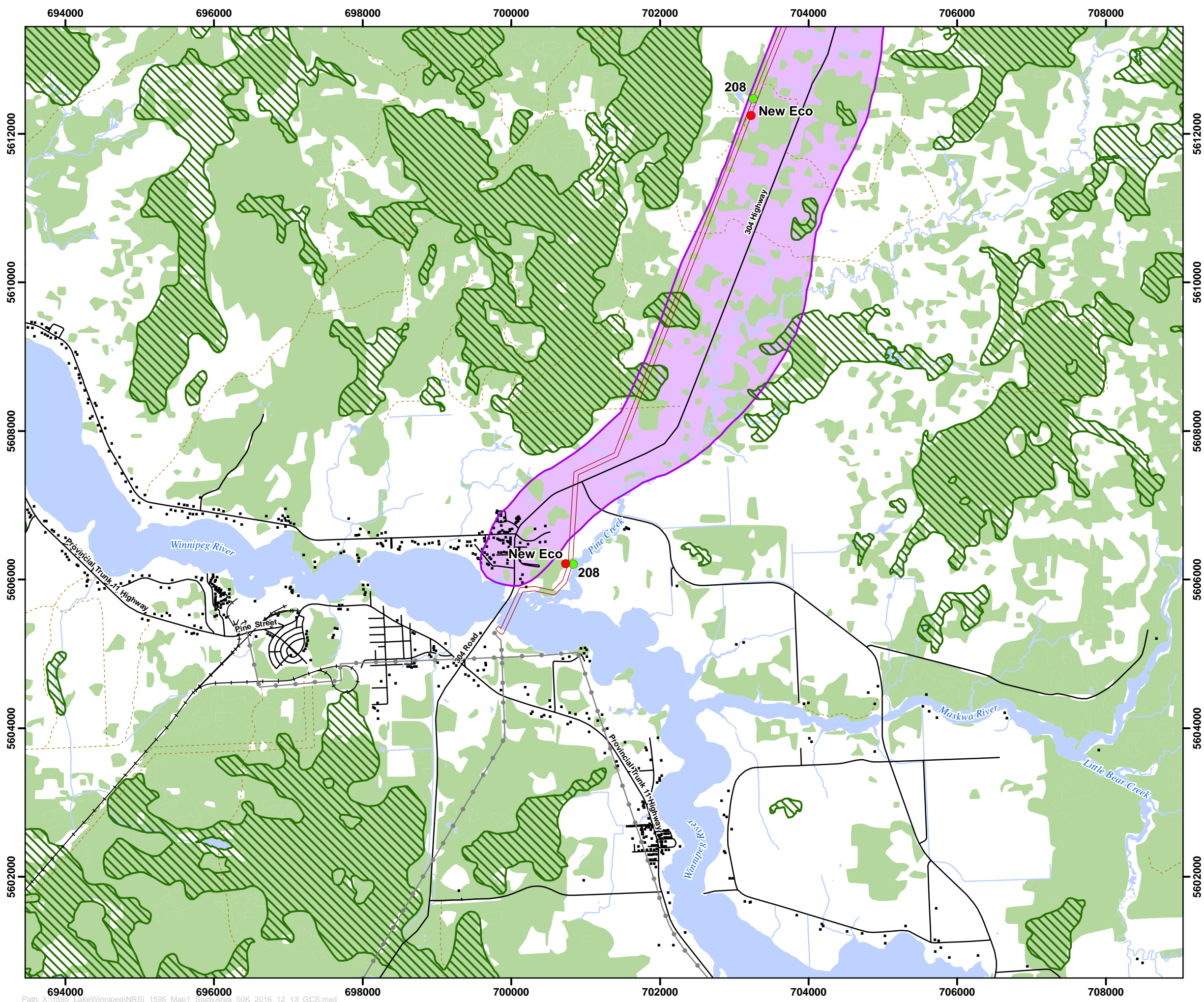
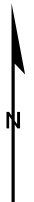
Base Layers (CanVec)

- Building
- Power transmission line (overhead)
- Trail
- Railway
- Road
- Watercourse
- Waterbody
- Wetland
- Wooded area



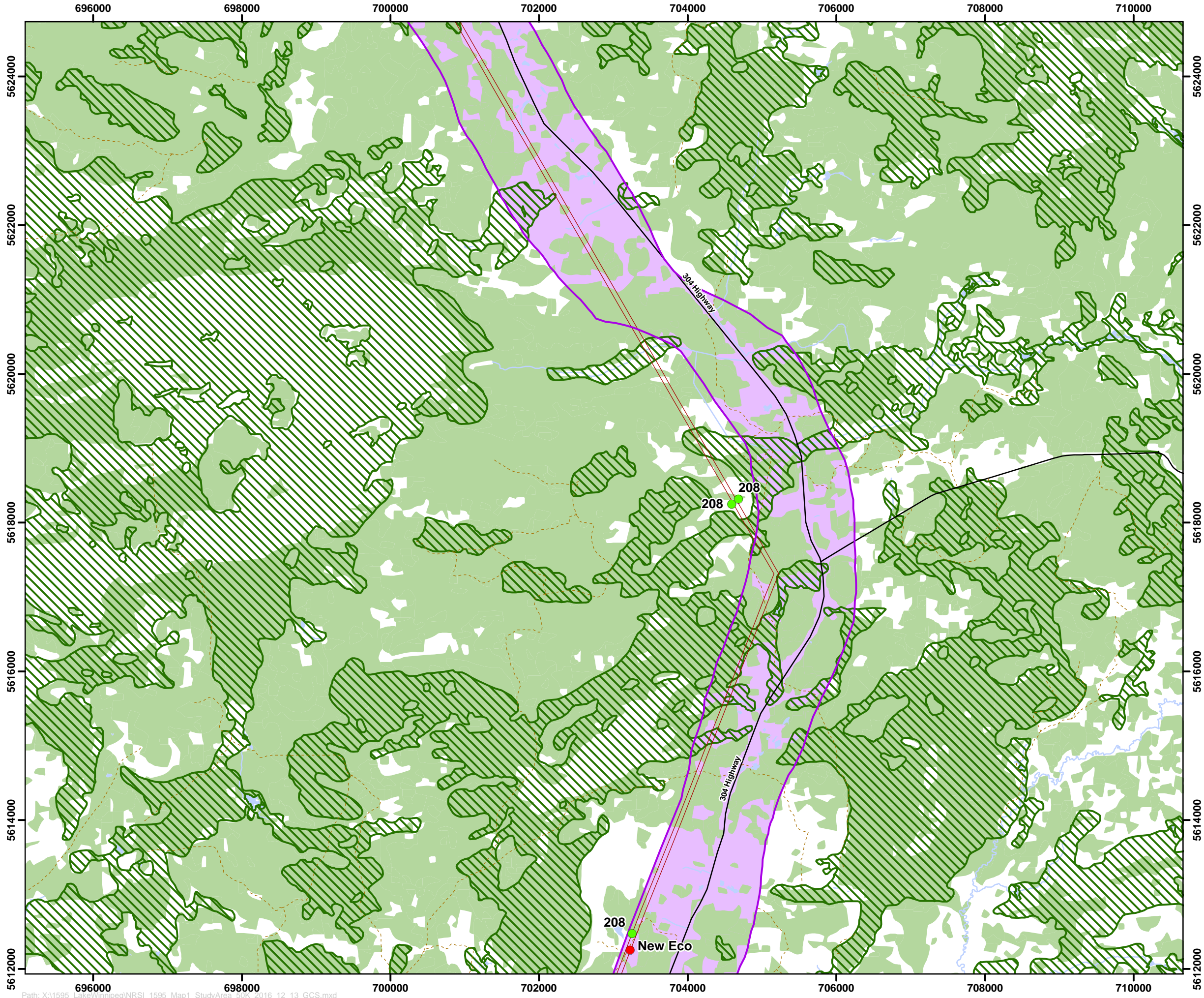
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Project: 1595 Date: December 13, 2016	NAD83 - UTM Zone 14 Size: 11x17" 1:50,000
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Lake Winnipeg East System Improvement Transmission Project

2016 Vegetation Biophysical Monitoring



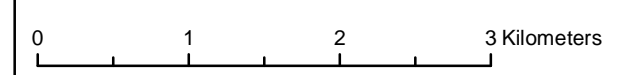
Legend

- Plant Gathering Survey Plot (LWE-Ruse)
- Species of Conservation Concern (LWE-Eco)
- Berry Harvest
- Gathering Area
- Planned Infrastructure (Disturbance Area)
- Trail
- Road
- ~ Watercourse
- Waterbody
- Wetland
- Wooded area



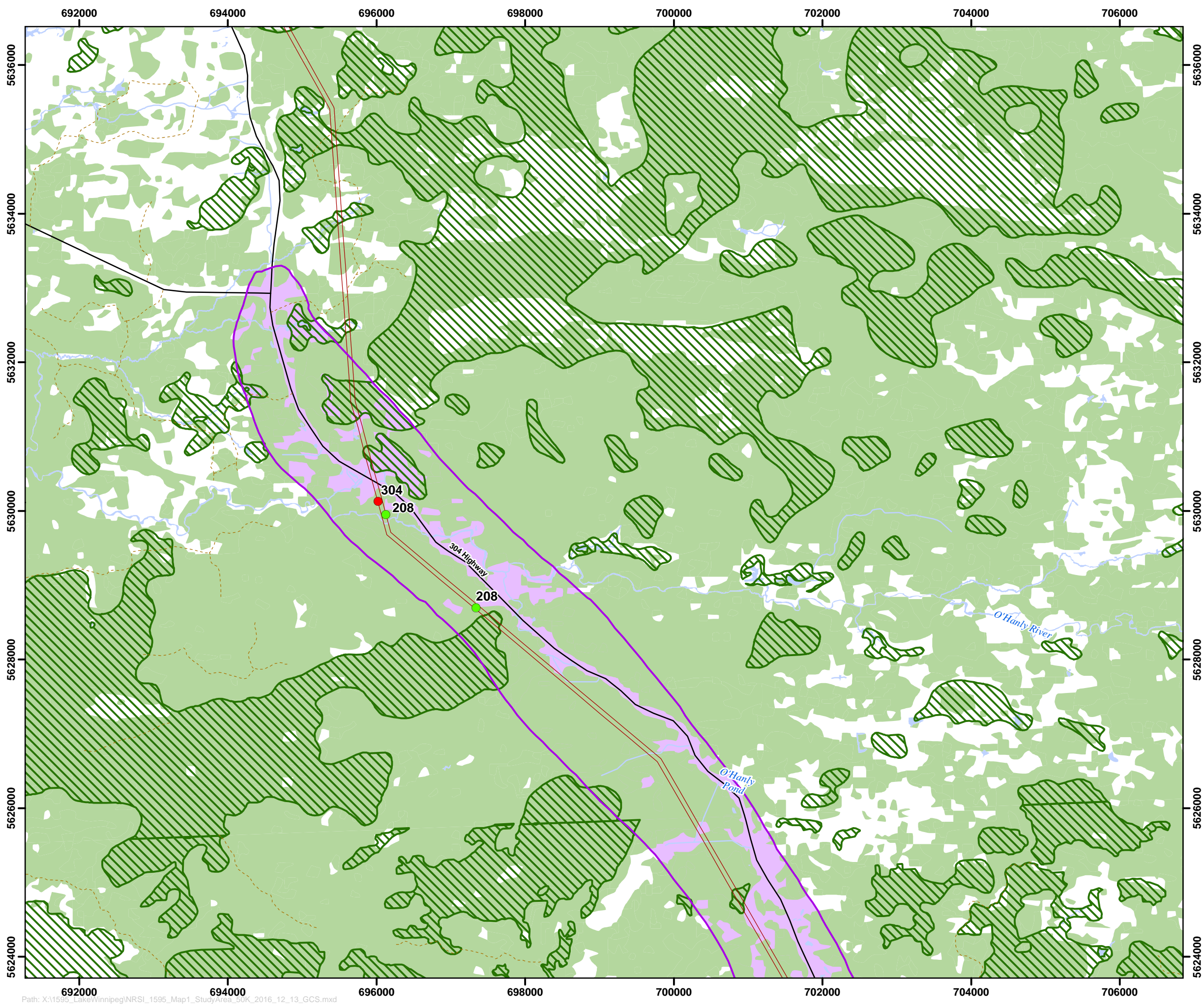
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Lake Winnipeg East System Improvement Transmission Project

2016 Vegetation Biophysical Monitoring

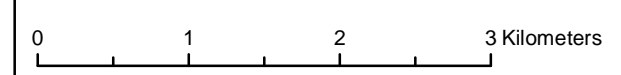


- Legend**
- Plant Gathering Survey Plot (LWE-Ruse)
 - Species of Conservation Concern (LWE-Eco)
 - Berry Harvest
 - Gathering Area
 - Planned Infrastructure (Disturbance Area)
 - Trail
 - Road
 - ~ Watercourse
 - Waterbody
 - Wetland
 - Wooded area



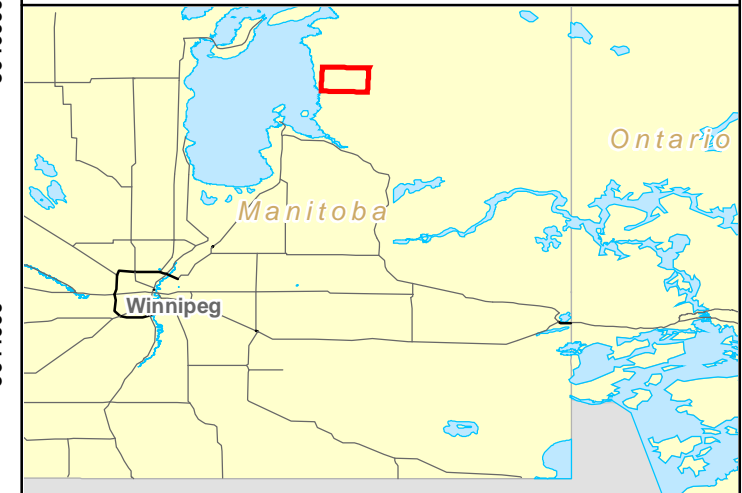
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Lake Winnipeg East System Improvement Transmission Project

2016 Vegetation Biophysical Monitoring



Legend

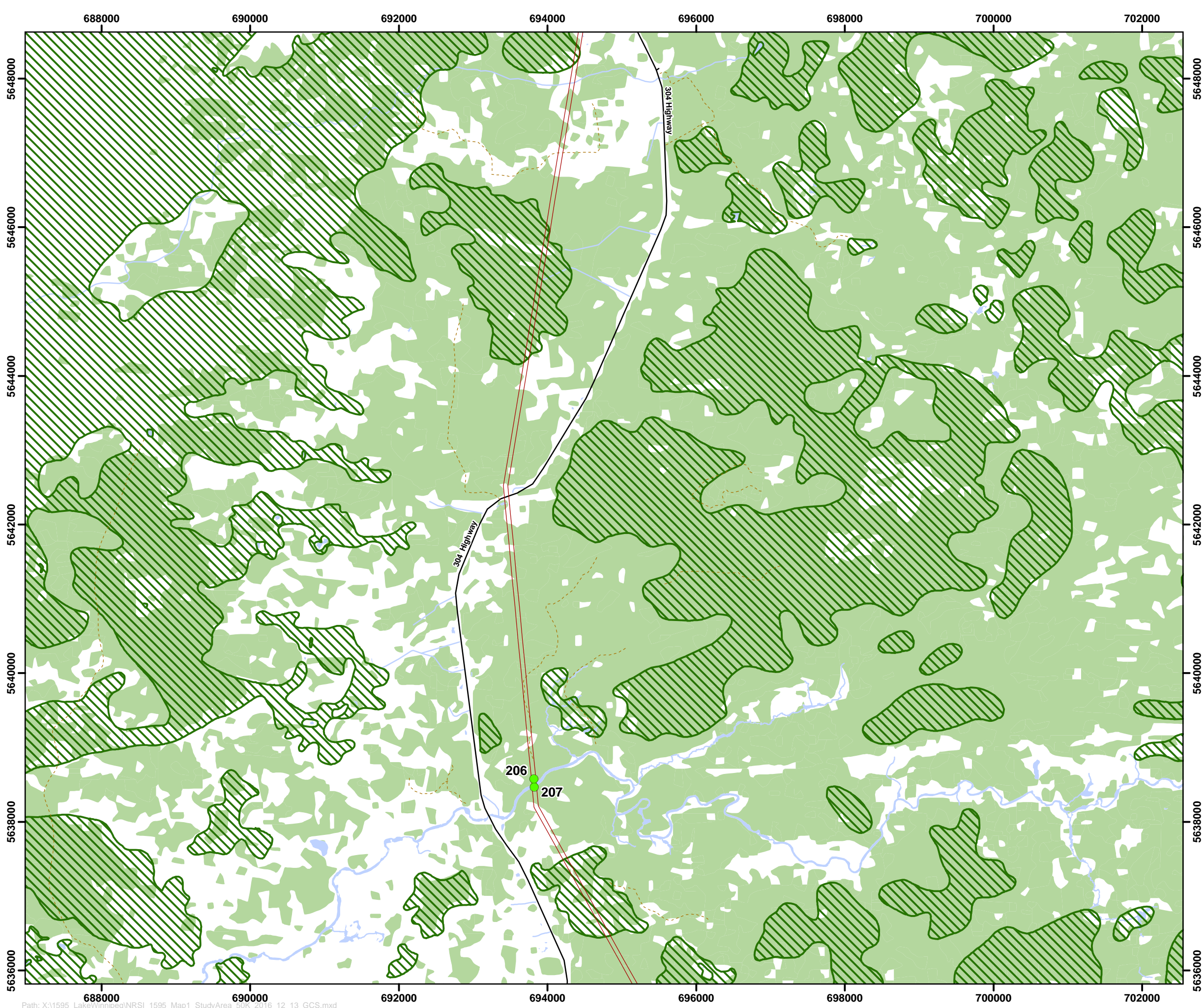
- Plant Gathering Survey Plot (LWE-Ruse)
- Species of Conservation Concern (LWE-Eco)
- Berry Harvest
- Gathering Area
- Planned Infrastructure (Disturbance Area)
- Trail
- Road
- ~ Watercourse
- Waterbody
- Wetland
- Wooded area



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0 1 2 3 Kilometers



Lake Winnipeg East System Improvement Transmission Project

2016 Vegetation Biophysical Monitoring



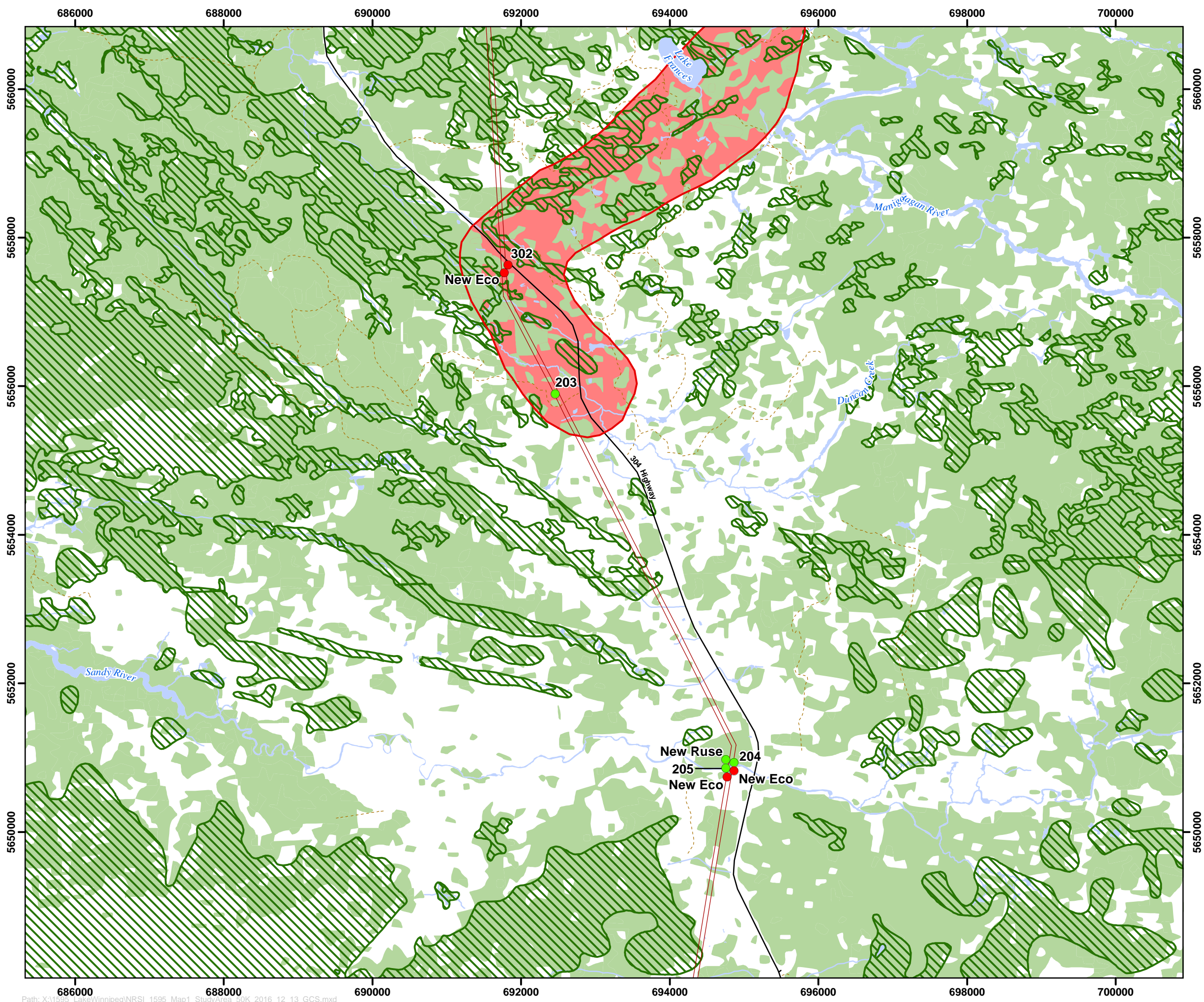
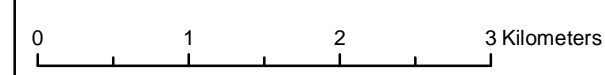
Legend

- Plant Gathering Survey Plot (LWE-Ruse)
- Species of Conservation Concern (LWE-Eco)
- Berry Harvest
- Gathering Area
- Planned Infrastructure (Disturbance Area)
- Trail
- Road
- Watercourse
- Waterbody
- Wetland
- Wooded area



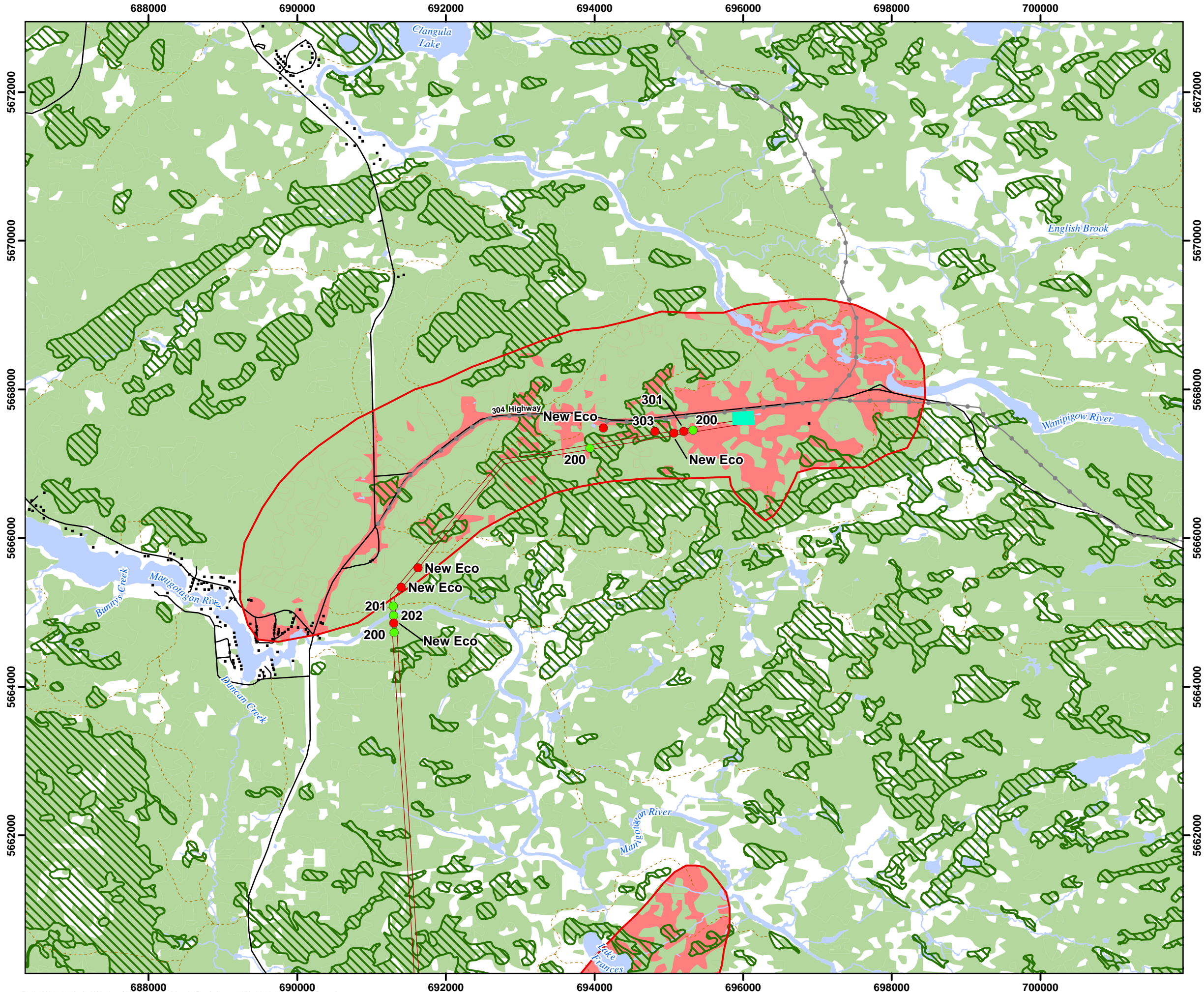
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Project: 1595 Date: December 13, 2016	NAD83 - UTM Zone 14 Size: 11x17" 1:50,000
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Lake Winnipeg East System Improvement Transmission Project

2016 Vegetation Biophysical Monitoring



- Legend**
- Plant Gathering Survey Plot (LWE-Ruse)
 - Species of Conservation Concern (LWE-Eco)
 - Berry Harvest
 - Gathering Area
 - Manigotagan Corner Station Site
 - Planned Infrastructure (Disturbance Area)
- Base Layers (CanVec)**
- Building
 - Power transmission line (overhead)
 - Trail
 - Road
 - Watercourse
 - Waterbody
 - Wetland
 - Wooded area



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Project: 1595 Date: December 13, 2016	NAD83 - UTM Zone 14 Size: 11x17" 1:50,000

APPENDIX I
Site Photographs

IMG_20170718_143209 – Hooker's Orchid (*Platanthera hookeri*) at LWE-Eco-302 on July 18, 2017.



IMG_20170719_103244 – Healthy, dense stand of Low Sweet Blueberry (*Vaccinium angustifolium*) within the transmission corridor at a sample plot. Blueberry coverage was 85% within the plot with 75% of plants bearing fruit.



IMG_20170718_144814 – Moderate re-growth of trees and shrubs within the transmission corridor. A large proportion of upland areas which were treed prior to vegetation clearing had reverted to this type of vegetation cover by the July 2017 surveys.



IMG_20170718_102519 – Re-growth of herbaceous and woody vegetation through areas which had deep wood mulch present following vegetation clearing in 2015/2016.



IMG_20170718_103234 – Small areas of disturbance at tower locations appearing slow to revegetate but generally free of non-native, invasive species.



IMG_20170719_145639 – Patches of non-native, invasive species occur sporadically within the RoW (LWE-Eco-304). Species such as White Sweet Clover (*Melilotus alba*) and Wild Parsnip (*Pastinaca sativa*) thrive following clearing but are suppressed by re-growth of woody species.



IMG_20170721_121324 – Open sight line down transmission corridor from Provincial Road #304.



IMG_20170721_123106 – Willow shrubs which can provide visual barrier from Provincial Road #304 if allowed to grow to 5m in height.



IMG_20170721_123315 – Effective visual barrier provided by mature Willow shrubs along Provincial Road #304 at a RoW highway crossing location.



IMG_20170721_124536– Variable substrates (damp organic pocket to left and dry outcrop to right) will dictate which areas can support dense woody vegetation to create visual barriers.

