



# Lake Winnipeg East System Improvement Transmission Project

## 2016 Vegetation Biophysical Monitoring Report

Prepared for:  
Manitoba Hydro  
360 Portage Avenue  
Winnipeg, MB

Project No. 1595 | February 2018



**NATURAL RESOURCE SOLUTIONS INC.**

Aquatic, Terrestrial and Wetland Biologists

# Lake Winnipeg East System Improvement Transmission Project

## 2016 Vegetation Biophysical Monitoring Report

### Project Team:

Brett Woodman	Senior Biologist, Project Advisor
Pat Deacon	Terrestrial & Wetland Biologist, Project Manager
Andrew Dean	Terrestrial & Wetland Biologist

Report submitted on February 9, 2018



---

Pat Deacon  
Project Manager  
Terrestrial and Wetland Biologist

## TABLE OF CONTENTS

<b>1.0</b>	<b>Introduction .....</b>	<b>1</b>
<b>2.0</b>	<b>Background .....</b>	<b>3</b>
<b>2.1</b>	<b>Monitoring Requirements .....</b>	<b>3</b>
<b>2.2</b>	<b>Species of Conservation Concern.....</b>	<b>5</b>
<b>2.3</b>	<b>Plants/Communities Important to Indigenous People .....</b>	<b>6</b>
<b>2.4</b>	<b>Invasive and Non-native Species .....</b>	<b>7</b>
<b>2.5</b>	<b>Riparian Buffers.....</b>	<b>9</b>
<b>2.6</b>	<b>Rehabilitation.....</b>	<b>10</b>
<b>3.0</b>	<b>Methods .....</b>	<b>12</b>
<b>3.1</b>	<b>Study Design.....</b>	<b>12</b>
<b>4.0</b>	<b>Results .....</b>	<b>17</b>
<b>4.1</b>	<b>Species of Conservation Concern.....</b>	<b>17</b>
<b>4.2</b>	<b>Plants/Communities Important to Indigenous People .....</b>	<b>22</b>
<b>4.3</b>	<b>Invasive and Non-native Species .....</b>	<b>31</b>
<b>5.0</b>	<b>Mitigation Recommendations .....</b>	<b>33</b>
<b>6.0</b>	<b>References.....</b>	<b>34</b>

### List of Tables

Table 1. Environmentally Sensitive Site - Species of Conservation Concern .....	20
Table 2. Assessment of Mitigation Measures at Species of Conservation Concern Sites .....	21
Table 3. Environmentally Sensitive Site Codes – Food or Medicinal Plants .....	24
Table 4. Assessment of Mitigation Measures at Plant Gathering Sites .....	30

### List of Maps

Map Set 1. 2016 Vegetation Biophysical Monitoring

### List of Appendices

Appendix I Site Photographs

## 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 will be 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 will occur annually throughout the construction phase and one year following the completion of construction. Vegetation surveys completed in 2016 constitute Year 1 During-construction, with further monitoring to follow in 2017 (Year 2 During-construction) and 2018 (Year 1 Post-construction).

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 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 2016, these components were not monitored during the 2016 surveys.

The vegetation survey data collected in 2016 serves as a baseline for effects monitoring over the coming years. 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 right-of-way (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 newly documented locations of SCC which were observed during 2016 surveys as well as plots

which were established to sample medicinal/edible plants which are gathered by First Nations people.

## 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 and clearing and grubbing of vegetation. While the transmission line overlaps the location 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 is to occur in July of 2016 and 2017 (during construction) and 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 and harvesting of plants. 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 Blueberry which is 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 is to occur in July of 2016 and 2017 (during construction) and 2018 (post-construction).

## **2.4 Invasive and Non-native Species**

While the majority of clearing, geotechnical and construction work along the transmission line will occur during the winter months, there is the potential for the introduction 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 is located approximately 5km north of Pine Falls, in an existing cleared area and easily accessed from Provincial Road #304.

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 (during construction) and 2018 (post-construction) monitoring of invasive and non-native plants will be conducted across the entire project area.

## **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.

Two areas of riparian buffer exceedance were identified and assessed by Maureen Forester in 2016 as part of watercourse crossing monitoring. These sites were re-assessed in 2017 and were found to be in good condition with the ground vegetated and stable and in compliance with the Environmental Protection Plan. 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 2016, 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 data, reports and accompanying files and documents were uploaded to the Environmental Protection Information Management System (EPIMS).

Surveys included visiting identified point locations of Environmentally Sensitive Sites. This included 4 point locations of plant SCC and 6 point locations of gathering sites. Additionally, 3 polygons encompassing large areas identified as plant gathering sites were surveyed, both to document species presence as well as to establish sampling plots to return to for future monitoring. 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 and is to be expanded upon in 2017 to assess the larger transmission RoW between Pine Falls and the Manigotagan Corner Station.

All surveys were completed between July 8-12, 2016; a total of five consecutive days. Surveys were completed by two NRSI biologists (Patrick Deacon and Andrew Dean) and a representative from the Sagkeeng First Nation (Kirk Guimond). A representative from the Black River First Nation and Hollow Water First Nation did not accompany NRSI staff during the 2016 surveys. Manitoba Hydro employee Kris Watts provided a safety and biosecurity briefing on the first morning and accompanied the group on the July 8 surveys.

## **Species of Conservation Concern**

Plant SCC populations were surveyed at 4 locations. These locations had been provided to NRSI based upon observation made during pre-construction survey work. 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/fruitletting period for each species, surveys were conducted in mid-July.

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 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. This survey was largely a presence/absence survey which sets a baseline for invasive species presence.

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 establishment. 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 will identify any notable populations of invasive non-native species which may establish. Should a population be identified during the fly-over, NRSI biologists would verify the observation on the ground 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 July 2016 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. The abundance of non-native or invasive plant species may increase as a result of the Project.

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 are to commence in 2017 as it is 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.

A representative from the Sagkeeng First Nation (Kirk Guimond) accompanied the NRSI biologists for all surveys in 2016.

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 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)

Locations identified as gathering areas were surveyed to locate plant species (food or medicinal) which are valued by local Indigenous People. These locations (both point and polygon data) had been provided to NRSI based upon pre-construction survey work and input received from First Nation and Métis contacts. These surveys involved locating the species occurrence, completing stem counts and evaluating the health of the plants, site conditions, and noting the effectiveness of mitigation efforts. For those occurrences which exist as large polygons, surveys at various access points were conducted to first locate any valued species (predominantly Blueberry and Cranberry patches), then evaluate their condition similar to those species for which point data was provided. Representative patches of plants were assessed using 10x10m sampling plots.

Individual stem counts were not feasible for Blueberry and Cranberry which have low, prostrate growth and are not easily distinguished on a plant-by-plant basis, in particular when growing in dense stands.

A GPS track was recorded for 1 of the 3 staff who worked in tandem walking transects as necessary. GPS points were documented for all photographs as well as locations of interest (disturbed soil, log piles, additional SCC).

## 4.0 Results

### 4.1 Species of Conservation Concern

Monitoring of SCC found most populations to be accounted for and in good health following the woody vegetation clearing which occurred during the winter of 2015/2016. Surveys identified that some species may be benefitting from the RoW activities as a result of additional sunlight and reduced competition afforded to herbaceous plants.

With the exception of LWE-Eco-301, all identified population of SCC vegetation appeared to be in good condition. It is noted that one of the identified mitigations “provide a 5m vegetated (shrub and herbaceous) buffer around the site” had not been implemented for LWE-Eco-304 - Swollen Sedge or LWE-Eco-301 – Dwarf Bilberry. Swollen Sedge has responded positively to the clearing, is widespread at that location and other areas within the RoW and is not likely to be affected. Dwarf Bilberry was not relocated and additional mitigation is discussed further in the following section.

#### Dwarf Bilberry

The population of Dwarf Bilberry (LWE-Eco-301) could not be relocated by surveyors. It is anticipated that the thick mulch in the vicinity of the provided UTM coordinates may be smothering the plants (Appendix I Photo DSC04758). It appears that the mitigation to flag this species prior to the start of work, as well as providing a 5m vegetated buffer, was not implemented.

It may be advisable to lightly scarify or remove mulch from a 10x10m area at this location using hand tools to remove the mulch and encourage growth. Removal of mulch using a heavy equipment blade or bucket may damage or kill any persistent Bilberry plants and is not recommended. Left untouched it is possible that plants could grow through the mulch; however the preferred rocky outcrop habitat of this species would not be maintained thus limiting potential for regeneration and long-term survival of this population.

### Hooker's Orchid

The 2016 survey of the known Hooker's Orchid population (LWE-Eco-302) documented a total of 11 plants (3 flowering, 8 basal leaves only). These plants were noted to be in healthy condition with flowering stems up to 15cm in height and no signs of sun scald or other indications of plant stress.

Two additional populations of Hooker's Orchid were also documented (UTM coordinates provided in Table 1). Several plants are present within the RoW immediately west of the LWE-Eco-302 site, while a second population occurs on the RoW northwest of the Sagkeeng log yard site approximately 5km north of Pine Falls. While both populations exhibited flowering stems and appeared healthy, the thick mulch covering the plants and lack of canopy may impact these plants in time.

### Sessile-fruited Arrowhead

The population of Sessile-fruited Arrowhead located along the Sandy River was noted to be in excellent health with no visible signs of stress or impacts relating to the clearing of the transmission line. All plants were 20-40cm in height (above water portion) with stands occurring as continuous bands along the river bank at the preferred water depth.

Due to the large extent of the population and the location of plants within the river, an estimate count was conducted from the bank. It is estimated that 2700 plants are present within the RoW (north and south bank). Approximately 20% of plants were observed to be bearing fruit. The population was noted to continue both upriver and downriver contiguous with those stands occurring within the RoW.

The riparian buffer at this crossing was intact with dense shrubs transitioning to riverine forbs and graminoids.

### Swollen Sedge

Pre-construction surveys had identified 1 population of Swollen Sedge occurring within the RoW. The 2016 surveys documented a total of 47 fruiting plants at this location which spans from the western extent of the RoW to the eastern extent. A small

proportion of plants at this location (5%) had been browsed by ungulates. Additionally, a log pile at LWE-Eco-304 was likely covering some plants.

During the 2016 surveys 7 additional populations were documented (UTM coordinates provided in Table 1). The numerous occurrences of this species within the RoW suggest that Swollen Sedge is somewhat common in the project area with additional populations certain to be present in other sections of the RoW. The removal of tree and shrub cover related to transmission line clearing may have a positive effect on this species through increased plant vigor and recruitment. Surveys did not indicate that plant health at the edge of the RoW (up to 70% canopy) differed from the centre of the RoW (0% canopy).

**Table 1. Environmentally Sensitive Site - Species of Conservation Concern**

ESS Identifier	Species	Survey Plot ID	Comments
LWE-Eco-301	Dwarf Bilberry ( <i>Vaccinium caespitosum</i> )	Bilberry-001	No plants observed in 2016
LWE-Eco-302	Hooker's Orchid ( <i>Platanthera hookeri</i> )	Orchid-001	11 plants (3 fruiting, 8 basal leaves only)
New LWE-Eco*		Orchid-002	3 plants (2 fruiting, 1 basal leaves only)
New LWE-Eco*		Orchid-003	2 plants (1 fruiting, 1 basal leaves only)
LWE-Eco-303	Sessile-fruited Arrowhead ( <i>Sagittaria rigida</i> )	Arowhead-001	700 plants on north bank (approximate count) 20% of plants fruiting (approximate)
New LWE-Eco*		Arrowhead-002	2000 plants on south bank (approximate count) 20% of plants fruiting (approximate)
LWE-Eco-304	Swollen Sedge ( <i>Carex intumescens</i> )	Sedge-001	47 plants, log pile likely covering additional plants
New LWE-Eco*		Sedge-002	1 plant
New LWE-Eco*		Sedge-003	50 plants
New LWE-Eco*		Sedge-004	20 plants
New LWE-Eco*		Sedge-005	5 plants
New LWE-Eco*		Sedge-006	2 plants
New LWE-Eco*		Sedge-007	19 plants
New LWE-Eco*		Sedge-008	1 plant

An asterisk (\*) denotes newly documented SCC from 2016 surveys.

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.	-	-	-	-

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 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 and LWE-Eco-304 sites were flagged in the field; however both sites exhibited full vegetation clearing with no buffer retained.

The removal of trees using low disturbance methods was achieved in part through the mitigation of working on frozen ground. Additionally, contractors utilized methods including clearing trees by hand (chainsaw), the use of a feller-buncher and/or Pro Mac



mulcher head equipment. These implements were utilized at the discretion of the contractor as feasible for the site conditions.

The disappearance of an SCC or its significant decline within an ESS is identified as a decision trigger and threshold for action. Given that the Swollen Sedge located at LWE-Eco-304 has responded positively to the clearing, and is somewhat widespread and common within the RoW (as numerous other stands were located), no additional mitigation is recommended for this ESS.

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. It is unclear at this time if the plants are live and remain present beneath the mulch. Additional mitigation for this ESS is recommended in Section 5.0.

#### **4.2 Plants/Communities Important to Indigenous People**

Numerous plant species gathered by Indigenous People for food or medicine were observed and all appeared to be responding well to the clearing. It is noted that some Blueberry patches – both Low Sweet Blueberry (*Vaccinium angustifolium*) and Velvet-leaf Blueberry (*V. myrtilloides*) had light to moderate amounts of mulch on them which may not be ideal for this species which prefers the shallow soils among rocky outcrops. As the mulch settles and decays these habitats should continue to function and support these plants. Other edible or medicinal species including Cranberry – both Large Cranberry (*Vaccinium macrocarpon*) and Small Cranberry (*V. oxycoccos*), Highbush Cranberry (*Viburnum trilobum*), Wild Ginger (*Asarum canadense*), Sweetflag (*Acorus americana*), various Raspberry species (*Rubus* spp.), Wild Rice (*Zizania aquatica*), Beaked Hazel (*Corylus cornuta*) and Wild Plum (*Prunus americana*) were observed incidentally during the surveys.

The 2016 surveys assessed populations of several species which are used as food or medicine. The most commonly encountered species included Low Sweet Blueberry, Velvet-leaf Blueberry, Large Cranberry, Small Cranberry and Sweetflag – otherwise known as Weekay. A number of 10x10m monitoring plots were established to monitor the edible and medicinal species.

Table 3 outlines the various sample plots which were established during 2016 surveys and an overview of plant abundance and health within each of these plots. It is noted that the abundance of any species between two or more locations could vary greatly. Plots which contain Blueberry, for example, range from 3% to 65% of the total area within the plot. These differences may be attributed to various factors including soil depth, available moisture and sunlight, and the presence of other competing vegetation.

It was not anticipated that the First Nations gathering sites would comprise such large polygons (the largest being over 30km in length). In order to survey these areas we conducted surveys of a subset of locations within the larger areas, largely based on where foot access from Provincial Road #304 was feasible. Given the saturated peatlands throughout the RoW, access by foot was limited in places. While we are satisfied with the area which was covered in terms of understanding the effectiveness of mitigation on plant gathering sites, should greater coverage of these large areas be desired the use of an amphibious vehicle would be required.

To make for easier access to those sites which are located along the major river systems within the project area (O'Hanley River, Black River and Manigotagan River), the use of a canoe is being considered for 2017 surveys.

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

ESS Identifier	Description	Survey Plot ID	Survey Results
LWE-Ruse-200	Large berry picking area.	Blueberry-001	Both Blueberry species present. Estimated cover: 35% Bearing fruit: 80% Plants are healthy, 30cm in height, thin layer of wood mulch is present but patchy.
		Cranberry-001	Both Cranberry species present. Estimated cover: 3% Bearing fruit: 5% Plants are healthy, growing among saturated peat hummocks.  K. Guimond notes the presence of Cloudberry ( <i>Rubus chamaemorus</i> ) and Labrador Tea ( <i>Ledum groenlandicum</i> ), other species gathered by Indigenous People.
		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.
LWE-Ruse-201	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking,	Sweetflag-001	A large stand of Sweetflag (Weekay) along Manigotagan River (UTM is central within the stand).

ESS Identifier	Description	Survey Plot ID	Survey Results
	Sage gathering and ceremonial plants. North shore.		<p>15 clumps were observed growing within the littoral zone. Additional plants upstream and downstream of RoW.</p> <p>Clumps range from 1m x1m to 2m x 15m.</p> <p>Plants healthy, above-water plant height of 1m.</p> <p>75% 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>
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>
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>

ESS Identifier	Description	Survey Plot ID	Survey Results
			Plants are healthy, up to 30cm in height. Located on rocky outcrop with minimal wood mulch.
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>
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>Plants healthy, above-water plant height of 1m.</p> <p>30% of plants bearing fruit.</p> <p>No construction-related disturbance apparent.</p>
LWE-Ruse-206	Food/medicinal plant gathering area including Sweetflag, Sweetgrass, Ginger, Cranberries, berry picking,	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>

ESS Identifier	Description	Survey Plot ID	Survey Results
	Sage gathering and ceremonial plants. North shore.		<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>
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>
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	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;</p>

ESS Identifier	Description	Survey Plot ID	Survey Results
	Black River then south to Pine Falls.		<p>however canopy will reduce sun scald to the benefit of the plants</p> <p>Other species which Indigenous People gather are present including 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>).</p>
		Blueberry-004	<p>Both Blueberry species present.</p> <p>Estimated cover: 3%</p> <p>Bearing fruit: 5%</p> <p>Plants are healthy, up to 20cm in height. Located on rocky outcrop with minimal wood mulch.</p>
		Cranberry-002	<p>Small Cranberry present.</p> <p>Estimated cover: 3%</p> <p>Bearing fruit: 0%</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>
		Blueberry-005	<p>Both Blueberry species present.</p> <p>Estimated cover: 65%</p> <p>Bearing fruit: 10%</p> <p>Plants are healthy, up to 30cm in height. Located on rocky outcrop with wood mulch covering 30% of the plot.</p>

ESS Identifier	Description	Survey Plot ID	Survey Results
		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>
		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>
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>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.</p>

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. Following the 2016 surveys it appears that the vegetation clearing within the RoW has not had a major impact on plant species gathered for food or medicine. The preferred habitats of certain species (Blueberries on sparsely treed rocky outcrops and Cranberries within saturated peatlands), generally were not greatly affected by the clearing of woody vegetation. Generally speaking these habitats did not become smothered in wood mulch or become rutted or disturbed as a result of equipment operation. It is not anticipated that these species will be negatively affected by additional sunlight brought about by the vegetation clearing.

**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.	-	-	-	-	-	-			

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.

### 4.3 Invasive and Non-native Species

Surveys conducted for invasive and non-native species in 2016 did not identify any notable populations or species which require management at this time.

Stands of Common Reed (*Phragmites australis*), had been identified growing within the ditches of Provincial Road #304 to the north of Pine Falls between Northshore Road and Broadlands Road, in the vicinity of angle tower 11. NRSI biologists confirmed these stands to be the native sub-species *P. australis* ssp. *americanus* as opposed to the non-native *P. australis* ssp. *australis*. Mapping available through the Invasive Species Council of Manitoba (2011) indicates that the non-native Common Reed has a known distribution confined to Winnipeg and the surrounding area. The wider distribution of this species throughout the province is unknown.

Non-native invasive species which were observed during the 2016 surveys included:

- Canada Thistle (*Cirsium arvense*)
- Birdsfoot Trefoil (*Lotus corniculatus*)
- 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 Meddick (*Medicago lupulina*)

Some non-native and invasive plant species such as White Sweet Clover and Canada Thistle were noted to be present sporadically within the RoW. These herbaceous invasive species were almost certainly present prior to clearing and seem to have responded positively to the clearing showing vigorous growth. Most of the listed species

show some affinity to areas where Provincial Road #304 or existing trails intersect with the RoW.

All of the invasive species which were noted in 2016 tend to establish and thrive in areas of disturbance. Although the vegetation clearing within the RoW has created a disturbance which will allow the aforementioned species to thrive in the short-term due to reduce woody competition, re-growth of a dense shrub layer will continually limit their spread and ability to impact natural habitats within the project area. None of the observed species are prone to becoming widespread and displacing native species on a large scale such as the non-native Common Reed or Purple Loosestrife (*Lythrum salicaria*).

## 5.0 Mitigation Recommendations

Overall the 2016 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.

### 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. These areas should be delineated by tall wooden stakes painted in blaze orange. The 2 new populations of Hooker's Orchid should be afforded the mitigation measures identified in Table 2.
- Retain low-growing shrubs to the extent possible to protect herbaceous species from sun scald and smothering by wood chips.
- Consider removal of wood chips in the vicinity of the Dwarf Bilberry population (LWE-Eco-301) using hand tools. It is recommended that the depth of wood chips be reduced to allow plants access to light and rehabilitate the population. No machinery should be permitted to complete this task as it would risk damaging or killing plants.

### 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.

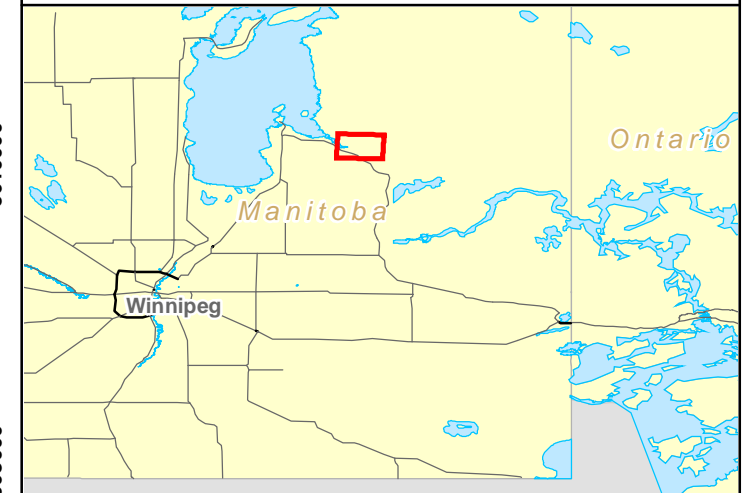
## 6.0 References

- Calyx Consulting. 2012. Lake Winnipeg East System Improvement (LWESI) Transmission Project. Vegetation Technical Report. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB.
- Invasive Species Council of Manitoba. 2011. Invasive Phragmites. Available online: <http://invasivespeciesmanitoba.com/site/index.php?page=common-reed-phragmites>
- Government of Manitoba. 2015. Environment Act License No. 3120.
- Manitoba Hydro. 2012. Lake Winnipeg East System Improvement Project Environmental Assessment Report.
- Manitoba Hydro. 2015. Lake Winnipeg East System Improvement Transmission Project - Environmental Protection Plan.
- Natural Resource Solutions Inc. (NRSI). 2016. Lake Winnipeg East System Improvement Transmission Project - Vegetation Biophysical Monitoring Plan.
- Northern Lights Heritage Services (NLHS). 2012. Lake Winnipeg East System Improvement (LWESI) Transmission Project. Cultural Resources Technical Report. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB.

## **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)

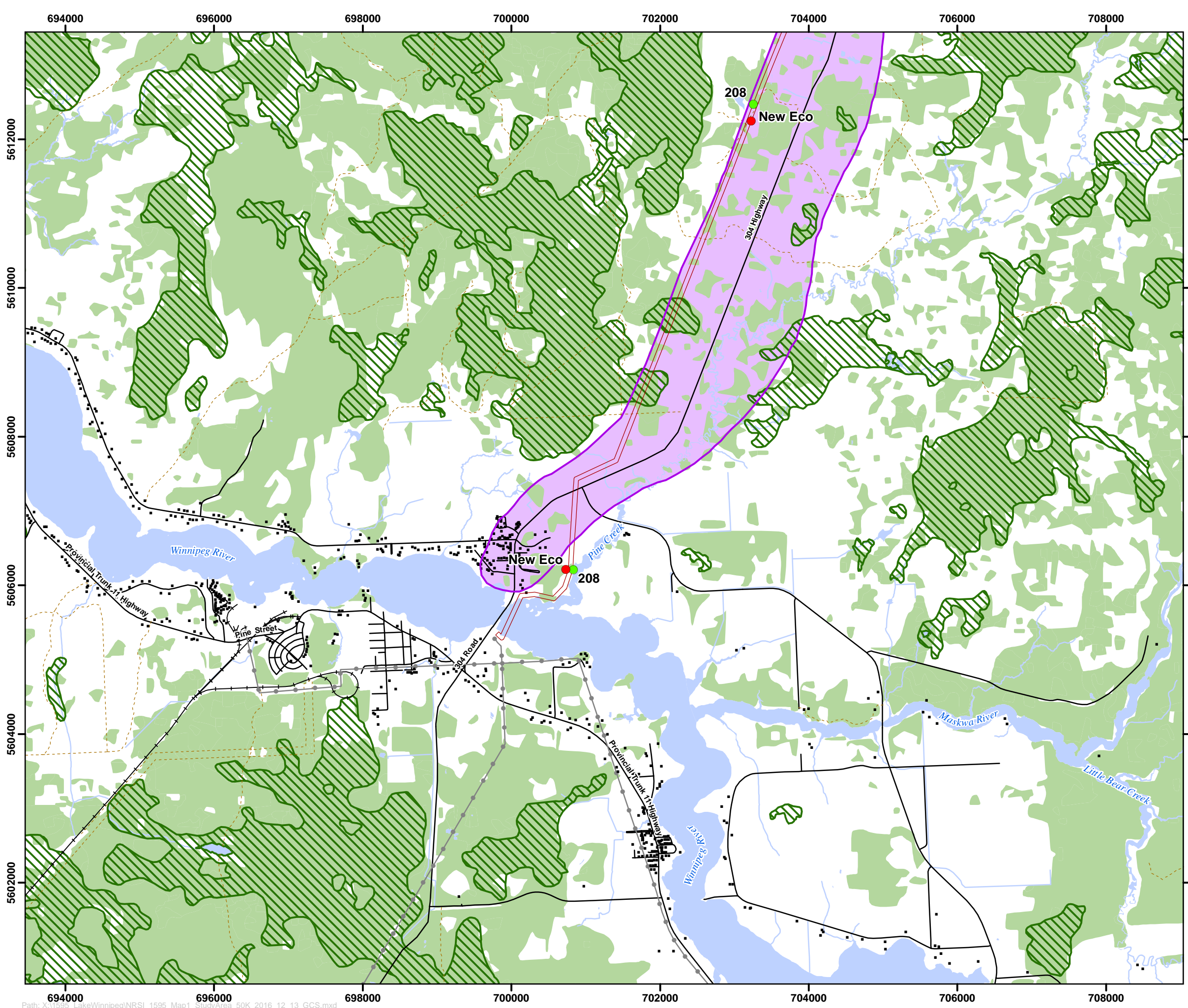
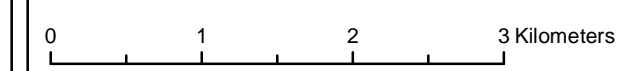
### Base Layers (CanVec)

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



Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by CanVec  
Copyright: Natural Resources Canada.

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



# Lake Winnipeg East System Improvement Transmission Project

## 2016 Vegetation Biophysical Monitoring



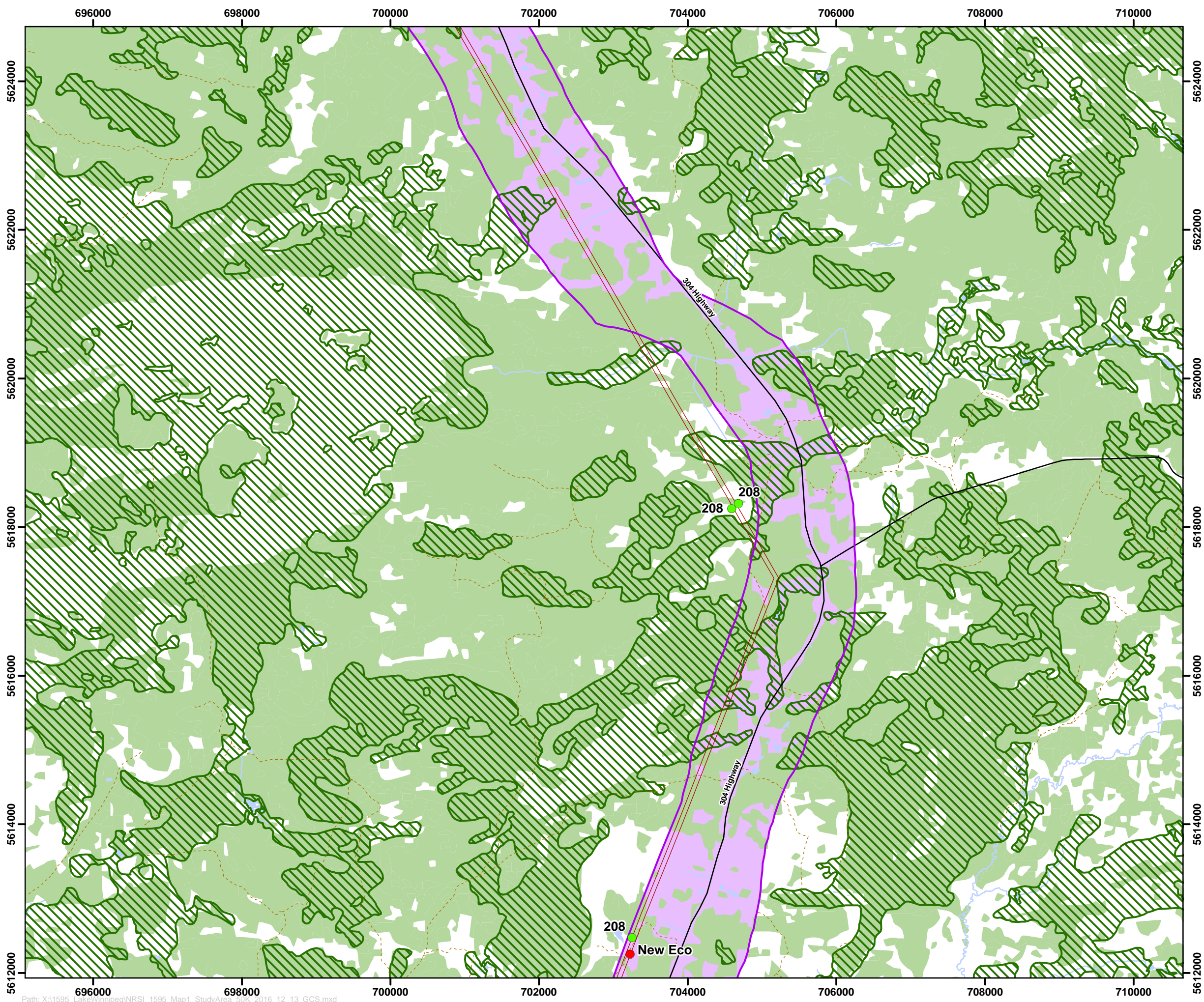
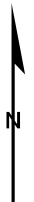
### Legend

- 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



Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by CanVec Copyright: Natural Resources Canada.

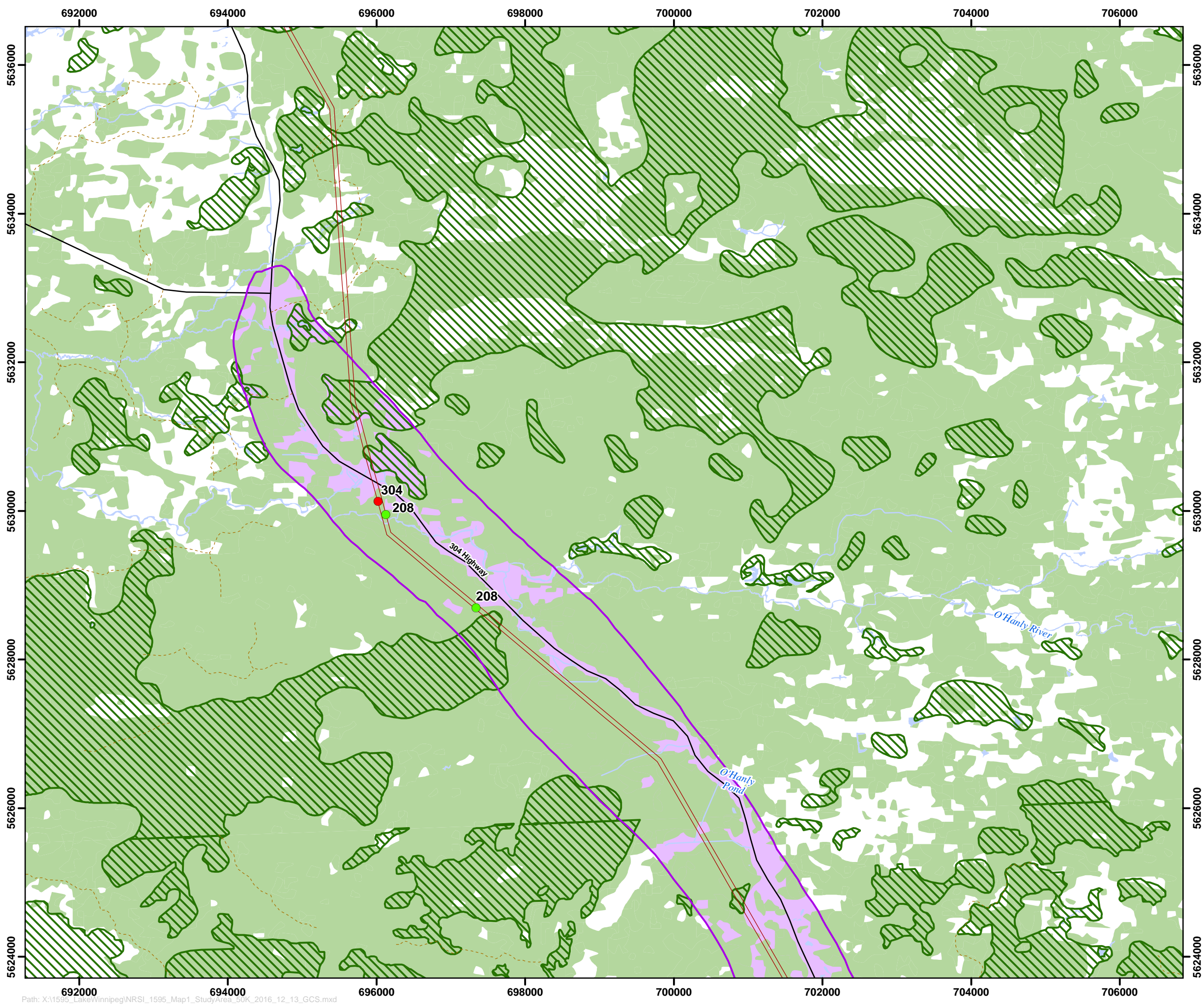
Project: 1595 Date: December 13, 2016	NAD83 - UTM Zone 14 Size: 11x17" 1:50,000
--	---





# Lake Winnipeg East System Improvement Transmission Project

## 2016 Vegetation Biophysical Monitoring



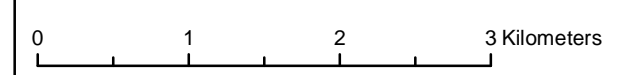
### Legend

- 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



Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by CanVec Copyright: Natural Resources Canada.

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



# Lake Winnipeg East System Improvement Transmission Project

## 2016 Vegetation Biophysical Monitoring



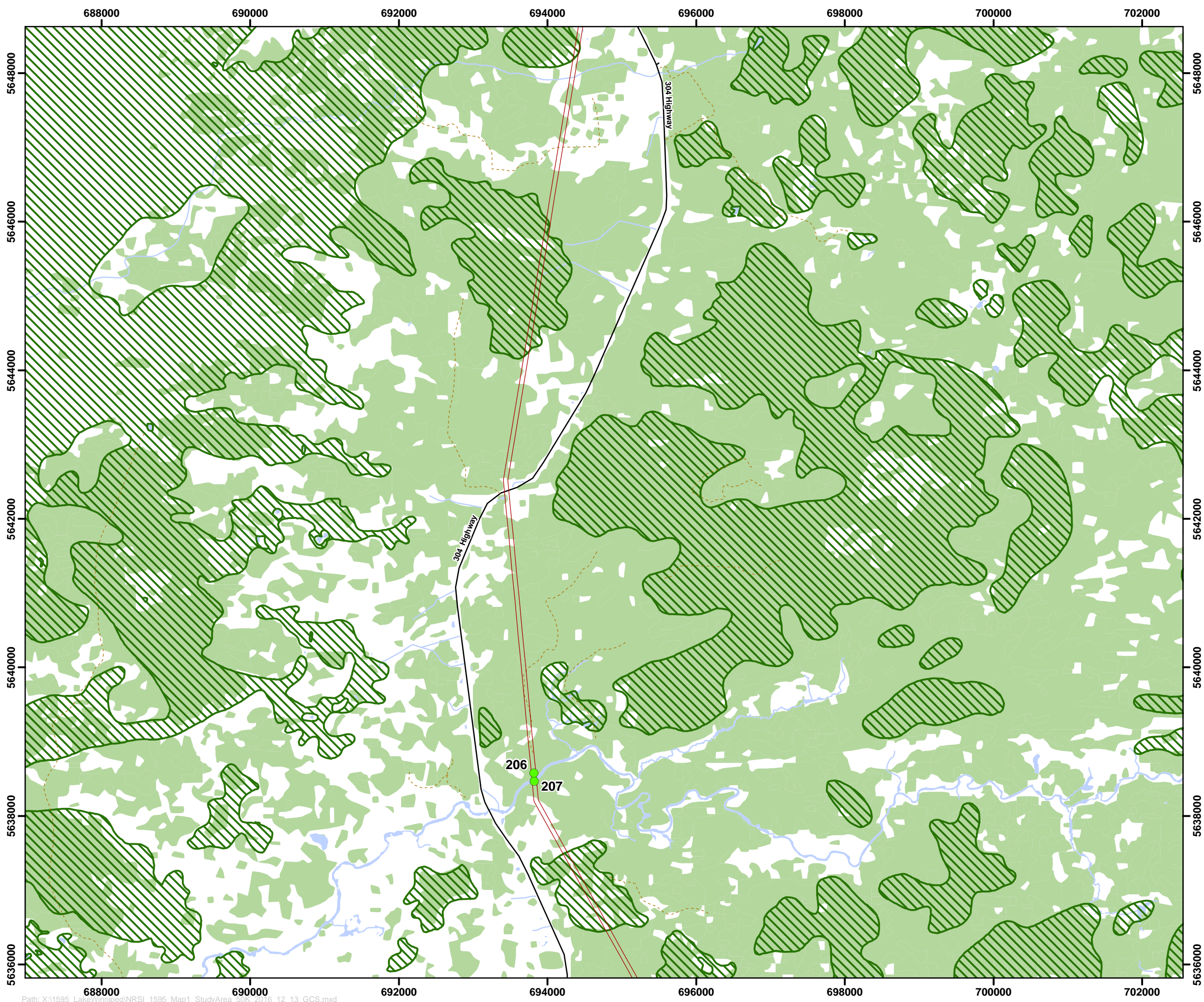
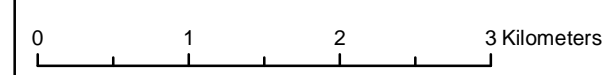
### Legend

- 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



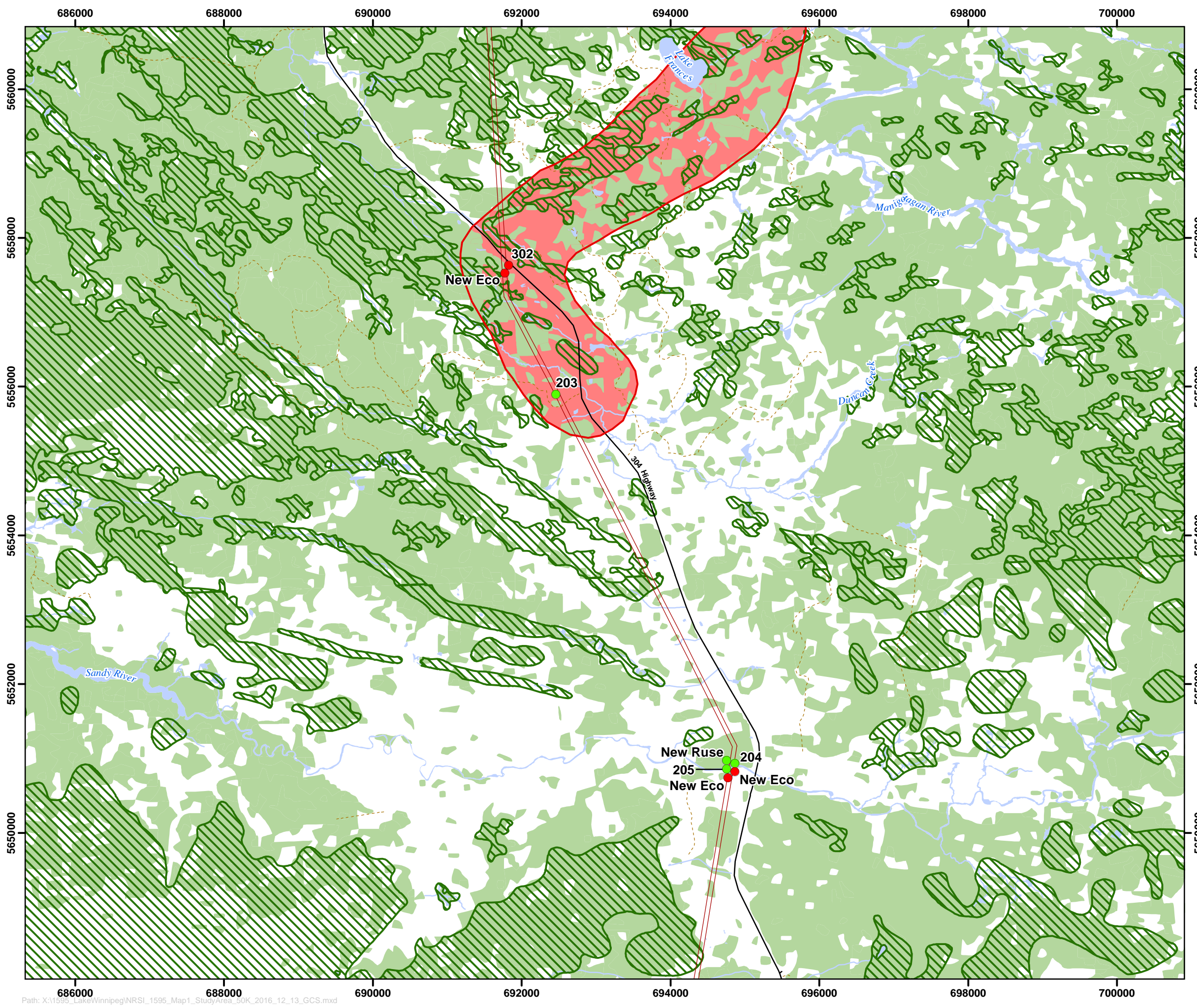
Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by CanVec Copyright: Natural Resources Canada.

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



# Lake Winnipeg East System Improvement Transmission Project

## 2016 Vegetation Biophysical Monitoring

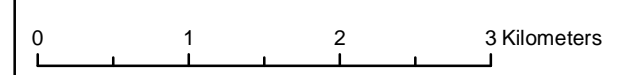


- Legend**
- Plant Gathering Survey Plot (LWE-Ruse)
  - Species of Conservation Concern (LWE-Eco)
  - Berry Harvest
  - Gathering Area
  - Planned Infrastructure (Disturbance Area)
  - Trail
  - Road
  - Watercourse
  - Waterbody
  - Wetland
  - Wooded area



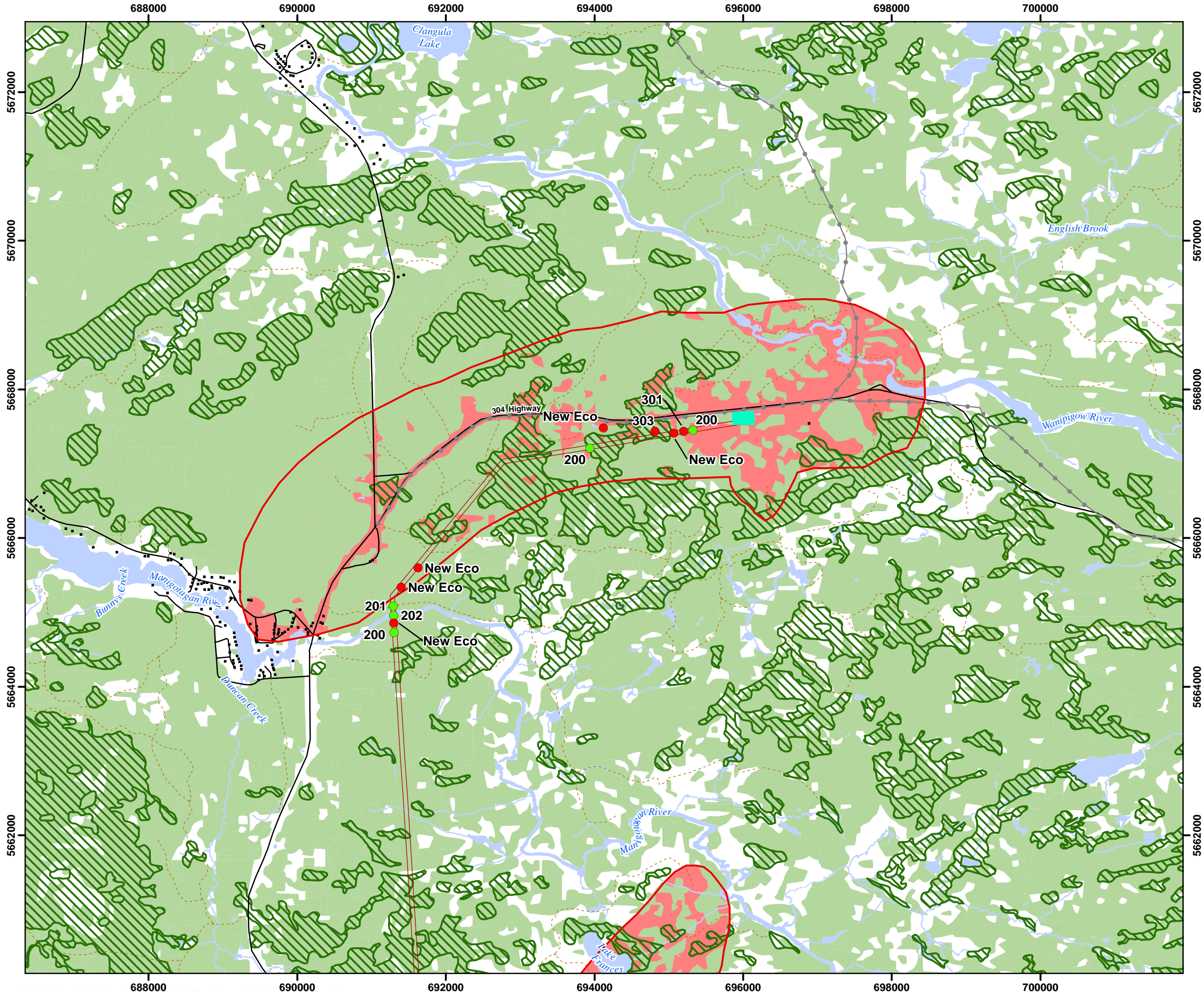
Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by CanVec Copyright: Natural Resources Canada.

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



# 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



Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by CanVec Copyright: Natural Resources Canada.

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



**APPENDIX I**  
Site Photographs

DSC04731 – Hooker's Orchid (*Platanthera hookeri*) at LWE-Eco-302 on July 8, 2016.



DSC04758 – Location of Dwarf Bilberry (*Vaccinium caespitosum*) population LWE-Eco-301 on July 9, 2016



DSC04707 – Swollen Sedge (*Carex intumescens*) LWE-Eco-304 on July 8, 2016.



DSC04740 – Wild Ginger (*Asarum canadense*) within LWE-Ruse-208 on July 9, 2016.



DSC04800 – Sweetflag (*Acorus americanus*) at LWE-Ruse-201 on July 10, 2016.

