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GOODLIGHT LP

Post Construction Monitoring Report

Goodlight Solar Project

A Monitoring Report in accordance with the commitments outlined in the project Natural Heritage Assessment.



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1.0

Project Information

In accordance with the commitments outlined in the Goodlight Natural Heritage Assessment (NHA) Environmental Impact Study (EIS) (Dillon Consulting Limited, 2012), one-year of post-construction amphibian monitoring was required to reassess significant amphibian breeding habitat located within 120 m of the project location. This includes habitat for Western Chorus Frog (*Pseudacris triseriata*).

The purpose of the post-construction monitoring was to reassess this amphibian breeding habitat previously evaluated as significant (ABH2) and confirm if this habitat are still being utilized at levels equal to pre-construction densities as recorded during initial 2011 studies.

1.1

Monitoring Strategy and Methods for Significant Amphibian Breeding Habitat

Table 12 (Environmental Effects Monitoring Plan) (see **Appendix A**) in the Goodlight NHA EIS overviews the requirements for one year of post-construction amphibian surveys to determine if species presence, abundance and richness is not significantly different from pre-construction levels. The monitoring was conducted according to the Marsh Monitoring Program methodology described in Section 6.5.2.1 of the NHA Evaluation of Significance Report (Dillon Consulting Limited, 2012) and is outlined in Section 2.0.

2.0

2015 Post-Construction Monitoring

2.1

Monitoring of Significant Amphibian Breeding Habitat (ABH2)

An area of amphibian breeding habitat (ABH2) 9.51 ha in size, identified based on ELC surveys and identification of appropriate habitat characteristics in delineated wetland areas during the NHA studies, was confirmed to be significant in the NHA submitted to the Ministry of Natural Resources and Forestry (MNRF).

2.1.1

Amphibian Monitoring Methods

During the initial pre-construction NHA studies, five (5) amphibian point counts were placed in proximity to or within the significant amphibian breeding habitat. The number and location of point counts used during the 2015 post-construction monitoring were identical to those from the pre-construction surveys. (see **Appendix B** - Figure 1 and photos in **Appendix C**).

Amphibian monitoring followed the Marsh Monitoring Program protocol (Bird Studies Canada, 2009). Three different surveys were conducted between April 15th and June 30th, with at least two weeks between each survey. Surveys began at least one half hour after sunset during evenings with a minimum night temperature of 5°C, 10°C and 17°C for each of the three respective surveys.

Each amphibian survey involved standing at a predetermined station (i.e., a candidate amphibian breeding habitat) and listening for amphibian calls. The calling activity of individuals estimated to be within 100 metres of the observation point was documented. All individuals beyond 100 metres were recorded as outside of the count circle and calling activity was not recorded. Calling activity was ranked using one of the following three abundance code categories:

- Code 1: Calls not simultaneous, number of individuals can be accurately counted
- Code 2: Some calls simultaneous, number of individuals can reliably be estimated
- Code 3: Calls continuous and overlapping, number of individuals cannot be estimated (i.e., chorus)

In areas where appropriate habitat existed, the areas were examined using non-intrusive methods (visual) for egg masses and amphibian larvae. The diversity and abundance of amphibian species observed was noted and considered during the evaluation of whether the habitat is not significantly different from pre-construction levels.

2.1.2

Amphibian Monitoring Results

Monitoring of amphibians at the Goodlight Project Site consisted of a series of three (3) surveys that were completed on April 27, May 29 and June 20, 2015. Conditions for the three surveys were determined to be appropriate according to the monitoring methods outlined above, and are summarized in **Table 1**.

TABLE 1: SURVEY DATES AND WEATHER CONDITIONS FOR AMPHIBIAN MONITORING AT GOODLIGHT

Date (2015)	Surveyors	Sunset	Start Time	End Time	Weather Conditions			
					Ambient Air Temperature (°C)	Wind (Beaufort Scale)	Cloud Cover (%)	Precipitation
April 27	Mike Wolosinecky	20:01	21:41	22:19	8.5	1	90	None
May 29	Jonathan Harris	20:48	21:18	21:39	25	1-2	90	None
June 20	Jonathan Harris	21:03	21:33	21:56	19	0	70	None

Results of the 2015 monitoring are presented in **Table 2** which also contains a comparison with the 2011 NHA results.

The criteria used to assess the significance of the habitat in the 2012 NHA Evaluation of Significance Report, was based on the *Significant Wildlife Habitat Ecoregion Criteria Schedules* (MNRF, 2012). Under the Ecoregion 6E Criteria Schedule, the presence of 3 or more species with at least 20 breeding individuals (adults, juveniles, eggs/larval masses) must be observed to consider the habitat 'significant'.

Using the data collected in 2015, the habitat was again evaluated using the 2012 criteria schedules. This information is summarized in **Table 2**.

TABLE 2: COMPARISON OF 2011 AND 2015 AMPHIBIAN MONITORING RESULTS

Habitat	Composition	Results of the 2011 NHA Survey	Significant	Not Significant	Results of the 2015 NHA Survey	Significant	Not Significant
ABH2	1.91 ha of Willow Swamp Thicket, 7.09 ha of Mineral Meadow Marsh, 0.28 of Bulrush Mineral Shallow Marsh and 1.23 ha of Mixed Shallow Aquatic	<p>During amphibian breeding surveys in 2011, the call of six amphibian species were heard, including:</p> <ul style="list-style-type: none"> American Toad (5 males) Spring Peeper (24 males) Green Frog (13 males) Northern Leopard Frog (3 males) Western Chorus Frog (13 males) Gray Treefrog (18 males) <p>No individuals (adults or tadpoles) or egg masses were observed within this habitat.</p>	✓	-	<p>During amphibian breeding surveys in 2015, the call of five amphibian species were heard, including:</p> <ul style="list-style-type: none"> Wood Frog (1 male) Spring Peeper (12 males) Western Chorus Frog (4 males) Gray Treefrog (7 males) Green Frog (4 males) <p>Three egg masses were observed within this habitat and were either Spring Peeper or Western Chorus Frog egg masses.</p>	✓	-

During the 2015 surveys more than 20 breeding individuals comprised of five amphibian species were observed in ABH2. The species richness at this location was found to be similar to that observed in 2011.

Based on this, it appears that the species presence, abundance and richness for amphibians in ABH2 is slightly lower than that of pre-construction levels, but is still considered significant according to the criteria schedules. Although there was one fewer species heard calling and fewer numbers of individuals than pre-construction results, there were four egg masses observed in the 2015 surveys whereas none were observed in the 2011 studies.

Historical climate data was examined for overall precipitation received by the project area for 2011, and 2015 (Canadian Climate Data, Environment Canada). The data suggests that the Goodlight Solar Project Site received higher amounts of rainfall in the month preceding the pre-construction amphibian monitoring surveys in 2011 than in 2015, which may have had an effect on amphibian abundance in the area in the subsequent months. This data is summarized in **Table 3**.

TABLE 3: COMPARISON OF 2011 AND 2015 PRECIPITATION RECORDED AT UDORA WEATHER STATION

Time Period	2011 Precipitation (mm)	2015 Precipitation (mm)
Month of March	55.0	12.8
Month of April	81.0	48.6
Month of May	81.6	55.6
Month of June	111.0	186.0
TOTAL	328.6	303.0

3.0

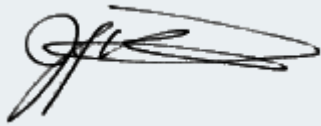
Summary

To meet the commitments outlined in the Goodlight NHA EIS (Dillon Consulting Limited, 2012), one-year of post-construction monitoring was carried out at the facility to assess the longevity of the significant wildlife habitat evaluated prior to the project's construction. The purpose of the post-construction monitoring was to determine if species presence, abundance and richness was significantly different from pre-construction levels for the habitat evaluated as significant Amphibian Breeding Habitat (ABH2).

The amphibian breeding habitat, ABH2, in the Goodlight Solar Project was evaluated as significant based on the data collected prior to construction in 2011 and was also evaluated as significant based on post-construction monitoring in 2015. This includes habitat for Western Chorus Frog, which remained significant following construction.

As committed to in the NHA EIS (Dillon Consulting Limited, 2012) and required by Condition L of the Renewable Energy Approval (REA#3968-9AHRNA), GoodLight LP is required to submit this report to the Director, MOECC and the MNRF for information purposes only. Should the MNRF wish to discuss the results of this report further, the NHA EIS commits to consultation only.

If you have any questions about the content of this report, please contact Jennifer Petruniak at 416-229-4647, Ext. 2432 or at jpetruniak@dillon.ca.



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Project Manager

4.0

References

- Bird Studies Canada. 2009. Marsh Monitoring Program Participant's Handbook for Surveying Amphibians, 2009 Edition. 13pages. Published by Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency. February 2009.
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- Ontario Ministry of Natural Resources. February 2012. Significant Wildlife Habitat Ecoregion Criteria Schedules. Addendum to Significant Wildlife Habitat Technical Guide. Working Draft. 73pp.

Appendix A

Environmental Effect Monitoring Plan

Table 12: Environmental Effects Monitoring Plan

Potential Positive/Negative Environmental Effects		Significant/ Provincially Significant Natural Feature(s) Affected by Activity	Performance Objective	Mitigation Measures	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional								
Site Preparation and Construction Activities									
Removal of 1.95 ha of Deciduous Cultural Woodland and Sugar Maple-White Ash Deciduous Forest during clearing, grubbing and grading of project location.	<ul style="list-style-type: none">Loss of breeding and foraging habitatReduction of habitatDisplacement of species during construction and operation of the facility; decrease in species abundance and diversityChange in land topography associated with vegetation clearing, grubbing and subsequent surficial gradingChange in surface water run-off volumes/patternsPotential to changes in water qualityIncreased vulnerability of cleared areas to invasion by non-native species	<div>Assumed Provincially Significant Wetland Unit 1 (unevaluated wetland and Grass Creek PSW)</div> <div>Assumed Provincially Significant Wetland Unit 4</div> <div>Significant Amphibian Breeding Habitat (ABH2)</div> <div>Significant Open Country Breeding Bird Habitat (OCBB2)</div> <div>Significant Woodland A</div> <div>Generalized Candidate Significant Wildlife Habitat</div>	<ul style="list-style-type: none">Restore woodland area removed and functions elsewhere in the region in partnership with a conservation organizationMaintain overall site drainage patternsNo excessive mortality (i.e., >50%) of tree species exposed to edge effects after vegetation clearingEnsure surface water flow is maintained to the wetland areas to prevent abnormal water level fluctuationsMinimize soil exposure and erosion to adjacent landsMinimize mortality to breeding birds,	<div><u>Erosion and Sediment Control</u><ul style="list-style-type: none">Minimize soil exposureInstall erosion and sediment control measures prior to vegetation clearing, grubbing and grading to prevent mobilization of sediment and other contaminants from the project location into the surrounding landscapeRestrict vegetation clearing to only within project locationConstruction equipment and machinery travelling on Eldon Station Road or Sandringham Road should be free of debris; deposition of soil on either road way from construction vehicles should be minimized. Should street sweeping be required, efforts to include sweeping soil deposited on roadway away from natural features</div> <div><u>Stormwater Management</u><ul style="list-style-type: none">Develop and implement a flow management plan to ensure drainage patterns are not significantly altered from existing conditions due to road drainage, reduction in surface permeability, etc.</div> <div><u>Vegetation Considerations</u><ul style="list-style-type: none">Limit the use of heavy machinery within 5 m of the dripline of the woodland/ swamp wetland to</div>	<div>Monitor erosion and sediment control measures regularly during site preparation and construction</div> <div>Monitor effectiveness of flow management measures; ensure flow is free of sedimentation</div> <div>Visual assessment of edge vegetation</div> <div>One year post-construction amphibian surveys to determine species presence, abundance and richness is not significantly different from pre-construction levels</div>	<div>Around the perimeter of project location where ESC measures are implemented</div> <div>Monitor for evidence of erosion/ sedimentation to the wetland areas</div> <div>Amphibian surveys at ABH2 according to Marsh Monitoring Protocol</div>	<div>Monitor ESC measures regularly during construction</div> <div>Post-construction ESC monitoring to occur monthly or after rain events 10 mm or greater until vegetation is re-established</div> <div>Amphibian surveys to be conducted during one breeding season post-construction</div>	<div>ESC inspection checklist log compiled for each monitoring event</div> <div>Amphibian survey results to be submitted to the MNR for information purposes only</div>	<div>Repair deficiencies in ESC structures as soon as possible upon notification of breach in E&SC structure and buffer fencing</div> <div>Appropriate replacement of wetland vegetation in Wetland 1 and Wetland 4 if a high degree of sedimentation occurs or excessive (more than 50%) vegetation mortality is observed</div> <div>If use significant ABH by amphibian species is not documented at levels equal to pre-construction densities, consultation with the MNR will be undertaken to discuss results.</div>

Potential Positive/Negative Environmental Effects		Significant/ Provincially Significant Natural Feature(s) Affected by Activity	Performance Objective	Mitigation Measures	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional								
			breeding amphibians and other wildlife species	prevent soil compaction <ul style="list-style-type: none"> Re-vegetation cleared lands with native low shrub and/or grassland species <u>Timing</u> <ul style="list-style-type: none"> Limit vegetation clearing outside of the core bird breeding period (May 1 to August 1) to avoid disturbance to breeding birds; if any vegetation clearing must occur during this period a qualified biologist will conduct nest searches prior to clearing <u>Wildlife</u> <ul style="list-style-type: none"> Check engines regularly for snakes before machinery use Visual monitoring for wildlife species and avoidance where encountered 					
Removal of 23.14 ha of Open Pasture and 21.05 ha of Old Field Meadow during clearing and grading of project location.	<ul style="list-style-type: none"> Loss of breeding and foraging habitat Reduction of habitat Change in land topography associated with vegetation clearing, grubbing and subsequent grading Change in surface water run-off volumes/patterns Potential to changes in water quality Increased vulnerability of cleared areas to invasion by non-native species 	All wetlands Significant Woodland A Significant Open Country Breeding Bird Habitat (OCBB2) Significant Amphibian Breeding Habitat (ABH2) Assumed Significant Open Country Breeding Bird Habitat	Eliminate incidental mortality of grassland/open country breeding birds Maintain surface water flow and water quality to ABH2*, ABH5*, ABH6*, ABH7*, ABH8*	<u>Erosion and Sediment Control</u> <ul style="list-style-type: none"> Minimize soil exposure Install erosion and sediment control measures prior to vegetation clearing, grubbing and grading to prevent mobilization of sediment and other contaminants from the project location into the surrounding landscape Restrict vegetation clearing to only within project location Construction equipment and machinery travelling on Eldon Station Road or Sandringham Road should be free of debris; deposition of soil on either road way from construction vehicles should be minimized. Should street sweeping be required, efforts to include 	Monitor erosion and sediment control measures regularly during site preparation and construction Monitor effectiveness of flow management measures; ensure flow is free of sedimentation Visual assessment of edge vegetation One year of post-construction amphibian surveys to determine species presence, abundance and richness	Around the perimeter of project location where ESC measures implemented Monitor for surface water run-off flow and evidence of erosion to the wetland areas supporting significant ABH	Monitor ESC measures regularly during construction Post-construction ESC monitoring to occur monthly or after rain events 10 mm or greater until vegetation is re-established	ESC inspection log compiled for each monitoring event Amphibian survey results to be submitted to the MNR for information purposes only Summary provided to the MNR of grassland bird encounters during construction phase to be provided	Repair deficiencies in ESC structures as soon as possible upon notification of breach in E&SC structure and buffer fencing Appropriate replacement of wetland vegetation in amphibian breeding habitats if a high degree of sedimentation occurs or excessive (more than 50%) vegetation mortality is observed per m ² If use of breeding habitats by amphibian is not documented at levels equal




Potential Positive/Negative Environmental Effects		Significant/ Provincially Significant Natural Feature(s) Affected by Activity	Performance Objective	Mitigation Measures	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional								
		(OCBB1) Amphibian Breeding Habitat (ABH5*, ABH6*, ABH7*, ABH8*) Turtle Nesting Area* Turtle Over- wintering Area* Assumed Significant Habitat for Common Nighthawk (CN1) Generalized Candidate Significant Wildlife Habitat		sweeping soil deposited on roadway away from natural features <u>Stormwater Management</u> <ul style="list-style-type: none">Develop and implement a flow management plan to ensure drainage patterns are not significantly altered from existing conditions due to road drainage, reduction in surface permeability, etc. <u>Timing</u> <ul style="list-style-type: none">Limit vegetation clearing outside of the core bird breeding period (May 1 to August 1) to avoid disturbance to breeding birds; if any vegetation clearing must occur during this period a qualified biologist will conduct nest searches prior to clearing <u>Wildlife</u> <ul style="list-style-type: none">Visual monitoring for wildlife species and avoidance where encountered	is not significantly different from pre- construction levels Three years of post- habitat creation breeding bird surveys to determine species presence, abundance and richness in provided grassland habitat. All monitoring methodology is provided in Appendix A of the NHA EIS.	Amphibian surveys according to Marsh Monitoring Protocol Breeding bird surveys to occur within the 21.05 ha of created/ enhanced grassland habitat	Amphibian surveys to be conducted during one breeding season post- construction Breeding bird surveys to be conducted during three breeding seasons post- habitat creation	information purposes only Annual summary of breeding bird data provided to the MNR for information purposes only	to pre-construction densities, consultation with the MNR will be undertaken to discuss results
Disruption of underground roots along woodland edge during installation of perimeter fence	▪ Potential to destabilize trees and other vegetation if root systems are damaged	Significant Woodland A	Maintain woodland edge	<ul style="list-style-type: none">Maintain a buffer from woodland vegetation of at least 5 m from the dripline of woodland edge speciesMaximize the distance of all construction equipment used from the woodland edge; operate machinery in the project location area only	Visual assessment of edge vegetation	Woodland edges where fencing is to be installed	Biweekly during the growing season	Inspection checklist log compiled for each monitoring event Submitted to the MOE at the end of the construction phase	Health assessment by a qualified biologist, arborist or forester if visual evidence suggests dieback of the woodland edge. Edge of woodland to be maintained by re- planting at a 1:1 ratio where hazard trees are required to be removed

*these natural features are treated as significant until appropriate studies can be undertaken pre-construction. Should these features be evaluated significant, mitigation measures and monitoring commitments will be implemented as indicated.

Appendix B

Figures

Goldlight Figure 1: Habitat and Survey Locations

-  2015 Significant Amphibian Breeding Habitat
-  2011 Significant Amphibian Breeding Habitat
-  Local Road








2011 Point Counts

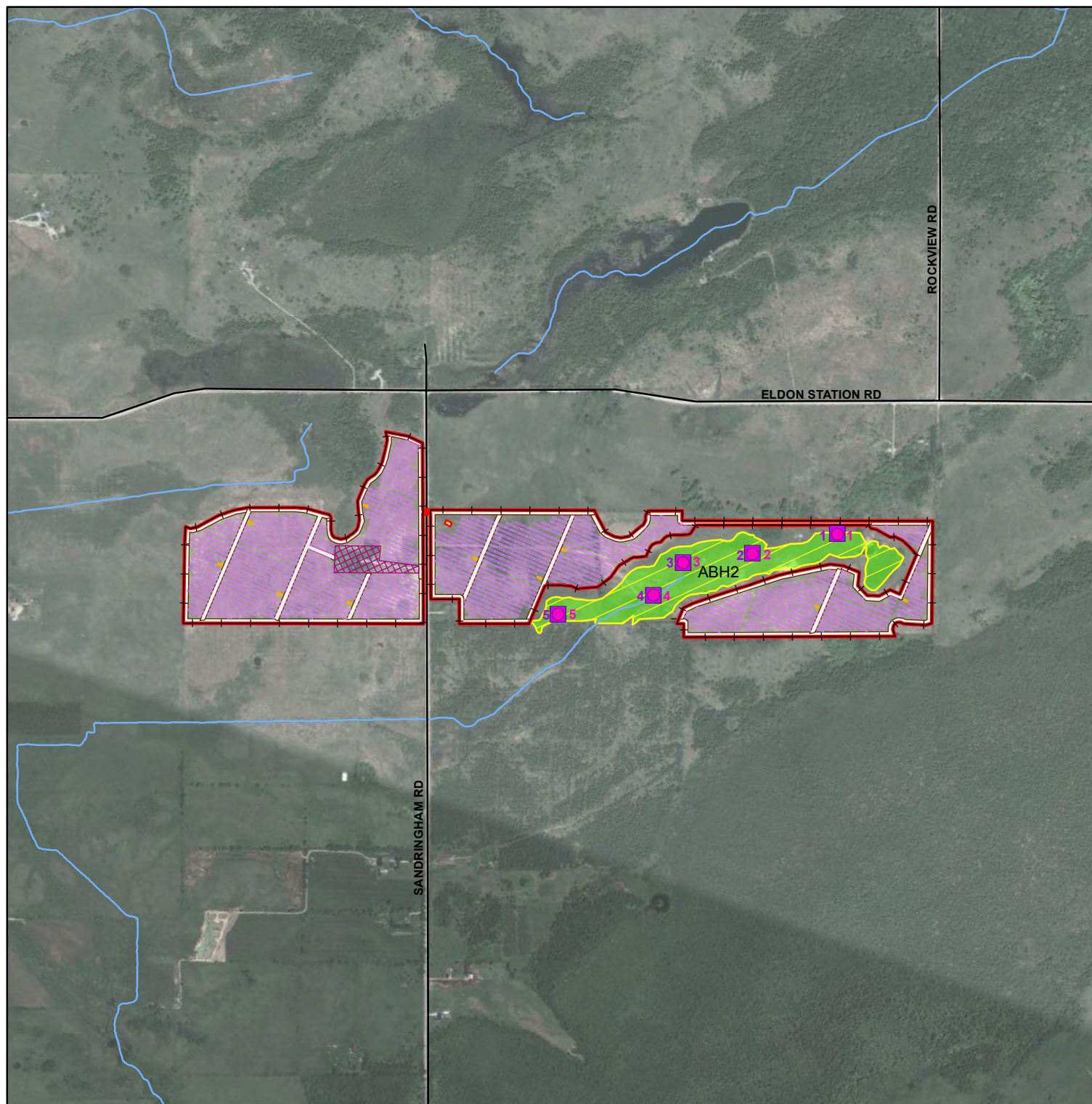
-  2011 Amphibian Monitoring

2015 Point Counts

-  2015 Amphibian Monitoring

Solar Park Components

-  Fence
-  Project Location
-  Inverter Unit
-  Substation
-  Laydown Area
-  Solar Panels and Racks
-  Access Road



1:15,000

0 100 200 300 m

Appendix C

Habitat Photographs

Amphibian Breeding Habitat

Amphibian
Breeding
Habitat 2
(ABH2)

May 29, 2015



Amphibian
Breeding
Habitat 2
(ABH2)

May 29, 2015



Amphibian Breeding Habitat

Amphibian
Breeding
Habitat 2
(ABH2)

May 29, 2015



Amphibian
Breeding
Habitat 2
(ABH2)

May 29, 2015



Amphibian Breeding Habitat

Amphibian
Breeding
Habitat 2
(ABH2)

May 29, 2015



Amphibian
Breeding
Habitat 2
(ABH2)

May 29, 2015



