Biophysical Impact Assessment for the Ascension Lands



Prepared by:

Westhoff Engineering Resources, Inc.

Land & Water Resources Management Consultants

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Prepared for:

Highfield Land Management

File: WER116-77

Prepared by:

Westhoff Engineering Resources, Inc.

Suite 601 1040 – 7th Avenue SW Calgary, Alberta T2P 3G9

Phone: 403.264.9366 Fax: 403.264.8796 Email: <u>werinc@westhoff.ab.ca</u>

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Corporate Authorization

This document entitled Biophysical Impact Assessment for the Ascension Lands was prepared by Westhoff Engineering Resources, Inc. It is intended for the use of Highfield Land Management and approval authorities for which it has been prepared. The contents of the report represent the best judgment of Westhoff Engineering Resources, Inc. based on information available at the time of preparation. Any use a third party makes of the report, or reliance on or decisions made based on it, are the responsibilities of such third parties. Westhoff Engineering Resources, Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the report.

Duplication or distribution of this report or any portion hereof is forbidden without approval from Westhoff Engineering Resources, Inc.

Unauthorized use of the concepts and strategies reported in this document and any accompanying drawings and/or figures is forbidden. They are the sole intellectual property of the author.

Warne Bre

Report prepared by Don Hodges, B.A. Geog. and Wayne Bessie, M.Sc. P. Biol. QWSP

Report reviewed by Karen Oldershaw, M. E. Des., P. Biol. QWSP



Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page iii

Executive Summary

Highfield Land Management is proposing the Ascension development in Rocky View County (SW/SE-19-25-2 W5M). Westhoff Engineering Resources Inc. (Westhoff) was retained to prepare a Biophysical Impact Assessment (BIA) for the Ascension Lands. The BIA describes existing environmental conditions, the potential impacts of the development, and mitigation measures to reduce these impacts. The significance of identified impacts is also evaluated along with the potential for cumulative effects.

Existing Conditions

The Project Site is located within the Parkland Natural Region and Foothills Parkland Natural Subregion. The native grassland associated with the Foothills Parkland Natural Subregion is no longer represented within the Site, although patches of native vegetation remain along a central watercourse.

Terrain conditions within the Project Site are variable with rolling uplands, several wetlands and a natural watercourse running through the center of the Site. The watercourse enters the Site in the north as a low open swale and then develops into a relatively steep narrow ravine as it drains south and west, where it leaves the Site. Slopes are relatively steep (15-25% or greater) along the southern portion of the watercourse and in two associated ravines on its north boundary. Dunvargan soils consisting of Orthic Black and Rego Black Chernozems are dominant throughout, with Orthic Humic Gleysols found in low-lying areas.

A total of four naturally occurring wetlands are identified within the Project Site: two Temporary, one Swamp, and one Permanent Shallow Open Water wetland. The central creek is classified as a Transitional watercourse and the two smaller associated ravines to the north are classified as ephemeral watercourses. Road construction has impacted Wetland 1, located along the southern boundary, and Wetland 4, located along the central watercourse. Wetlands 2 and 3 appear to be undisturbed.

A range of wildlife species have the potential to occur within the Project Site. We recorded incidental observations of 22 species during field surveys; two are listed provincially as Sensitive. Wildlife are likely to use the central watercourse valley as a natural route for travelling from the Site to areas west, including the Bow River Valley. However, there are considerable barriers to wildlife movement on the north and east boundaries due to Bow Valley Trail and 12 Mile Coulee Road.

We applied provincial Environmentally Significant Areas (ESA) criteria to evaluate natural features on the landscape. The central watercourse and associated wetland and riparian zone is considered an ESA because it is a natural watercourse and because it provides natural habitat conditions for wildlife. None of the remaining wetlands meet the provincial criteria for Aquatic ESAs.

© Westhoff Engineering Resources, Inc.

Potential Impacts and Mitigations

The potential impacts of the proposed development were assessed with reference to a concept for development provided to Westhoff by Brown & Associates Planning Group in August 2020.

Potential Impacts include:

- loss of soil from compaction, removal, erosion and/or admixing;
- sediment runoff to adjacent wetlands, watercourses and surrounding areas;
- accidental spills of fuels, chemicals, and other potentially hazardous materials;
- loss or alteration of vegetation, including native plant communities;
- loss of 2 out of 4 naturally occurring wetlands;
- local loss of portions of Wetland 4 at road and utility crossings;
- potential changes in the hydrology of Wetland 1 and Wetland 4;
- potential impacts to the central watercourse due to the introduction of stormwater, including bank erosion and possible reduction in water quality;
- damage, disturbance, and/or loss of individual wildlife species and their residence; and
- changes in local wildlife diversity.

The following mitigation measures will be implemented to reduce, eliminate, or control the potential negative impacts of the proposed development.

- Erosion and Sediment Control (ESC) Plan to limit or control deleterious substances leaving the Site or entering area water bodies;
- Environmental Protection Plan (EPP) to manage potential environmental impacts resulting from construction;
- Landscape and Weed Management Program to reduce post-development impacts to native plant communities and wildlife habitat;
- Setbacks applied to both the central watercourse and Wetland 1 for the purposes of pollution prevention and slope stability;
- Stormwater management strategies to mitigate for potential impacts to the central watercourse and Wetland 1;
- A Wetland Management Plan to document the detailed approach to mitigating potential impacts to Wetlands 1 and 4;

Page iv

• In-lieu payment to the Province (wetland replacement), as per the Alberta Wetland Mitigation Directive, for Wetlands 2 and 3;

© Westhoff Engineering Resources, Inc.

- A Landowner's Manual to educate area residents on what they can do to maintain the health of natural open spaces over the long-term and how to avoid conflicts with wildlife; and
- A monitoring program to document the implementation and success of the ESC Plan and EPP.

Ideally, stripping and grading will be completed outside the critical time period for many wildlife species: approximately April 1 to August 31. If stripping and grading within the critical time period cannot be avoided, pre-construction surveying will be conducted to avoid impacting wildlife and wildlife residences, in particular active breeding sites.

Residual Impacts and Significance

We predict that the proposed development will have residual impacts after mitigation measures are implemented. These residual impacts are the loss of upland plant communities, wetlands and associated wildlife habitat, and the loss of individual wildlife species.

At the time this BIA was prepared, there was no formal process, or available provincial or municipal criteria, for determining what qualifies as a significant residual loss of native plant communities. As per the Bearspaw Area Structure Plan, (adopted June 1994), native plant communities are not automatically acquired and/or protected from development. The current concept plan retains and integrates a considerable portion of the natural plant communities and associated topography within the area.

The proposed development will result in the permanent loss of 2 of the 4 wetlands. Wetland replacement is one of multiple accepted approaches to managing loss of wetlands on both provincial and municipal scales. We conclude this residual impact is not significant provided wetland loss is off set through wetland replacement applying accepted provincial standards.

Wildlife fatalities are a residual impact of the development, particularly as a result of stripping and grading. In general, we would consider a significant residual impact on wildlife to be the damage or loss of a listed species. For the Ascension Lands, stripping and grading is expected to occur outside of the breeding season when less mobile juveniles are present: April 1 to August 31. As a result, we anticipate the fatality risk of listed species outside this breeding season to be low. Therefore, no significant residual impacts to wildlife are expected.

Cumulative Effects

We considered the potential for cumulative effects on wetlands and water resources resulting from the proposed development. To date, the cumulative effects of development on wetlands have been mitigated primarily through the Province's replacement program, as will be the case for this Project. Overall, we anticipate that the cumulative effects of past, current and future land use and activity in this region will be managed through the retention of wetlands within the Project Site coupled with the application of provincially approved wetland replacement measures.

Page v

© Westhoff Engineering Resources, Inc.

Westhoff	Biophysical Impact Assessment for
Engineering	the Ascension Lands
 D	Final Report
Resources , Inc.	August 31, 2020

We identify water resources when describing potential cumulative effects even though projectrelated impacts on water were not assessed in the BIA. The Bow River Basin Council identifies the most significant challenges in this sub-basin as the effective flow management of the Bow River downstream of the Bearspaw Dam and management of stormwater runoff.

We anticipate the potential local impacts on water will be addressed through other studies pertaining to stormwater management. Provided best management practices are implemented that meet available municipal and provincial standards, the proposed development is not expected to contribute to cumulative adverse effects on water resources in the sub-basin as a whole.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Table of Contents

1.1 Purpose 1 2 Methods 3 2.1 Review of Existing information 3 2.1.1 Alberta Conservation Information Management System (ACIMS) 3 2.1.2 Previous Wildlife Observations 3 2.1.3 Agricultural Region of Alberta Soil Inventory Database 3 2.1.4 Historical Aerial Photographs and Precipitation Data 3 2.1.5 Surface Hydrology 5 2.2.6 Field Sampling 5 2.2.7 Rare Vascular Plants and Rare Ecological Communities 5 2.2.8 Wetland Identification and Delineation 7 2.2.5 Wetland Identification and Delineation 7 2.2.6 Wetland Identification 8 2.2.7 Watercourse Identification 8 2.2.7 Watercourse Identification 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monintoring 10<	1	Introduction1		
2 Methods 3 2.1 Review of Existing information 3 2.1.1 Alberta Conservation Information Management System (ACIMS) 3 2.1.2 Previous Wildlife Observations 3 2.1.3 Agricultural Region of Alberta Soil Inventory Database 3 2.1.4 Historical Aerial Photographs and Precipitation Data 3 2.1.5 Surface Hydrology 5 2.2.7 Field Sampling 5 2.2.8 Rare Vacular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.2.4 Wetland Identification and Delineation 7 2.5.5 Wetland Functional Assessment 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Classification 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance		1.1	Purpose	1
2.1 Review of Existing Information 3 2.1.1 Alberta Conservation Information Management System (ACIMS) 3 2.1.2 Previous Wildlife Observations 3 2.1.3 Agricultural Region of Alberta Soil Inventory Database 3 2.1.4 Historical Aerial Photographs and Precipitation Data 3 2.1.5 Surface Hydrology 5 2.2.6 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.3 Wildlife Observations 6 2.2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Identification 8 2.2.6 Wetland Identification 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Identification 8 2.2.8 Watercourse Classification 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.9 Description of Cumulative Eff	2	Meth	ods	3
2.1.1 Alberta Conservation Information Management System (ACIMS) 3 2.1.2 Previous Wildlife Observations 3 3.1.3 Agricultural Region of Alberta soil Inventory Database 3 2.1.4 Historical Aerial Photographs and Precipitation Data 3 2.1.5 Surface Hydrology 5 2.2.7 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.4.4 Wetland Identification and Delineation 7 2.2.5 Wetland Functional Assessment 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Dete		2.1	Review of Existing Information	3
2.1.2 Previous Wildlife Observations 3 2.1.3 Agricultural Region of Alberta Soil Inventory Database 3 2.1.4 Historical Aerial Photographs and Precipitation Data 3 2.1.5 Surface Hydrology 5 2.2 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.4.4 Wetland Identification and Delineation 7 2.2.5 Wetland Classification 8 2.2.6 Wetland Classification 8 2.2.7 Watercourse Classification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.7 Determining Significance of Residua			2.1.1 Alberta Conservation Information Management System (ACIMS)	3
2.1.3 Agricultural Region of Alberta Soil Inventory Database 3 2.1.4 Historical Aerial Photographs and Precipitation Data 3 2.1.5 Surface Hydrology 5 2.2 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Widlife Observations 6 2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Identification 8 2.2.7 Wateracourse Identification 8 2.2.8 Watercourse Identification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Identification of Cumulative Effects			2.1.2 Previous Wildlife Observations	3
2.1.4 Historical Aerial Photographs and Precipitation Data. 3 2.1.5 Surface Hydrology 5 2.2 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.4.4 Wetland Identification and Delineation 7 2.2.5 Wetland Identification 8 2.2.6 Watercourse Identification 8 2.2.7 Watercourse Identification 9 2.8 Watercourse Identification 9 2.4 Environmentally Significant Areas 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.9 Description of Cumulative Effects 10 3 Natural Region 11			2.1.3 Agricultural Region of Alberta Soil Inventory Database	3
21.5 Surface Hydrology 5 2.2 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Classification 8 2.2.6 Wetland Functional Assessment 8 2.2.6 Wetland Classification 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Classification 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.9 Description of Cumulative Effects 10 2.9 Description of Cumulative Effects 11 3.1 Natural Region 11 3.2 <td></td> <td></td> <td>2.1.4 Historical Aerial Photographs and Precipitation Data</td> <td>3</td>			2.1.4 Historical Aerial Photographs and Precipitation Data	3
2.2 Field Sampling 5 2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.4 Wetland Identification and Delineation 7 2.5 Wetland Functional Assessment 8 2.6 Wetland Functional Assessment 8 2.7 Watercourse Identification 8 2.8 Watercourse Classification 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 2.9 Description of Cumulative Effects 10 3 Austoria and Rare Ecological Communities 14 3.4 Upland Plant Communities 14 3.4 Upland Plant Communities 18 3.7 Introduced Plants 17 3.6			2.1.5 Surface Hydrology	5
2.2.1 Plant Community Identification 5 2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Identification 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 9 2.3 Watercourse Identification 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Communities 14 3.4 Upland Plant Communities 14 3.7<		2.2	Field Sampling	5
2.2.2 Rare Vascular Plants and Rare Ecological Communities 5 2.2.3 Wildlife Observations 6 2.2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Classification 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Identification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.9 Description of Cumulative Effects 10 2.9 Description of Cumulative Effects 10 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.7 Wetland Crigin and Disturbance 19 3.7.3 Wetland Functional Assessment 22			2.2.1 Plant Community Identification	5
2.2.3 Wildlife Observations 6 2.2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Classification 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Classification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.9 Description of Cumulative Effects 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.7 Wetland Grigin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 <td< td=""><td></td><td></td><td>2.2.2 Rare Vascular Plants and Rare Ecological Communities</td><td>5</td></td<>			2.2.2 Rare Vascular Plants and Rare Ecological Communities	5
2.2.4 Wetland Identification and Delineation 7 2.2.5 Wetland Classification 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Classification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 18 3.7.1			2.2.3 Wildlife Observations	6
2.2.5 Wetland Classification 8 2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Identification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetland Grigin and Disturbance <td></td> <td></td> <td>2.2.4 Wetland Identification and Delineation</td> <td>7</td>			2.2.4 Wetland Identification and Delineation	7
2.2.6 Wetland Functional Assessment 8 2.2.7 Watercourse Identification 8 2.2.8 Watercourse Classification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Invertory 18 3.7.2 Wetland Functional Assessment 22 3.8 Watercourses 23			2.2.5 Wetland Classification	8
2.2.7 Watercourse Identification 8 2.2.8 Watercourse Classification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetland Grigin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Wat			2.2.6 Wetland Functional Assessment	8
2.28 Watercourse Classification 9 2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetlands 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 3.10 Wildli			2.2.7 Watercourse Identification	8
2.3 Public Lands Evaluation 9 2.4 Environmentally Significant Areas 9 2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetland S 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 3.10 <td></td> <td></td> <td>2.2.8 Watercourse Classification</td> <td>9</td>			2.2.8 Watercourse Classification	9
2.4 Environmentally Significant Areas		2.3	Public Lands Evaluation	9
2.5 Identification of Impacts 10 2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 </td <td></td> <td>2.4</td> <td>Environmentally Significant Areas</td> <td>9</td>		2.4	Environmentally Significant Areas	9
2.6 Mitigation Measures 10 2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetlands 18 3.7.3 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 3.10 Wildlife 23 3.10 Wildlife 23 3.10 Wildlife 23	2.5 Identification of Impacts			
2.7 Determining Significance of Residual Impacts 10 2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 3.10 Wildlife 23 3.10 Wildlife 23 3.10 Wildlife 23		2.6	Mitigation Measures	
2.8 Monitoring 10 2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7.1 Inventory 18 3.7.2 Wetlands 18 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc.		2.7	Determining Significance of Residual Impacts	
2.9 Description of Cumulative Effects 10 3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		2.8	Monitoring	
3 Existing Environment 11 3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		2.9	Description of Cumulative Effects	
3.1 Natural Region 11 3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc.	3	Existi	ng Environment	11
3.2 Landform, Hydrology and Soils 11 3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc.		3.1	Natural Region	
3.3 Historical Disturbance and Land Use 14 3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		3.2	Landform, Hydrology and Soils	
3.4 Upland Plant Communities 14 3.5 Introduced Plants 17 3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		3.3	Historical Disturbance and Land Use	14
3.5 Introduced Plants. 17 3.6 Rare Plants and Rare Ecological Communities. 18 3.7 Wetlands. 18 3.7.1 Inventory. 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses. 23 3.9 Public Lands 23 3.10 Wildlife. 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		3.4	Upland Plant Communities	14
3.6 Rare Plants and Rare Ecological Communities 18 3.7 Wetlands 18 3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		3.5	Introduced Plants	
3.7 Wetlands		3.6	Rare Plants and Rare Ecological Communities	
3.7.1 Inventory 18 3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		3.7	Wetlands	
3.7.2 Wetland Origin and Disturbance 19 3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		•	3.7.1 Inventory	
3.7.3 Wetland Functional Assessment 22 3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii			3.7.2 Wetland Origin and Disturbance	
3.8 Watercourses 23 3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii			3.7.3 Wetland Functional Assessment	22
3.9 Public Lands 23 3.10 Wildlife 23 © Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc. Page vii		3.8	Watercourses	23
3.10 Wildlife		3.9	Public Lands	23
© Westhoff Engineering Resources, Inc. Page vii Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc.		3.10	Wildlife	23
Distribution of this document or any portion thereof is forbidden without approval from Westhoff Engineering Resources, Inc.	©ν	Vesthof	f Engineering Resources, Inc.	Page vii
WED116 77	Dist	ributio	n of this document or any portion thereof is forbidden without approval from Westhoff Engineerir	ng Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

	3.11	Landscape Connectivity	.25
	3.12	Environmentally Significant Areas	.26
4	Ident	ification of Impacts	26
	4.1	Impacts to Soils, Terrain and Surface Hydrology	.29
	4.2	Loss or Alteration of Plants and Plant Communities	.29
	4.3	Loss or Alteration of Watercourses and Wetlands	.29
	4.4	Loss or Disturbance of Wildlife and Wildlife Habitat	.30
	4.5	Landscape Connectivity and Wildlife Movement	.30
5	Mitig	ation	30
	5.1	Erosion and Sediment Control	.30
	5.2	Environmental Protection Plan	.31
	5.3	Landscape Plan and Weed Management Program	.31
	5.4	Setbacks	.31
	5.5	Stormwater Management Strategies	.32
	5.6	Wetland Mitigation	.32
	5.7	Land Owner's Manual	.33
	5.8	Timing of Construction	.33
	5.9	Monitoring	.34
6	Resid	ual Impacts and Significance	34
	6.1	Upland Plant Communities	.34
	6.2	Wetlands	. 35
	6.3	Wildlife	. 35
7	Descr	iption of Cumulative Effects	35
	7.1	Wetlands	.36
8	Refer	ences	38

Appendix A	Historical Aerial Photographs	41
Appendix B	Upland Vegetation Data	42
Appendix C	Rare Plant Sampling Map	43
Appendix D	Wetland Data	44
Appendix E	Potential Wildlife Species	53

Biophysical Impact Assessment for the Ascension Lands

Final Report

August 31, 2020

List of Figures

Figure 1: Project Location	2
Figure 2: Terrain and Sub-Catchments	12
Figure 3: Slope Conditions	13
Figure 4: Plant Communities	16
Figure 5: Wetlands	20
Figure 6: 2014 Water levels in Wetland 1	21
Figure 7: 2016 Water Levels in Wetland 1	22

List of Tables

Table 1: Representative Plant Species by Community	15
Table 2: Introduced Plants within the Project Site	17
Table 3: Wetland Area and Classification	19
Table 4: Observed Wildlife Species	24
Table 5: Summary of Potential Impacts	27

1 Introduction

Highfield Land Management is proposing The Ascension Lands development in Rocky View County (SW/SE-19-25-2 W5M) (Figure 1). The Project Site is bounded by Bow Valley Trail/Highway 1A to the north, 12 Mile Coulee Rd to the east and Blueridge Rise to the south. The Ascension Lands consist of approximately 112 ha of primarily cultivated areas with natural landscape features that include a watercourse and four wetlands.

1.1 Purpose

Westhoff Engineering Resources Inc. (Westhoff) was retained to prepare a Biophysical Impact Assessment (BIA) for The Ascension Lands. On a municipal level, BIAs are commonly requested when development is proposed that may impact natural landscape features. Rocky View County (RVC), in their 2013 Servicing Standards, provides guidelines for preparing a BIA:

- describe the existing environment (including soils, vegetation, landform, hydrology, and wildlife);
- describe the proposed activity and provide a rationale, including alternatives considered that may have less impact;
- predict and analyze the potential effects of the activity on the environment;
- recommend mitigation measures that would reduce or eliminate impacts of the activity on the environment;
- identify compensation measures where impacts cannot be avoided;
- identify cumulative effects caused by the accumulation and interaction of multiple stressors affecting the parts and the functions of ecosystems; and
- describe how mitigation measures will be monitored over time to ensure effectiveness.

This BIA was prepared to describe the existing biophysical conditions of the Project Site. The BIA was initiated in the fall of 2016, outside of the growing season. Follow-up field surveys were completed in the spring of 2017.

We prepared this BIA referring to standards for wetland assessment presented in the Alberta Wetland Assessment and Impact Report Directive 2015, No, 8 (Alberta Environment and Parks 2015).



August 31, 2020

2 Methods

2.1 Review of Existing Information

2.1.1 Alberta Conservation Information Management System (ACIMS)

Alberta Conservation Information Management System (ACIMS) is a provincial government organization that maintains a database and tracks information on species, communities, and sites of conservation interest (Alberta Environment and Parks 2016). We completed an ACIMS database search to identify any past observations of provincially listed plant species on or in the vicinity of the Project Site.

2.1.2 Previous Wildlife Observations

We reviewed Alberta wildlife field guides to develop a list of amphibian, reptile, mammal and bird species that may potentially inhabit areas within the Project Site (Smith 1993, McGillivray and Semenchuk 1998, Pattie and Fisher 1999, Russel and Bauer 2000, Stebbins 2003, Semenchuck 1992). Federal and provincial wildlife databases also provided information on the general distribution of wildlife species federally-listed as Species At Risk under the Species At Risk Act (SARA) (Government of Canada 2002) or provincially identified as Sensitive, May Be At Risk or At Risk as per the General Status of Alberta Wild Species (Alberta Environment and Sustainable Resource Development 2011).

We compiled wildlife observations from the Fisheries and Wildlife Management Information System (FWMIS). FWMIS is a Government of Alberta fisheries and wildlife database administered by Alberta Environment and Parks (AEP). We completed a 3 km radius FWMIS database search to determine whether any federally-listed Species at Risk or provincial species identified as Sensitive, May Be at Risk, or At Risk have been previously observed on or in the vicinity of the Site (AESRD 2016).

2.1.3 Agricultural Region of Alberta Soil Inventory Database

The Agricultural Region of Alberta Soil Inventory Database (AGRASID) identifies soil classes and groups that have been mapped throughout the province. We performed a database search to determine the types of soils that have been mapped on the Project Site (Alberta Agriculture and Rural Development 2016).

2.1.4 Historical Aerial Photographs and Precipitation Data

We refer to the Alberta Wetland Identification and Delineation Directive, 2015, No.4 (Alberta Environment and Parks 2015), to provide guidelines on the approach to our historical review. We reviewed historical aerial photographs prior to and following field surveys. Photographs were accessed through Alberta Environment and Parks (AEP) and Google Earth[™]. A sub-set of AEP photographs was chosen based on the following criteria:

- photographs taken from multiple years over several decades;
- photographs taken in multiple seasons;
- photographs selected based on correlated precipitation levels; and
- photographs representing the best available scale, clarity of image and availability.

We selected aerial photographs from AEP and Google Earth[™] images (Appendix A):

- June 9, 1950
- August 2, 1966
- June 12, 1974
- October 11, 1977
- October 3, 1981
- May 8, 1988
- August 19, 1994
- July 21, 1997

- May 12, 2002
- May 29, 2005
- September 13, 2008
- September 7, 2012
- July 28, 2014
- August 22, 2015
- April 17, 2016

The historical review provides an indication of changes in environmental conditions, specifically the distribution and extent of any detectible wetlands or watercourses within the Site. We also used the photographs to document variation in surface water conditions for any such water bodies observed within the Project Site over time.

As part of the historical review process described in the Wetland Identification and Delineation Directive, precipitation data is required to correlate with the historical photographs and aid in determining wetland class (Alberta Environment and Parks 2015). We compiled precipitation data from Alberta Agriculture and Forestry to document the total amount of precipitation relative to each day, month and year that historical aerial photographs were available (Alberta Agriculture and Forestry 2016).

This data provides insight into historical environmental conditions and whether available photographs may be associated with wet, dry, or average precipitation year. Average annual precipitation levels from 1955 to 2015 was calculated to be 438.61 mm. To determine whether photographs were from dry, average, or wet years, we calculated the upper and lower 25% quartile. A dry year is represented by precipitation levels below or at 388.68 mm and a wet year has levels at or above 485.50 mm. We applied the information gained through the historical aerial photograph review in confirming the classification of any observed wetlands.

Westhoff
Engineering
Resources , Inc.

Page 5

2.1.5 Surface Hydrology

The Alberta Wetland Assessment and Impact Report Directive (Alberta Environment and Parks 2015) requests that general information on the local surface water catchments be provided to support the evaluation of any area wetlands identified within the Site. Catchment mapping for the Project Site was provided by exp Services Inc. on November 7, 2016.

2.2 Field Sampling

We completed the following field surveys at the Project Site:

- Preliminary wetland identification and delineation, and preliminary plant community surveys: October 12 and November 1, 2016
- Reconnaissance surveys: October 5 and October 18, 2016
- Amphibian survey: May 4, 2017
- Rare plant survey: June 9 and 13, 2017
- Wetland and vegetation classification and surveys: June 16, 21 and 26, 2017

Details regarding specific survey methods are provided below.

2.2.1 Plant Community Identification

We reviewed multiple resources to develop a methodology for describing plant communities within the Project Site (Alberta Sustainable Resource Development, Rangeland Management Branch 2005) (Alberta Native Plant Council 2000) (Alberta Sustainable Resource Development 2005). We completed modified inventory/plant community surveys to characterized species composition by community. Plant community surveys were competed during the growing season to ensure species diagnostics are most identifiable. Sampling sites were chosen to ensure the most representative spatial extent of the community was captured.

Sample plots were delineated in each representative habitat type. Within these plots, we recorded the presence and percent cover of individual plant species. Percent cover is the percent of the ground area covered by a vertical projection of the foliage onto the ground surface. Incidental observations of plant species were also recorded while travelling between sample sites.

2.2.2 Rare Vascular Plants and Rare Ecological Communities

Information on rare vascular plants and rare ecological communities was derived from background research and field surveys conducted by Westhoff on June 9 and 13, 2017. Westhoff followed the standardized rare plant survey methodology developed by the Alberta Native Plant Council (Alberta Native Plant Council 2012).

Rare plants are defined as all species listed on ACIMS' current Tracking List and Watch list, including plant species ranked for rarity following the standard ranking system developed by the Nature Conservancy. These species are typically ranked S1 to S3, where:

- S1 is a species with a low population and/or has 5 or fewer known provincial occurrences;
- S2 has low population and/or 6-20 known provincial occurrences; and
- S3 has 21-100 known provincial occurrences.

Plotless floristic surveys were completed by meandering throughout natural or disturbed vegetation areas searching all observed microsites and micro-community areas. All surveys were completed with the aid of a GPS unit, to record starting locations, locations of micro-community transitions, and to provide tracks showing the search pathway between these locations. Photographs of search areas were taken.

If a species could not be identified in the field, a specimen or plant photograph was obtained to be identified in the office using a plant key and by comparing to photographs to existing specimens. To ensure no harm occurred to a potential rare species population, whole individuals were collected only if they were part of a large local population (>20 observations); otherwise a small portion of the plant was collected to allow identification or a detailed photograph and written description was obtained.

The standard reference materials for rare plant surveys were ACIMS List of Elements in Alberta (Vascular Plants; Ecological Communities) (Alberta Conservation Information Management System 2015), Flora of Alberta (Moss 1983) and Rare Vascular Plants of Alberta (Kershaw, et al. 2001).

2.2.3 Wildlife Observations

We completed amphibian call surveys to evaluate habitat use of the Project Site. The call surveys were completed in the spring at random locations at each water body or wetland. Survey protocol generally followed the Sensitive Species Inventory Guidelines methodology recommended by Alberta Sustainable Resources Development (Alberta Government 2013). April/May is within the approximate breeding season for frog and toad species with the potential to occur within the Project Site. Night-time temperatures are commonly low; therefore, these surveys were not conducted after sunset but rather during the warmest part of the day (between approximately 11:00 am and 4:00 pm) to accommodate greater call detection.

Incidental wildlife observations were recorded during all field visits to the Project Site. Such observations include sightings, call detection and evidence of wildlife use of habitat such as scat, diggings, nesting, and tracks.

Page 6

© Westhoff Engineering Resources, Inc.

Westhoff	Biophysical Impact Assessment for
Engineering	the Ascension Lands
Degeneration In a	Final Report
Resources, Inc.	August 31, 2020

2.2.4 Wetland Identification and Delineation

A wetland is defined as land saturated with water long enough to promote the formation of water altered soils, growth of water tolerant vegetation and various kinds of biological activity that are adapted to the wet environment (Alberta Environment and Sustainable Resource Development 2013).

We referred to the Alberta Wetland Identification and Delineation Directive 2015 for guidelines on wetland identification and delineation (Alberta Environment and Parks 2015). The Directive provides methods to identify and delineate a wetland based on the characteristics of the wetland being assessed (i.e., simple vs. complex) and the availability of high quality, representative imagery. The methods are based on various combinations of desktop delineation and field verification (Alberta Environment and Parks 2015).

The initial step in identifying the presence of wetlands is to complete a historical review, as described in Section 2.1.4. The historical photographs were first geo-referenced using the national road network available from the Natural Resources Canada (GeoGratis). This process allows for a rough comparison of the current and historical wetlands; however, it does not correct for inherent spatial distortions and displacements in the photographs themselves. Sources of these distortions and displacements include variations in terrain, lens camera distortions and spatial errors, both vertically (elevation) and horizontally (latitude/longitude). As a result, the overlay is not 100% spatially accurate but rather it provides an approximate location for the wetland.

We selected a subset of the historical photographs, capturing photographs from several different years and different seasons. We did this to capture the natural variability or fluctuations in the wetland and to classify the wetland to provincial standards. Using this subset of photographs, we identified and delineated any observed wetlands in ArcGIS. We used these delineations to prepare a preliminary map of area wetlands and uploaded the delineations to a Trimble Geo7X GPS unit to verify the delineations in the field.

Based on observed differences between the desktop delineations and current site conditions, we delineated the wetland boundaries in the field. We delineated wetland boundaries based on wetland verses upland vegetation and extent of hydric soils (where required). Once identified, we surveyed the boundaries of Project Site wetlands with a Trimble Geo7X GPS unit. Raw GPS data was differentially corrected with data from the CAN-NET system.

While delineating the wetland boundaries, we also completed an Appendix 7 field form, obtained from the Alberta Wetland Identification and Delineation Directive, to record plant species at the boundary between wetland and non-wetland. We conducted the surveys with 1 m x 1 m plots, recording percent relative cover of abundant species on both the non-wetland and wetland sides of the boundary.

Page 7

We conducted wetland vegetation field surveys to record dominant plant species and wetland zones. To conduct the wetland vegetation field surveys, we established sample plots (with a radius of 2.5 m) in each representative wetland zone. Within these plots, we recorded the presence and extent of individual plant species (vegetation percent cover).

Observations of previous wetland disturbance such as roadways, ditches, or previous land use activities, such as cultivation, were recorded for all wetlands.

2.2.5 Wetland Classification

We classified any identified wetlands with reference to the Alberta Wetland Classification System (AWCS). The AWCS incorporates and merges information from existing wetland classification systems tailored specifically for wetlands in Alberta. Wetlands are subdivided into types based on biological, hydrological or chemical attributes (Alberta Environment and Parks 2015).

In general, each wetland class is distinguished based on the presence of different wetland vegetation zones. The class is determined by the type of vegetation zone occurring in the central or deepest part of the wetland. This deepest vegetation zone must be 25% or more of the total wetland area.

2.2.6 Wetland Functional Assessment

As part of the 2013 wetland policy, the Province created the Alberta Wetland Rapid Evaluation Tool–Actual (ABWRET–A) to assess the natural functions for all wetland types. This tool generates wetland function scores. Once a score is generated, the province assigns a value category to the wetland. This evaluation is to help the applicant and AEP in deciding an appropriate mitigation plan for the wetland (Alberta Environment and Parks 2015). Electronic copies of the ABWRET data were submitted to AEP for review on June 27, 2017.

2.2.7 Watercourse Identification

A watercourse is defined as the bed, bank or shore of a river, stream or creek, whether it contains or conveys water continuously or intermittently (Alberta Environment and Sustainable Resource Development 2012). We identified watercourses based on the following:

- observations of flowing water;
- the presence of a defined channel;
- observations of hydrophytic vegetation; and
- observations of changes in grade from lowland to upland conditions.

Westhoff	Biophysical Impact Assessment for	
Engineering	the Ascension Lands	
Deseumons Inc	Final Report	
Resources, Inc.	August 31, 2020	

We surveyed the centre line of the watercourse with a Trimble Geo7X GPS unit. Raw GPS data was differentially corrected with data from the CAN-NET system.

2.2.8 Watercourse Classification

We applied the review of historical aerial photographs, combined with information from field surveys to classify watercourses within the Project Site. We applied the Alberta Environment and Sustainable Resource Development's Watercourse Classification (Alberta Environment and Sustainable Resource Development 2012) system. The watercourse classification system is as follows.

- Large Permanent: major streams and rivers with well-developed floodplains and carry flows year-round. The non-vegetated channel width is greater than 5 m.
- Small Permanent: permanent streams, often with small valley bottoms and bench floodplain development. The stream carries flow year-round but may freeze completely in winter or dry up during periods of drought. The banks and non-vegetated channel are well defined, with channel width greater than 0.7 m to 5 m.
- Transitional: small streams, often with small valley bottoms and bench floodplain development. The stream carries flow year-round but may freeze completely in winter or dry up during periods of drought. The banks and nonvegetated channel are well defined, with channel width greater than 0.4 m to 0.7 m.
- Intermittent: small stream channels with usually no terrestrial vegetation in the channel. The stream usually has some bank development and carries flows during spring runoff and heavy rainfall. Small springs can also supply flows to intermittent streams. Channel width is less than 0.4 m.
- Ephemeral: a vegetated draw that is connected to a higher-class watercourse. The draw carries flow only during or immediately after rainfall or snowmelt. There is little to no channel development.

2.3 Public Lands Evaluation

A submission to Alberta Public Lands was made for confirmation of whether the Crown claims ownership of the bed and shore of any identified waterbodies within the Project Site.

2.4 Environmentally Significant Areas

The Environmentally Significant Areas in Alberta: 2014 Update report identifies Environmentally Significant Areas (ESAs) on a provincial scale (Fiera Biological Consulting Ltd. 2014). The report identifies four criteria, which are used to assess whether an area is an ESA. The criteria are:

Page 9

1. Areas that contain focal species, species groups or their habitats;

© Westhoff Engineering Resources, Inc.

- 2. Areas that contain rare, unique or focal habitat, such as natural springs, Class A and B rivers and waterfowl staging areas;
- 3. Areas with ecological integrity, including undisturbed upland or wetland habitat; and
- 4. Areas that contribute to water quality.

We adapted these criteria to evaluate whether any ESAs occur within the Project Site.

The 2014 criteria are difficult to apply to individual wetlands. Therefore, we also refer to the criteria presented in the Province's Aquatic Environmentally Significant Area (AESA) report, completed in 2010 to assess the significance of Project Site wetlands (Fiera Biological Consulting Ltd. 2010).

2.5 Identification of Impacts

We identify the predicted impacts of The Ascension Lands development with reference to the Concept Plan, provided by Brown & Associates in August 2020. This BIA Report does not include a comprehensive evaluation of surface or ground water conditions or an assessment of potential impacts on these water resources as a result of the proposed development.

2.6 Mitigation Measures

Mitigation measures are measures applied to eliminate, reduce, or control the predicted negative impacts of a particular project (Government of Canada 1992). We present mitigation measures that could eliminate, reduce, or control the predicted negative impacts of the Project.

2.7 Determining Significance of Residual Impacts

We identify the biophysical impacts associated with the proposed project that we predict will persist after mitigation measures are implemented. We apply professional judgment in evaluating the significance of any residual impacts. The magnitude of the predicted residual impact was weighed against any positive effects of the proposed project activities.

2.8 Monitoring

Recommendations for follow-up monitoring, field surveys, or reporting are provided, as needed.

2.9 Description of Cumulative Effects

Cumulative effects are the changes to the environment caused by all past, present and reasonably foreseeable future human activities (Alberta Environment 2009). We describe the possible changes in the environment caused by the proposed development when combined with other past, present, and reasonably foreseeable future human activities. We describe these cumulative effects in the context of the broader region.

Page 10

© Westhoff Engineering Resources, Inc.

The information and resources available for this study do not permit the assessment of cumulative impacts of the Project to be undertaken using "best practice" Cumulative Effects Assessment (CEA) methodology (Hegmann, et al. 1999). Instead, our approach is to adopt elements of CEA standard methodology in a description of possible cumulative effects.

3 Existing Environment

3.1 Natural Region

Alberta is divided into six Natural Regions based on patterns in climate, topography, soils and vegetation (Natural Regions Committee 2006). The Project Site is located within the Parkland Natural Region and Foothills Parkland Natural Subregion. The Foothills Parkland represents a transition between prairie grasslands in the southeast and the boreal and montane forests in the north and west portions of the province.

In general, the Foothills Parkland Subregion consists of a rolling, hilly landscape. Native vegetation communities include rough fescue grasslands, willow shrublands and aspen woodlands. Balsam poplar, aspen and willow shrub stands occur along watercourses. The major soil groups represented in the Foothills Parkland Subregion are Black and Dark Gray Chernozems in the uplands, and Humic Gleysols associated with wetlands.

On a local scale, aerial photographs show that the Project Site has been modified through cultivation for approximately 60 years. The native grassland associated with the Foothills Parkland Natural Subregion is no longer represented within the Site, although patches of native vegetation remain along a central watercourse. Further details regarding local plant communities are provided in Section 3.4.

3.2 Landform, Hydrology and Soils

Terrain conditions within the Project Site are variable with rolling uplands, several wetlands and a natural watercourse running through the center of the Site (Figure 2). Wetlands and the watercourse are described in further detail in Sections 3.7 and 0.

exp Services Inc. prepared a slope map using 2015 LiDAR received from Airborne Imaging (Figure 3). Relatively steep slopes (15-25%) occur at multiple locations within the Site. A relatively steep ridgeline runs northwest southeast along the eastern Project boundary, separating the Site from Highway 1A. Two additional steep uplands occur in the western portion of the Site.

There is variable terrain associated with the natural watercourse at the center of the Project Site (Figure 2 and Figure 3). The watercourse enters the Site in the north as a low open swale and then develops into a relatively steep narrow ravine as it drains south and west, where it leaves the Site. Slopes are relatively steep (15- 25% or greater) along the southern portion of the watercourse and in two associated ravines on its north boundary.

Page 11

© Westhoff Engineering Resources, Inc.





A total of six sub-catchments were identified within the Project Site (Figure 2). Three of the subcatchments, on the west side of the Site, drain into the central watercourse. The three remaining catchments east of the watercourse drain into a large wetland along the southern boundary of the Site; this wetland has no apparent outlet, based on field observations.

Within the Project Site, Dunvargan soils consisting of Orthic Black and Rego Black Chernozems are dominant throughout, with Orthic Humic Gleysols found in low lying areas. Soils associated with the creek are identified as miscellaneous undifferentiated mineral soils (Alberta Agriculture and Rural Development 2016).

3.3 Historical Disturbance and Land Use

Our review of the historical aerial photographs revealed patterns of human activities and development in and around the Project Site, including the following:

- a residence and associated outbuildings are visible in the earliest historical photograph from 1950;
- the uplands of the Site have been cultivated extensively since 1950 while the central watercourse has remained relatively undisturbed;
- two dugouts within the watercourse appear between approximately 1950 and 1966. The access roads across the creek appear at the same time. The residence and outbuildings have also increased in size;
- Blueridge Rise road was constructed between 1977 and 1981, along the southern boundary of the Site, through an identified wetland; and
- a berm was constructed parallel the watercourse on the eastern boundary between approximately 2005 and 2008.

3.4 Upland Plant Communities

We identify eight plant communities within the Project Site, with the majority of the Site being cultivated lands. Representative upland plant community areas are summarized in **Error! Reference source not found.**. The total percent of wetland area is included in **Error! Reference source not found.**, although wetlands are described further in Section 3.7. Disturbed areas (residence) are also included in 1. These areas are included to accurately identify percentages of cover types within the Project Site.

The general distribution of the plant communities is presented in Figure 4. Upland vegetation data sheets are presented in Appendix B.

Biophysical Impact Assessment for the Ascension Lands Final Report

August 31, 2020

Plant Community	Representative Plant Species	Area (%)
Cultivated	common wheat	77
Deciduous Woodland	balsam poplar, trembling aspen, willow, common dandelion, star-flowered Solomon seal, smooth brome	2
Low Shrub/Disturbed Grassland willow, prickly rose, smooth brome, quack grass, Kentucky bluegrass, creeping thistle		6
Low Shrub/Native Grassland	silverberry, buckbrush, prickly rose, shrubby cinquefoil, northern wheatgrass, blue- eyed grass, cut-leaved anemone	5
Tall Shrub	silverberry, prickly rose, gooseberry, shrubby cinquefoil, smooth brome, bluebur, northern bedstraw, Kentucky bluegrass	4
Non-Native Grassland	smooth brome, quack grass, creeping thistle, northern bedstraw, Kentucky bluegrass	2
Residence	manicured grass	2
Wetland, Watercourse and Dugout	awned sedge, water sedge, wild mint, northern willowherb, wire rush, common horsetail	2

Table 1: Representative Plant Species by Community



LEGEND

- Project Site
- - Top of Break
- Cultivated
- Residence

- Dugout
- Low Shrub/Disturbed Grassland
- Deciduous Woodland Low Shrub/Native Grassland
 - Non-native Grassland
 - Tall Shrub

- Wetland Watercourses
 - - Transitional
 - Ephemeral

Imagery Source: Valtus Imagery

Client:	Client: HIGHFIELD LAND MANAGMENT				
Project: BIO	Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS				
Title: PLANT COMMUNITIES					
Date: Project No.: Scale: FIGURE: 4 10-17-2016 WER116-77 1:5,000 FIGURE: 4					
Westhoff Engineering Resources, Inc.					

Land & Water Resources Management Consultants

Introduced Plants 3.5

Introduced plants are non-native plants to Alberta. Those species observed within the Project Site during field surveys are summarized in Table 2 along with their Weed Act status (Government of Alberta 2010).

Common Name	Scientific Name	Weed Act Status
annual hawk's-beard	Crepis tectorum	not regulated
black henbane	Hyoscyamus niger	Noxious
black medic	Medicago lupulina	not regulated
bluebur	Lappula squarrosa	not regulated
common dandelion	Taraxacum officinale	not regulated
common goat's-beard	Tragopogon dubius	not regulated
common plantain	Plantago major	not regulated
creeping thistle	Cirsium arvense	Noxious
hound's-tongue	Cynoglossum officinale	Noxious
Kentucky bluegrass	Poa pratensis	not regulated
Lamb's-quarters	Chenopodium album	not regulated
Lady's thumb	Polygonum persicaria	not regulated
Nodding thistle	Carduus nutans	Prohibited Noxious
Peking cotoneaster	Cotoneaster acutifolius	not regulated
perennial sow-thistle	Sonchus arvensis	Noxious
quack grass	Elymus repens	not regulated
shepherd's purse	Capsella bursa-pastoris	not regulated
smooth brome	Bromus inermis	not regulated
stinkweed	Thlaspi arvense	not regulated
tall buttercup	Ranunculus acris	Noxious
tartarian honeysuckle	Lonicera tatarica	not regulated
timothy	Phleum pratense	not regulated
wild radish	Raphanus raphanistrum	Noxious
yellow sweet-clover	Melilotus officinalis	not regulated

Page 17

Page 18

Perennial sow-thistle and creeping thistle were distributed throughout the Project Site primarily in disturbed grassland areas. Black henbane and nodding thistle occur in the non-native grassland of the upper northern slopes. Hound's tongue occurs in the non-native grassland sites. The tall buttercup occurs near the dugouts in the central watercourse while the wild radish occurs in and around the croplands.

3.6 Rare Plants and Rare Ecological Communities

We completed an ACIMS database search to identify any past observations of provincially listed plant species on or in the vicinity of the Project Site. The ACIMS search indicates no listed species on or in the vicinity of the Site. Field surveys also revealed no occurrences of rare plants or rare ecological communities within the Project Site. Three observed species that may be considered uncommon (ranked S3) but are not considered rare are as follows:

- striped coralroot (Corallorhiza striata) in the riparian area near Wetland 1;
- large-flowered stickseed (Hackelia floribunda) in disturbed grasslands; and
- round-leaved hawthorn (Crataegus chrysocarpa) in the central drainage.

A rare plant survey sampling figure is presented in Appendix C.

3.7 Wetlands

3.7.1 Inventory

We identify four wetlands within the Project Site based on our review of historical aerial photographs and field surveys (Figure 5). A summary of the Project Site wetlands is presented in Table 3, including wetland areas, class, historical photograph review and vegetation information that supports the classification. More detailed data on wetlands is presented in Appendix D.

Wetland 1 is a permanent shallow open water wetland. There is an unusual pattern of wetland vegetation zones present in Wetland 1. Bands of deep marsh, represented by common cattails, are established on the wetland edge. The deep marsh zone of a wetland is typically closer to the centre of permanent wetlands. This vegetation pattern is discussed further below in Section 3.7.2.

Wetland 2 is a temporary marsh, which typically is expected to maintain surface water for an extended period in the spring and early summer but is frequently dry during late summer and fall. We classify Wetland 3 as a shrubby swamp. Wetland 3 is located on the slope above the central watercourse and is likely associated with a spring or seepage. There is no terrain feature that would concentrate surface water flow to this location in sufficient volumes to reflect the obligate wetland vegetation. Therefore, we expect that this wetland is being supported by groundwater at or just below the surface.

© Westhoff Engineering Resources, Inc.

A fourth wetland area is associated with the central watercourse in the north portion of the Project Site and is classified as a temporary marsh. This wetland area is part of the riparian zone of the watercourse.

			Observed Wetland Characteristics		
Wetland Number	Area (ha)	Alberta Wetland Classification	Total Years Visible	Years Surface Water Visible	Representative Plants
1	0.98	Shallow Open Water – Permanent	15	14	common cattail, pond weed, awned sedge, slough grass, Nuttall's salt-meadow grass
2	0.04	Marsh – graminoid – Temporary	10	1	awned sedge
3	0.91	Shrubby Swamp	5	0	beaked willow, sandbar willow, yellow willow, flat-leaved willow, awned sedge, wire rush
4	0.44	Marsh – graminoid - Temporary	15	01	wire rush, common horsetail, Sartwell's sedge, fowl bluegrass

¹Surface water is difficult to discern for Wetland 4 given it is a narrow feature with dense emergent vegetation in the historical aerial photographs.

3.7.2 Wetland Origin and Disturbance

Our historical aerial photograph review indicates the Project Site wetlands have remained mostly undisturbed from 1950 to present day. What disturbance has taken place has primarily been the result of road and dugout construction. Wetland 1 was bisected by Blueridge Rise between 1974 and 1981. Observations during field surveys did not indicate any culverts connecting the two portions of the wetland.

As discussed above, there are patches of deep marsh vegetation (common cattail) above the shallow marsh zone in Wetland 1. These cattail patches appear to occur at the same elevation around the wetland's edge. We reviewed the recent aerial photographs and Google Street View and determined that water levels within this wetland appear considerably higher in previous years.



LEGEND

Project Site Watercourses Wetlands

-- Transitional Shrubby Swamp Ephemeral Temporary Marsh Shallow Open Water Permanent

Imagery Source: Valtus Imagery

Client: HIGHFIELD LAND MANAGEMENT								
Project: E	BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS							
Title: WETLANDS AND WATERCOURSES								
Date: 27-06-2017	Project No.: WER116-77	Scale: 1:5,000	FIGURE: 5					
Westhoff Engineering Resources, Inc.								

Westhoff Biophysical Impact Assessment for the Ascension Lands Final Report August 31, 2020

Figure 6 shows the high-water levels in the wetland in 2014. Google Earth historical photographs show that water levels decreased over the summer of 2015 even though precipitation data indicates 2015 had a relatively wet summer (Alberta Agriculture and Forestry 2016). Field observations in 2016 indicate water levels in 2016 remained lower (Figure 7). The source of this water level fluctuation is unconfirmed.

Wetland 4 associated with the central watercourse is impacted by the excavation of the two upstream dugouts and associated crossings. Wetlands 2 and 3 appear to be undisturbed.



Figure 6: 2014 Water levels in Wetland 1

Looking northwest at the wetland's north boundary, showing the cattails at the water's edge (Source: Google Street View)

Biophysical Impact Assessment for the Ascension Lands Final Report

August 31, 2020

Figure 7: 2016 Water Levels in Wetland 1



Looking west at the wetland's northern boundary, showing cattail patches on the wetland edge and an extensive drawdown area where surface water occurred in 2014 (Source: Westhoff 2016)

3.7.3 Wetland Functional Assessment

The Alberta Wetland Policy recognizes that not all wetlands are equal. Some provide more value than others in terms of how they impact water quality, groundwater, biodiversity, and human uses. The five criteria examined by the Province are:

- Biodiversity
- Water Quality Improvement
- Flood Reduction
- Human Value
- Abundance

The wetland value classes are:

- Low (D)
- Moderately low (C)
- Moderate (B)
- High (A)

The Project Site wetlands are classed as:

- Wetland 1: B
- Wetland 2: C
- Wetland 3: C
- Wetland 4: C

The final ABWRET form is presented in Appendix D.

3.8 Watercourses

We identify a watercourse within the Project Site (Figure 5). The watercourse bisects the Site flowing from the north and exiting along the southwest boundary. The watercourse is classified as "Transitional" based on field observations of a well-defined, non-vegetated channel and flowing water observed on October 12 and November 1, 2016. In a typical transitional watercourse, the banks and non-vegetated channel are well defined, with channel width greater than 0.4 m to 0.7 m; the channel carries flow year round but may freeze in winter or dry up during a drought year (Alberta Environment and Sustainable Resource Development 2012).

There are two smaller ravines that meet the central watercourse on its northern boundary. No surface water was observed in the ravines during field surveys; however, there are small, isolated patches of wetland vegetation in each ravine. No hydric soils were observed associated with these areas. The ravines are classified as ephemeral watercourses based on field observations and review of historical photographs (Alberta Environment and Sustainable Resource Development 2012).

The watercourse and both small ravines have been left mostly undisturbed in all the photographs reviewed. There was historical disturbance of the watercourse between approximately 1977 and 1981. Two dugouts were created along with berms transecting the watercourse and a small culvert was installed in the berm located between the dugouts. Bearspaw Village Road crosses the central watercourse, southwest of the Site; a culvert is present at this crossing.

3.9 Public Lands

Alberta Public Lands indicates that the lower reaches of the central watercourse as well as Wetland 1 are considered Crown-owned. Details regarding the assessment by Public Lands are provided in Appendix D.

3.10 Wildlife

We identify a total of approximately 155 birds, 44 mammals, 2 reptiles, and 6 amphibians that may potentially occur within the Project Site (Appendix E, includes scientific names). We prepared this list based on general species distributions and habitat preferences. A number of these potential species have been provincially identified and/or federally-listed as species of conservation concern.

Page 23

© Westhoff Engineering Resources, Inc.

Table 4 lists the wildlife species observed during field surveys of the Project Site in 2016 and 2017. We recorded incidental observations of 22 species during field surveys; two are listed provincially as Sensitive: lesser scaup and Swainson's hawk.

Species Common	Alberta General Status					
Amphibians and Reptiles						
Wood frog	Secure					
boreal chorus frog	Secure					
Mammals						
coyote	Secure					
moose (pellets)	Secure					
mule deer	Secure					
muskrat	Secure					
porcupine	Secure					
white-tailed deer	Secure					
Birds						
American crow	Secure					
American wigeon	Secure					
black-billed magpie	Secure					
Canada goose	Secure					
clay-coloured sparrow	Secure					
common snipe	Secure					
gadwall	Secure					
house wren	Secure					
lesser scaup	Sensitive					
mallard	Secure					
red-winged black bird	Secure					
savannah sparrow	Secure					
Swainson's hawk	Sensitive					
tree swallow	Secure					

Table 4: Observed Wildlife Species

We completed a 3 km radius database search of FWMIS. The FWMIS database documents the occurrence of three Alberta *Wildlife Act* listed "Endangered" species that have the potential to occur within the Project Site:

 northern leopard frog (*Rana pipiens*) prefer streams, creeks, and rivers for overwintering habitat. Breeding occurs in pools, ponds, marshes, and lakes. In the summer months, northern leopard frogs are found in moist upland meadows and riparian areas. Contiguity between these habitats is necessary for the species' survival (Government of Canada 2016). Habitat for northern leopard frogs may be present within and adjacent to the Project Site, primarily within the central watercourse.

grizzly bear (*Ursus arctos*) habitat spans a wide range of different plant communities. Forage species are available at different times throughout the growing season and reflect bear movement, from lower to higher elevations throughout alpine environments (Government of Canada 2002). The Project Site is on the eastern edge of a broader area that provides suitable seasonal habitat for grizzly bears. Therefore, only rarely are grizzly bears likely to be encountered within the Project Site.

• peregrine falcons (*Falco peregrinus*) prefer open landscapes along rivers with cliffs for nest sites. Nesting habitat does not occur within the Site, although it may be present adjacent to the Bow River.

None of the species identified in the FWMIS database were observed within the Project during field surveys.

3.11 Landscape Connectivity

Landscape connectivity is a scientific term that refers to the degree to which a landscape facilitates or impedes the movements of organisms among resource patches (Taylor, et al. 1993). In other words, landscape connectivity refers to the degree to which a landscape functions to provide organisms, such as wildlife, access to preferred habitats. Physical landscape connections between habitat patches can either be corridors (a strip of land connecting habitat patches), or stepping stones (small habitat patches in a row) (Forman 1995).

We describe landscape connectivity based on the extent of connected natural habitats present within and adjacent to the Project Site. On a regional scale, the Project Site is surrounded by country residential and urban development. Considerable barriers to wildlife movement exist on the north and east boundaries due to Bow Valley Trail and 12 Mile Coulee Road. However, wildlife are still likely to travel between the Project Site and areas to the west where more natural landscapes persist. Specifically, wildlife are likely to use the watercourse valley in the centre of the Project Site as a natural route for travelling from the Site to areas west, including the Bow River Valley. There are wildlife trails in the valley, with evidence of use by deer, which support this observation. The Bow River Valley is considered a primary wildlife corridor for the region as a whole.

Bearspaw Village Road crosses the watercourse at a location directly southwest of the Project Site. The roadway is built up and may create an obstacle for wildlife travelling the length of the watercourse. However, under current conditions, the roadway is not expected to create a barrier to wildlife movements. Also, we anticipate traffic is limited to local residents, and the sensory disturbance associated with the roadway may be relatively low. The potential for vehicle collisions in light of the current roadway design is unknown.

The steep valley and ravines associated with the watercourse are expected to provide good hiding cover for wildlife traversing the Project Site. However, the northern portion of the watercourse is open with little overstory (tree and shrub) vegetation, providing less cover for wildlife habitat use and movements. The northern extent of the watercourse, beyond the Project Site, terminates at a school site along Highway 1A. Highway 1A is likely a barrier and collision hazard for wildlife travelling to the north.

3.12 Environmentally Significant Areas

We adapted the 2014 provincial ESA criteria to evaluate whether any ESAs occur within the Project Site. Based on available data, the central watercourse and associated wetland and riparian zone is considered an ESA because it is a natural watercourse and because it provides natural habitat conditions for wildlife.

We also referred to the provincial criteria for identifying Aquatic ESAs (AESAs). None of the wetlands within the Project Site meet these criteria.

4 Identification of Impacts

The predicted impacts of the Ascension Lands development on identified biophysical conditions were determined with reference to the concept plan provided by Brown & Associates on June 21, 2017. The proposed development will consist of a mixture of residential and commercial land-uses. Wetland 1 and the central watercourse will be retained within the development and will be designated as Environmental Reserve. One road crossing with culverts is planned on the central portion of the watercourse. There will also be a utility crossing in the south-central portion of the watercourse with an associated berm and culvert. The lower portions of the two ravines that connect to the watercourse will be retained and designated as Environmental Reserve.

A summary of the potential impacts of the proposed development and recommended mitigation measures are presented in Table 5. Recommended mitigation measures are described in further detail in Section 5.
Westhoff Engineering **Resources**, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Environmental Component	Potential Impact	Mitigation Measures
Soils/terrain/ hydrology	 loss of soil from removal, erosion and/or admixing during construction crossing of watercourse for roadway and utilities in two separate locations soil compaction from heavy equipment used during construction sediment runoff to the retained watercourse, wetland, and surrounding areas accidental spills of fuels, chemicals, and other potentially hazardous materials modification of drainage patterns due to site grading 	 Erosion Sediment Control (ESC) Plan Environmental Protection Plan Re-use of soils in landscaping Stormwater management strategies, including design of water course crossings to maintain flows and minimize riparian/flood damage Retention of the majority of the central watercourses and the permanent wetland (Wetland 1)
Upland Vegetation	 accidental damage of retained vegetation during construction accidental spills of fuels, chemicals, and fertilizers during construction and community residence introduction of weeds or other invasive plants during construction and community residence damage to retained plant communities due to post development recreational activities partial loss of Tall Shrub, Low Shrub/Disturbed Grassland and Low Shrub/Native Grassland 	 Erosion Sediment Control (ESC) Plan Environmental Protection Plan Landscape, Restoration, Weed Management Plan pre, during and post construction Landowner's Manual for community residents Educational signs along recreation trails to encourage trail usage
Wetlands	 loss of Wetlands 2 and 3, loss of local areas of Wetland 4 at road crossing possible changes in the natural hydrology of retained wetlands including adjustments to the natural hydro-period, water chemistry, plant species composition, weed invasion. loss or alteration of retained wetland vegetation and habitat due to accidental spills of fuels, chemicals, and other hazardous materials 	 Retention of the majority of the central watercourses and the Wetland 1 Wetland replacement through in-lieu payment to the Province Erosion Sediment Control (ESC) Plan Environmental Protection Plan Stormwater management strategies Wetland Management Plan for retained wetlands including strategies for maintaining wetland hydrology, wetland restoration, maintenance, and monitoring

© Westhoff Engineering Resources, Inc.

Westhoff Engineering Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Environmental Component	Potential Impact	Mitigation Measures
	 disturbance of wetland margin from post development recreational activities 	 Building Development Setbacks Landowner's Manual for community residents Educational signs along recreation trails to encourage trail usage
Watercourse	 loss or modification of the watercourse at road and utility crossings loss or alteration of riparian vegetation and habitat due to accidental spills of fuels, chemicals, and other hazardous materials, or sedimentation during construction changes to hydrology due to integration into the proposed stormwater management system erosion of banks due to increased flows possible reduction of water quality during bridge/culvert crossing construction possible changes to water quality and quantity affecting plant species composition 	 retention of the majority of the watercourse Wetland replacement through in-lieu payment to the Province Erosion Sediment Control (ESC) Plan Environmental Protection Plan Stormwater management strategies Wetland Management Plan for retained wetlands including strategies for maintaining wetland hydrology, wetland restoration, maintenance, and monitoring Building Development Setbacks Landowner's Manual for community residents Educational signs along recreation trails to encourage trail usage
Rare Plants and Rare Ecological Communities	potential loss or damage during construction or due to surface runoff	any rare plants or rare ecological communities to be identified and addressed in the Environmental Protection Plan
whane	 damage, disturbance, or loss of individual wildlife species and their residence (active nests and burrows) temporary and long-term sensory disturbance, barriers to movement and habitat avoidance by wildlife changes in diversity towards species more tolerant of human activity accidental spills of fuels, chemicals, and other hazardous materials resulting in loss or alteration of habitat 	 Time construction to avoid critical time periods for wildlife Retention of wetland 1 and the central watercourse as local habitat features Landowner's Manual for community residents Educational signs along recreation trails to encourage trail usage and access controls

Biophysical Impact Assessment for the Ascension Lands

Westhoff Engineering **Resources**, Inc.

Environmental Component	Potential Impact	Mitigation Measures
	 wildlife-human conflicts due to wildlife attractants (e.g. bird seed, food, garbage) 	

4.1 Impacts to Soils, Terrain and Surface Hydrology

Portions of the Project Site will be cleared, resulting in impacts to local soils and terrain. Within construction zones, impacts to soil include soil removal, loss, compaction, erosion, and admixing. Where the Site is stripped of topsoil and/or subsoil, this material should be stockpiled and re-used, where possible, in areas to be landscaped (i.e., residential lots, parks, and other open spaces). There is the potential for soil erosion and sedimentation due to surface runoff and wind unless proper control measures are applied. There will also be changes to surface drainage patterns and surface water conditions as a result of the proposed development. These changes may result in erosion and sedimentation as well as changes in water quality in area water bodies. Proposed crossings of the watercourse may influence flows resulting in local changes in surface hydrology and flood potential. Integration with stormwater may also influence the water quality and quantity in the central watercourse.

4.2 Loss or Alteration of Plants and Plant Communities

The majority of the uplands consist of cultivated fields, which will be lost as a result of the development. There will also be some loss of native plant communities, primarily from the construction of the watercourse crossings and stormwater management infrastructure.

Some accidental damage to native vegetation communities may occur if site clearing is not restricted to designated areas of construction. Accidental damage may also occur if stormwater runoff is not properly managed. Weed invasion is also a potential impact of the proposed development that can influence the quality and diversity of native plant communities. Recreational activities in areas of native vegetation may result in damage or disturbance to native plant communities from vegetation trampling and trail braiding.

4.3 Loss or Alteration of Watercourses and Wetlands

The majority of the central watercourse and Wetland 1 will be retained. Impacts to the watercourse will potentially be incurred at the proposed roadway and utility crossings. Impacts may potentially occur to the watercourse and wetland during construction unless proper erosion and sediment control measures are applied. Watercourse and wetland impacts may occur as a result of the establishment of an outfall from proposed stormwater infrastructure Wetlands 2 and 3 are proposed to be lost as a result of the development.

© Westhoff Engineering Resources, Inc.

4.4 Loss or Disturbance of Wildlife and Wildlife Habitat

The majority of the uplands consist of cultivated lands, which provide some habitat value for wildlife. This habitat will be lost as a result of the development of the Site. Although used to some degree by wildlife, habitat conditions within the non-native grasslands are considered relatively poor compared to more native plant communities. Therefore, the impacts on the associated wildlife habitat are considered low. Habitat will, however, be retained along the main watercourse, which includes a higher diversity of plant communities: wetlands, forests, Low Shrub/Native Grassland and Tall Shrub.

The proposed construction activities may result in local sensory disturbance and damage or disturbance of individual wildlife species and their residence (active nests and/or burrows). This potential impact is of particular concern during the breeding season, which for many species is between approximately April 1 and August 31. This sensitive time period will vary based on yearly shifts in climatic conditions. Damage or harassment of certain species is prohibited under the Migratory Birds Convention Act (Government of Canada 1994), the Species at Risk Act (Government of Canada 2002) and the Alberta Wildlife Act (Government of Alberta 1997).

4.5 Landscape Connectivity and Wildlife Movement

The proposed development will result in some local loss of landscape connectivity for terrestrial wildlife travelling through the local area. Depending on roadway and utility crossing designs, these features may create barriers or an increased collision hazard for wildlife travelling through the area. Wildlife movement north of the Project Site is already restricted under existing conditions due to Highway 1A.

5 Mitigation

Mitigation measures are measures applied to eliminate, reduce, or control the predicted negative impacts of a particular project (Government of Canada 1992). Mitigation measures for wetlands and other natural landscape features are presented below.

5.1 Erosion and Sediment Control

An Erosion and Sediment Control Plan (ESC Plan) will be developed as per current Rocky View County or equivalent guidelines. The design and implementation of site-specific erosion and sediment control measures will be done prior to, during, and following the completion of each phase of the proposed development. The purpose of the ESC Plan is to provide measures to limit or control the potential for deleterious substances, like sediments in runoff, from leaving the Site or entering area water bodies, such as the wetlands and watercourses. Emphasis will be placed on preventing stormwater runoff from directly entering these water bodies in both the construction and residential occupation phases of the development.

5.2 Environmental Protection Plan

An Environmental Protection Plan (EPP) will be prepared as per Rocky View County or equivalent guidelines. Best Management Practices documented in the EPP Plan will include vegetation protection, dust control measures, management of mud-tracking off-site, designated stockpile storage, designated re-fueling areas, waste management and recycling. The EPP Plan will be completed prior to construction and should be implemented by the prime contractor completing the work.

Wetlands, retained native plant communities, forest stands, and the watercourse will be identified as sensitive features in the EPP Plan. Snow fencing, or a similar material will be used to provide a barrier around these features to limit construction equipment access. The barrier will be located past the wetland and drainage boundaries, and the drip line of the trees in retained tree stands. The EPP will also provide mitigation strategies for identified rare plants within the Project Site.

5.3 Landscape Plan and Weed Management Program

A landscape and weed management plan will be implemented to maintain and enhance postdevelopment conditions in terms of native plant communities and wildlife habitat. Where possible, restoration activities should be implemented adjacent to the upper portion of the watercourse; this area is identified as the low shrub/disturbed grassland. Restoration activities may include establishing native shrubs, typical to the Natural Subregion, as well as weed control on *Weed Act* Prohibited Noxious and Noxious listed weeds (Government of Alberta 2010). The setback for Wetland 1 should also be restored, as needed, using species typical of the Natural Subregion.

5.4 Setbacks

Setbacks have been established on Wetland 1 and the watercourse for the purposes of pollution prevention and slope stability. The setback on Wetland 1 of 25.25 m from the delineated wetland boundary was established based on the provincial "Stepping Back from the Water" guidelines. An initial 20 m setback was identified then a slope modifier applied that accounts for slope variation within the setback. The following slope modifier is applied "if the average slope of the strip (setback) is more than 5%, then the width of the strip is increased by 1.5 m for every 1% of slope over 5%" (Government of Alberta 2012).

Setbacks on the central watercourse were determined with reference to a slope stability analysis prepared by exp Services Inc. In steeper portions of the watercourse valley, the crest of the slope was identified at the transition from a 5:1 to a 3:1 gradient. A 6 m buffer width was applied extending from the crest to address slope stability based on local subsurface conditions.

The estimated crest of slope was not calculated for the northern portion of the watercourse where gradients are shallower. Instead, a setback to the watercourse was interpreted based on field observations of the crest of slope plus 6 m. The setback width varies in the northern portion of the watercourse, becoming wider to accommodate a more streamlined

Environmental Reserve boundary. Municipal Reserve lands are located directly adjacent the ER to add to the natural open space provided adjacent the watercourse.

Land uses within the designated setbacks will be restricted to infrastructure required for recreation and stormwater management. Specifically, no buildings will be developed within the setback and vegetation will be maintained consistent with the native and near native communities of the retained watercourse valley and Wetland 1.

5.5 Stormwater Management Strategies

This BIA does not include a comprehensive evaluation of potential impacts on water quantity or quality within Wetland 1 or the watercourse due to the release of stormwater. The Ascension Lands Staged Master Drainage includes stormwater management measures expected to mitigate potential impacts to Wetland 1 and the central watercourse. The concept includes the development of a stormwater wet pond that will be naturalized to integrate with the surrounding landscape, providing some habitat value for area wildlife. The stormwater outfalls to the watercourse will be designed with erosion protection to prevent damage or disturbance of the native vegetation and the bed and shore of the associated creek.

Stormwater management plan(s) will be prepared with reference to Rocky View County and provincial standards. Related planning documents and associated applications to the Province will be required to meet regulations under the Provincial *Water Act* and the *Environmental Protection and Enhancement Act*.

5.6 Wetland Mitigation

The Alberta Wetland Mitigation Directive provides direction and criteria to implement a Wetland Mitigation Hierarchy from the initial planning stages through to the application stage of the proposed activity. The mitigation hierarchy is a three stage approach that includes avoidance, minimization and replacement, with avoidance being the highest priority (Alberta Environment and Parks 2015).

As indicated above, two wetlands within the Project Site will be avoided and retained within the development: wetland 1 in the south and portions of wetland 4 along the central watercourse. Wetlands within an urban context are subject to considerable change in their natural hydrological conditions. The natural supply of surface water to a wetland can change when it is surrounded by development and its catchment area is reduced. Changes in wetland hydrology can affect the characteristics of a wetland, including wetland class, the extent and plant species composition of wetland zones, and changes in the wildlife habitat provided.

A Wetland Management Plan will be completed that documents the detailed approach to mitigating potential impacts to wetlands selected for retention. Retained wetlands require management practices to assist in maintaining their long-term sustainability. Wetland management includes further detailed inventory of Wetland 1 and the wetland along the watercourse, namely for the purpose of understanding and mimicking existing conditions affecting wetland character (e.g. current wetland hydrology). As well, the Wetland Management

Plan should include specific maintenance and monitoring protocols to be applied over the short and long-term. The scope of the Wetland Management Plan will be confirmed through consultation with Rocky View Country and the Province.

Wetlands 2 and 3, and a portion of Wetland 4, will be lost as a result of the development. These losses will be mitigated through in-lieu payment to the Province (wetland replacement), as per the Alberta Wetland Mitigation Directive (Alberta Environment and Parks 2015).

5.7 Landowner's Manual

A Landowner's Manual will be prepared and provided to residents of this new community. The Manual will include information on the sensitivity of the watercourse and wetlands and what area residents can do to maintain their health over the long-term. The manual would include guidelines for appropriate landscaping, weed control and avoiding damage to the Environmental Reserve areas (e.g. no mowing or dumping of garden waste). The manual should also include measures for area residents to be sensitive to wildlife while using recreation pathways located in natural open space.

Wildlife-human conflicts are a potential impact associated with the development. The Owners' Manual will provide information on avoiding conflicts with wildlife, primarily through effective attractant management, encounter awareness and signage. Wildlife road crossing signs will be posted at the watercourse crossing. Educational signage will be posted at trailheads and along recreation trails to encourage responsible trail usage.

5.8 Timing of Construction

Damage and/or destruction of wildlife and their residences may occur during the construction phase of the work. Ideally, the construction activities should be initiated outside the critical breeding period (approximately April 1 to August 31) for wildlife species that may potentially inhabit the Project Site (Government of Canada 2018) (McGillivray and Semenchuk 1998) (Pattie and Fisher 1999) (Russel and Bauer 2000).

This timeframe corresponds with the critical breeding period identified as Environment Canada's General Nesting Periods of Migratory Birds (Government of Canada 2018). The Province identifies a general window for wildlife breeding activity as April 15 to August 15. Overall, it is the yearly variability in climate that influences when breeding activity begins. An early spring may result in breeding activity, such as nesting, starting as early as April 1.

Pre-construction surveys are required after April 1 to support the avoidance of sensitive wildlife features including active burrows or nests. Surveys are also required if construction is temporarily delayed for 4 or more consecutive days.

1. A qualified biologist will complete the wildlife survey of the area four days prior to any construction activities commencing.

Page 33

© Westhoff Engineering Resources, Inc.

- If construction stops for four or more consecutive days, the area will be surveyed again by a qualified biologist for active breeding activity before commencing works with heavy machinery.
- 3. If active breeding activity is observed, no construction activities using heavy machinery can occur until mitigation measures are applied. These mitigation measures may include a temporary construction setback designated around the breeding site. The Canadian Wildlife Service and/or Alberta Fish and Wildlife should be consulted to determine the required width of the construction setback and any additional mitigation measures to be applied. City of Calgary Parks will be informed of any and all correspondence regarding setbacks and mitigation measures recommended by the regulators.
- 4. The construction setback would be in effect as long as breeding activity occurs.
- 5. A qualified biologist will re-survey the area to determine if breeding/nesting activity is still present.
- 6. Once breeding activity is no longer present, the setback can be removed, and construction activities can begin.

These pre-construction surveys will facilitate compliance with the Migratory Birds Convention Act (Government of Canada 1994), the Species at Risk Act (Government of Canada 2002), and the Alberta Wildlife Act (Government of Alberta 2000).

5.9 Monitoring

A monitoring program will be initiated during construction to document the implementation and success of the ESC Plan and EPP Plan. Also, the monitoring program would confirm avoidance of wetlands and the effectiveness of applied weed control methods.

6 Residual Impacts and Significance

We identify the potential environmental impacts associated with the proposed development that we predict will persist after mitigation measures are implemented. These residual impacts are the loss of upland plant communities, wetlands and associated wildlife habitat, and the loss of individual wildlife species. The approach we apply in evaluating the environmental significance of a residual impact is to first define significance and then apply this definition to evaluate Project-related impacts.

6.1 Upland Plant Communities

The proposed development will result in the permanent loss of some native upland plant communities. However, this loss will be mitigated through the retention of native vegetation associated with the central watercourse, which is considered an ESA. These retained areas will be designated as Environmental Reserve.

Page 34

Westhoff Engineering Resources, Inc.

At the time this BIA was prepared, there was no formal process, or available provincial or municipal criteria, for determining what qualifies as a significant residual loss of native plant communities. As per the Bearspaw Area Structure Plan, (adopted June 1994), native plant communities are not automatically acquired and/or protected from development. The current concept plan retains and integrates a considerable portion of the natural plant communities and associated topography within the area.

6.2 Wetlands

The proposed development will result in the permanent loss of 2 of the 4 wetlands. Wetland loss will be mitigated by providing wetland replacement through existing provincial approval processes. Wetland replacement is one of multiple accepted approaches to managing loss of wetlands on both provincial and municipal scales.

At the time this report was prepared, there were no available provincial or municipal criteria for determining what qualifies as a significant residual impact to wetlands. We conclude this residual impact is not significant provided wetland loss is off set through wetland replacement applying accepted provincial standards.

6.3 Wildlife

Accidental death or damage to individual wildlife species can occur when wildlife habitat is disturbed or lost. There is the potential for wildlife fatalities during the development of the Project Site, particularly during stripping and grading. Small mammals and birds are most susceptible to these activities. Timing the stripping and grading activities to occur outside of the sensitive breeding season for most wildlife significantly reduces this risk but does not eliminate it.

In general, we would define a residual impact as significant if it were to result in the damage or loss of a listed species. A number of provincially and/or federally listed wildlife species have the potential to occur within the Project Site. The majority of these listed species are birds, which tend to be highly mobile as adults. These species have the capacity to leave areas quickly once the stripping and grading begins.

We recommend that stripping and grading occur outside of the breeding season when less mobile juveniles are present. If this sensitive time period (April 1 to August 31) cannot be avoided, on-site monitoring will be conducted by a qualified biologist prior to and during siteclearing to facilitate avoidance of wildlife and wildlife residences, in particular active breeding sites. For the Ascension Lands, we expect the fatality risk for listed species outside the breeding season to be low. Therefore, we conclude that this residual impact to wildlife is not significant.

7 Description of Cumulative Effects

Cumulative effects are the changes to the environment caused by all past, present and reasonably foreseeable future human activities (Alberta Environment 2009). As per the City of

Page 35

Calgary BIA framework, this BIA report identifies and describes the likely cumulative impacts of the proposed project when combined with other projects that are proposed or planned in proximity to the Project Site.

The information and resources available for this study do not permit the assessment of cumulative impacts of the Project to be undertaken using "best practice" Cumulative Effects Assessment (CEA) methodology (Hegmann, et al. 1999). Some preliminary assessment is possible, and the following description of cumulative effects is presented in this light.

Our approach to the identification and description of potential cumulative impacts adopts elements of CEA by first selecting Valued Ecosystem Components (VECs) that we expect may be sensitive to these impacts. A VEC is defined as any part of the environment that is considered important by the proponent, public, scientists or government. The importance of a VEC may be determined on the basis of cultural values or scientific concern (Hegmann, et al. 1999).

7.1 Wetlands

Wetlands are recognized federally as a VEC because of their important ecological functions and associated socio-economic values (Hanson, et al. 2008). The Alberta Wetland Policy emphasizes the conservation, restoration, protection and management of wetlands to sustain the benefits they provide (Alberta Environment and Sustainable Resource Development 2013). The cumulative effects of rapid population and economic growth in Alberta have been the loss and degradation of two thirds of the wetlands in settled areas of the Province (Alberta Environment and Sustainable Resource Development 2013).

Wetland losses will be incurred as a result of the proposed Ascensions development. To date, the cumulative effects of development on wetlands have been mitigated primarily through the Province's replacement program, as will be the case for this Project. The new provincial wetland policy will continue to apply various approaches to wetland compensation as a standard for managing wetland loss in the Province.

Overall, we anticipate that the cumulative effects on wetlands in this region will be managed through the retention of a priority wetland within the Project Site coupled with the application of provincially approved wetland replacement measures.

7.2 Water Resources

The conservation of water resources is an issue at the forefront of growth management and planning initiatives in the region surrounding Calgary. The Calgary Regional Partnership (CRP), a network of municipalities surrounding Calgary, points to the availability of water as a key issue when preparing the region for the more than 1.8 million people expected to arrive over the next 60 years (Calgary Regional Partnership 2012).

We identify water resources as a VEC when describing potential cumulative effects even though project-related impacts on water were not assessed in the BIA. We anticipate the potential local impacts on water will be addressed through other studies pertaining to stormwater

management. We discuss water resources as a VEC due to the perceived importance of water conservation in the planning and management of population growth in the regional as a whole.

The Bow River Basin Council (BRBC), in their State of the Watershed Report, refers to 15 subbasins of the Bow River when identifying watershed risks and evaluating individual and cumulative effects on water and land management practices. The proposed Ascension Lands are located in the Bearspaw to Western Irrigation District sub-basin. The most significant challenges in this sub-basin are the effective flow management of the Bow River downstream of the Bearspaw Dam and management of stormwater runoff (Bow River Basin Council 2010).

Planning for the effective management of stormwater at the Ascension Lands will contribute substantially to the conservation of water resources. Provided best management practices are implemented that meet available municipal and provincial standards, the proposed development is not expected to contribute to cumulative adverse effects on water resources in the sub-basin as a whole. Continued regional monitoring by BRBC of the state of water resources in the sub- basin will gauge the success of management actions in meeting the desired outcome of protecting and enhancing water resources in the Bow River.

Page 38

8 References

- AESRD. 2016. Fish and Wildlife Management Information System (FWMIS) Internet Mapping Tool. Accessed August 25, 2016.
- https://maps.srd.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub. Alberta Agriculture and Forestry. 2016. "AgroClimatic Information Service (ACIS)."
- Alberta Agriculture and Rural Development. 2016. aGRISID. Accessed October 11, 2016.

http://www4.agric.gov.ab.ca/agrasidviewer.

- -. 2016. aGRISID. Accessed February 16, 2016. http://www4.agric.gov.ab.ca/agrasidviewer.
- Alberta Conservation Information Management System. 2015. *Download Data; Element Occurrence Data*. Online Database, Edmonton, AB: Alberta Environment and Parks.

Alberta Environment and Parks. 2016. ACIMS Data Request. Accessed August 25, 2016. http://www.albertaparks.ca/acims-data#.

- Alberta Environment and Parks. 2015. *Alberta Wetland Assessment and Impact Report Directive*. Edmonton, AB: Alberta Environment and Parks.
- Alberta Environment and Parks. 2015. Alberta Wetland Classification System. Edmonton AB: Alberta Government.
- Alberta Environment and Parks. 2015. *Alberta Wetland Identification and Delineation Directive*. Edmonton: Government of Alberta, Water Policy Branch.
- Alberta Environment and Parks. 2015. *Alberta Wetland Mitigation Directive*. Edmonton, AB: Alberta Environment and Parks.
- Alberta Environment and Parks. 2015. *Alberta Wetland Rapid Evaluation Tool Actual (ABWRET-A) Guide.* Edmonton: Alberta Environment and Parks.
- Alberta Environment and Sustainable Resource Development. 2013. *Alberta Wetland Policy*. Edmonton, AB: Government of Alberta.
- —. 2011. General Status of Alberta Wild Species. 06 01. Accessed 10 30, 2014. http://esrd.alberta.ca/fish-wildlife/species-at-risk/wild-species-status-search.aspx.
- Alberta Environment and Sustainable Resource Development. 2012. *Timber Harvest Planning and Operating Ground Rules Framework for Renewal.* Edmonton, AB: Government of Alberta.
- Alberta Environment. 2009. Towards Environmental Sustainability. Proposed Regulatory Framework for Managing Environmental Cumulative Effects. Edmonton, AB.: Alberta Environment.
- Alberta Government. 2013. Sensitive Species Inventory Guidelines. Edmonton: Government of Alberta.
- Alberta Native Plant Council. 2012. ANPC Guidelines for Rare Plant Surveys in Alberta 2012 Update. Available online at http://www.anpc.ab.ca/content/resources.php, Edmonton, AB.: Alberta Native Plant Council.
- Alberta Native Plant Council. 2000. ANPC Guidelines for Rare Plant Surveys in Alberta. Edmonton, AB.: Alberta Native Plant Council.
- Alberta Sustainable Resource Development. 2005. *Alberta Vegetation Inventory Interpretation Standards, Version* 2.1.1. Edmonton: Alberta Sustainable Resource Development.
- Alberta Sustainable Resource Development, Rangeland Management Branch. 2005. *Range Plant Communities and Range Health Assessment Guidelines for the Foothills Fescue Natural Subregion of Alberta*. Edmonton: Alberta Sustainable Resource Development.

© Westhoff Engineering Resources, Inc.

Westhoff Engineering Resources, Inc.

Page 39

- Bow River Basin Council. 2010. *Bow River Basin: State of the Watershed Summary*. Calgary, AB: Bow River Basin Council.
- Calgary Regional Partnership. 2012. *About the Calgary Regional Partnership*. Accessed December 15, 2014. http://www.calgaryregion.ca/crp/calgary-regional-partnership/about/overview.html.
- Fiera Biological Consulting Ltd. 2010. *Aquatic Environmentally Significant Areas in Alberta*. Edmonton, AB.: Fiera Biological Consulting Ltd.
- Fiera Biological Consulting Ltd. 2014. *Environmentally Significant Areas in Alberta: 2014 Update*. Edmonton, AB: Government of Alberta.
- Forman, R. 1995. "Some general principles of landscape and regional ecology." *Landscape Ecology 10* 133-142.
- Government of Alberta. 2012. *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region.* Edmonton, AB: Government of Alberta.
- Government of Alberta. 2010. Weed Control Regulation. Edmonton, AB.: Alberta Queen's Printer.

Government of Alberta. 1997. Wildlife Act. Edmonton, AB.: Alberta Queen's Printer.

Government of Alberta. 2000. Wildlife Act. Edmonton, AB.: Alberta Queen's Printer.

Government of Canada. 1992. Canadian Environmental Assessment Act. Ottawa, ON.: Minister of Justice.

- Government of Canada. 1994. Migratory Birds Convention Act. Ottawa, ON.: Queen's Printer.
- . 2018. Nesting periods. 10 30. Accessed 12 06, 2019. https://www.canada.ca/en/environment-climatechange/services/avoiding-harm-migratory-birds/general-nesting-periods/nestingperiods.html#_zoneB_calendar.
- -. 2002. Species at Risk Act. Ottawa, ON.
- 2002. Species at Risk Public Registry Species Profile. Accessed 09 2016. http://www.registrelepsararegistry.gc.ca/species/speciesDetails_e.cfm?sid=139.
- —. 2016. Species at Risk Public Registry. Accessed September 1, 2016. http://www.registrelepsararegistry.gc.ca/species/speciesDetails_e.cfm?sid=552.
- Hanson, A., L. Swanson, D. Ewing, G. Grabas, S. Meyer, L. Ross, M. Watmough, and J. Kirkby. 2008. *Wetland* ecological functions assessment: An overview of approaches. Owatta, ON: Canadian Wildlife Service.
- Hegmann, G. C., C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, A. Kingsley, W. Ross, H. Spaling, and D. Stalker. 1999. *Cumulative Assessment Practitioners Guide*. Hull, QC.: AXYS Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency.
- Kershaw, L., J. Gould, D. Johnson, and Lancaster J. 2001. *Rare Vascular Plants of Alberta*. Edmonton, AB: Univ. of Alberta Press and Nat. Resour. Can., Can. For. Serv., North. For. Cent.
- McGillivray, W. B., and G. P. Semenchuk. 1998. *The Federation of Alberta Naturalists: Field Guide to Alberta Birds*. Edmonton, AB: Federation of Alberta Naturalists.
- Moss, E.H. 1983. Flora of Alberta, 2nd Ed.; Revised by J.G. Packer. Toronto, ON: University of Toronto Press.
- Natural Regions Committee. 2006. *Natural Regions and Subregions of Alberta*. Edmonton, AB.: Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.
- Pattie, D., and C. Fisher. 1999. Mammals of Alberta. Edmonton, AB: Lone Pine Publishing.
- Russel, A. P., and A. M. Bauer. 2000. *The Amphibians and Reptiles of Alberta. A Field Guide and Primer of Boreal Herpetology.* Calgary, AB: University of Calgary Press.
- Semenchuck, G.P. (Editor). 1992. *The Atlas of Breeding Birds of Alberta.* Edmonton, AB: Federation of Alberta naturalists.

© Westhoff Engineering Resources, Inc.

WesthoffBiophysical Impact Assessment for
the Ascension Lands
Final Report
August 31, 2020

Smith, H.C. 1993. Alberta Mammals: An Atlas and Guide. Edmonton, AB.: Lone Pine Publishing.
Stebbins, R.C. 2003. Western Reptiles and Amphibians, Third Edition. New York, NY: Houghton Mifflin Company.
Taylor, P. D., L. Fahrig, K. Henein, and G. Merriam. 1993. "Connectivity is a vital element of landscape structure." Oikos 68 571-572.

August 31, 2020

Appendix A Historical Aerial Photographs



and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	West	t hoff Engine and & Water Resou	eering Resou	urces, Inc. Consultants
Note: The serial photograph has been geo-referenced	Date: 11-01-2016	Project No.: WER116-77	Scale: 1:9,500	ΑΡΡ Α
	Title: JUNE 9, 1950			
Project Site	Project: BIOF	PHYSICAL IMP THE ASCI	ACT ASSESSMENSION LAND	MENT FOR S
LEGEND	Client: HIGHFIELD LAND MANAGEMENT			



LEGEND	Client: HIGHFIELD LAND MANAGEMENT			EMENT
Project Site	Project: BIOPHYSICAL IMPACT ASSESSMENT FO THE ASCENSION LANDS			VIENT FOR S
	Title:	AUGU	ST 2, 1966	i
Note: The pariol photograph has been goe referenced	Date: 11-01-2016	Project No.: WER116-77	Scale: 1:9,500	APP A
and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	West La	hoff Engine nd & Water Resou	eering Resou	urces, Inc.



LEGEND Project Site	Client: HIGHFIELD LAND MANAGEMENT Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS			
	Title:	JUNE	E 12, 1974	
Note: The parial photograph has been get referenced	Date: 11-01-2016	Project No.: WER116-77	Scale: 1:9,500	APP A
and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	West	hoff Engine	eering Resou	urces, Inc. Consultants



LEGEND	^{Client:} HIC	SHFIELD LA	ND MANAG	BEMENT
Project Site	Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS			
	Title:	OCTOB	ER 11, 197	7
	Date: 11-01-2016	Project No.: WER116-77	Scale:	APP A
Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	West	hoff Engine	ering Resou	urces, Inc.



P	roject Site	

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.

	HIG	HFIELD LA	ND MANAG	EMENT
Project:	BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS			
Title:		OCTOE	BER 3, 198	1
Date:		Project No.:	Scale:	
11-01-2	2016	WER116-77	1:9,500	APP A
Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants				



LEGEND Project Site	Client: HIGHFIELD LAND MANAGEMENT Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS			
	Title:	ΜΑ	′ 8, 1988	
Note: The serial photograph has been get referenced	Date: 11-01-2016	Project No.: WER116-77	Scale: 1:9,500	APP A
and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants			



Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.

Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants



Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.

Title: JULY 21, 1997 Date: 11-01-2016 Project No.: WER116-77 Scale: 1:9,500 APP A Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants





Note. The achai photograph has been geo-referenced
and is not 100% spatially accurate therefore the project
site boundary may not be 100% accurate.

Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants



Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants



LEGEND Project Site	Client: HIGHFIELD LAND MANAGEMENT Project: BIOPHYSICAL IMPACT ASSESSMENT FOR					
Flojeci Sile	THE ASCENSION LANDS					
	Title: SEPTEMBER 7, 2012					
	Date: Project No.: Scale:					
Note: The earliel photograph has been and referenced	11-01-2016 WER116-77 1:9,500 APP A					
and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants					



Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants					
Note: The parial photograph has been and referenced	Date: 11-01-2	2016	Project No.: WER116-77	Scale: 1:9,500	APP A	
LEGEND Project Site Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	Title: JULY 28, 2014					
	Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS					
LEGEND						



LEGEND	Client: HIGHFIELD LAND MANAGEMENT					
Project Site	Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS					
	Title:	AUGU	ST 22, 201	5		
Note: The sorial photograph has been dee referenced	Date: 11-01-2016	Project No.: WER116-77	Scale: 1:9,500	APP A		
and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	West La	hoff Engine	eering Resou	urces, Inc. Consultants		



LEGEND	Client: HIGHFIELD LAND MANAGEMENT					
Project Site	Project: BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS					
	Title:	APRI	L 17, 2016			
Note: The serial photograph has been gee referenced	Date: 11-01-2016	Project No.: WER116-77	Scale: 1:9,500	APP A		
and is not 100% spatially accurate therefore the project site boundary may not be 100% accurate.	Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants					

Westhoff
Engineering
Resources , Inc.

August 31, 2020

Appendix B Upland Vegetation Data

Vegetation Community Mapping Data Sheet

Engineering Resources, Inc.

Westhoff

Date		Plot #		Observer			
Jun 16, 2017	1			Donald Hodges			
Н	labitat				Project		
Upland Non-native Gras	s			Hawkwood WER116-77			
		C:	+ο Γ	Description			
		31	le L	Description			
Aspect (Degrees)) 5	Slope (%)		Slope Position	Ant	hropoge	nic
South				Low slope (toe)	Natural		
Vegetation Description							
Strata							
B2							
Plants							1
Plant Species	Common N	ame		Plant Species S	cientific Name		%
Canada anemone			Ane	emone canadensis			0
common dandelion			Tara	axacum officinale			0
common yarrow			Ach	illea millefolium			0
creeping thistle			Cirs	sium arvense			2
golden bean			The	rmopsis rhombifolia			0
heart-leaved Alexanders	3		Zizi	a aptera			5
Kentucky bluegrass			Poa	pratensis			1
northern bedstraw			Gal	ium boreale		10	
northern gooseberry			Ribe	es oxyacanthoides		0	
pasture sagewort			Arte	emisia frigida		0	
purple avens			Geı	ım rivale			1
silverweed			Pote	entilla anserina			0
smooth brome			Bro	mus inermis			20
wild strawberry			Frad	garia virginiana			0
Vegetation Description				5 5			
Strata							
С							
Plants							
Plant Species	Common N	ame		Plant Species S	cientific Name		%
buckbrush			Syn	nphoricarpos occidental	is		20
prickly rose			Ros	a acicularis			1
Wildlife Observations							
Wildlife Comm	on Name			Wildlife Scientific Na	ime	# Ob	served
			Со	mments			
Location: South of Wetla	and 2						
Ground Cover: Low Veg	etation 75%;	Litter 25%					
weed Assessment: Cove	er Class U; D ed as 0 (zoro	Istribution Cla	ass i	I			
Photos: 1 - 51° 08' 27 6	$54" - 114^{\circ} 1$	<u>7</u> 6' 11 520"					
Photo #	0-r - 114 T	Photo Desc	rint	ion	Latitude	Long	aitude
1 Grass	v Area South	of Wetland 2			51° 08' 27.654"	114° 16'	11.520"

Photos: 1 - 51° 08' 27.654" - 114° 16' 11.520" Photo Description Plot 1.JPG



Vegetation Community Mapping Data Sheet

Engineering Resources, Inc.

Westhoff

2017 Plot 2. Low Shrub Native Grass

		± //			
Date	Plo)T #	Observer		
Jun 16, 2017	2		Donald Hodges		
Habitat				Project	
Low Shrub Native Grass Hawkwood WER116-77					
		Site [Description		
Aspect (Degrees)	Slope	e (%)	Slope Position	Antl	nropogenic
	· ·		•		
Vegetation Description					
Strata					
B2					
Plants					
Plant Species Con	nmon Name		Plant Species So	cientific Name	%
buckbrush		Syr	mphoricarpos occidentali	S	10
northern gooseberry		Rib	es oxyacanthoides		2
prickly rose		Ros	a acicularis		20
saskatoon		Am	elanchier alnifolia		5
shrubby cinquefoil		Das	siphora fruticosa		15
silverberry		Ela	eagnus commutata		30
Vegetation Description					
Strata					
C					
Plants					
Plant Species Con	nmon Name		Plant Species So	cientific Name	%
bluebur		Lap	pula squarrosa		0
common blue-eyed grass		Sis	yrinchium montanum		0
common yarrow		Ach	nillea millefolium		0
cut-leaved anemone		Ane	emone multifida		0
perennial sow-thistle		Sor	nchus arvensis		0
prairie sagewort		Art	emisia ludoviciana		0
slender wheatgrass		Ely	mus trachycaulus		0
wild strawberry		Fra	garia virginiana		0
Wildlife Observations			<u> </u>		
Wildlife Common N	lame		Wildlife Scientific Na	me	# Observed
		1			I
		Со	mments		
Location: sloped ravine area	near waterco	ourse; south	of two intermittent wat	ercourses in SW	of study area
Ground Cover: Exposed Soil	5; Low Vege	tation 85%;	Litter 10%		
Weed Assessment: Cover Cl	ass 1; Distrib	ution Class 2	2		
Incidental plants recorded as	$() (\pi \circ \pi \circ)$				
$PHOLOS: 1 - 51^{\circ}08^{\circ}25.290^{\circ}$	5 U (Zeru)	()("			
Dhoto #	- 114° 16' 24	.636"	tion	Latituda	Longitudo

Photos: 1 - 51° 08' 25.290" - 114° 16' 24.636" Photo Description *Plot 2.JPG*



Vegetation Community Mapping Data Sheet

Engineering Resources, Inc.

Westhoff

2017 Plot 3A Non-native Grassland

			1				
Date	P	lot #	Observer				
Jun 21, 2017	3		Wayne Bessie				
Habitat Project							
Non-native Grassland		Hawkwood WER116-77					
		Site	Description				
Aspect (Degrees)	Slo	oe (%)	Slope Position	Ant	hropoge	nic	
SW	20		Mid slope	Other			
Vegetation Description							
Strata							
B2							
Plants							
Plant Species Co	mmon Nam	e	Plant Species S	cientific Name		%	
prickly rose		Ro	sa acicularis			10	
Vegetation Description		1				1	
Strata							
С							
Plants							
Plant Species Co	mmon Nam	e	Plant Species S	cientific Name		%	
bluebur		La	ppula squarrosa			10	
creeping thistle		Cii	rsium arvense			5	
golden bean		Th	ermopsis rhombifolia			0	
Kentucky bluegrass		Po	a pratensis			1	
narrow-leaved hawksbeard						2	
northern bedstraw		Ga	alium horeale			5	
pasture sagewort		Δr	temisia frigida			0	
perennial sow-thistle		50	onchus arvensis			0	
auackarass		50				0	
smooth brome		Br	omus inermis			40	
stinkwood						40	
vellow sweet clover						1	
Wildlife Observations		IVIE				1	
Wildlife Common	Namo		Wildlife Scientific Na	mo	# 0h	sorved	
Swainson's Hawk	ivanie	Butoo swa		ine	# UD:	serveu	
		Buleo Swal			<u> </u>		
		C	ommonte				
Location: East Side of Slope	ad Grassland	North Side	of Study Area				
Anthropogenic Other: nativ	e grassland	with ingression	on of non-native species:	possibly cultiva	ted or sur	rface	
disturbed in past	e graceraria	inter ingreeen				1400	
Evidence of erosion on slop	e: open soil,	exposed roc	ks				
Ground Cover: Cobbles trad	ce, Exposed	Soil 30%; Lo	w Vegetation 60%; Litter	r 40%			
Weed Assessment: Cover C	lass 0; Distr	ibution Class	0				
Trace plants recorded as 0	(zero)						
Photos: 1 - 51.14459111	4.264911						
Photo #	Pł	noto Descrip	otion	Latitude	Long	gitude	
1 Non-nativ	ve grass; fac	ss; facing SW 51.144591 -114.264911					


Engineering Resources, Inc.

Westhoff

Date	Plo	ot #	(Observer	
Jun 21, 2017	3		Wayne Bessie		
Habita	t		Project		
Upland Shrub			Hawkwood WER 116-77		
		Site	Description		
Aspect (Degrees)	Slope	e (%)	Slope Position	Ant	hropogenic
SW	28	0 (70)	Mid slope	Natural	nopogorno
Vegetation Description					
Strata					
B2					
Plants					
Plant Species Comr	mon Name	:	Plant Species Sci	entific Name	%
buckbrush		Sy	mphoricarpos occidentalis		5
prickly rose		Ro	sa acicularis		5
saskatoon		Arr	nelanchier alnifolia		50
Vegetation Description					
Strata					
С					
Plants					
Plant Species Com	mon Name		Plant Species Sci	entific Name	%
alumroot					1
Canada goldenrod		So	lidago canadensis		1
creeping thistle		Cir	sium arvense		3
cut-leaved anemone		An	emone multifida		0
golden bean		The	ermopsis rhombifolia		0
harebell		Ca	mpanula rotundifolia		1
Kentucky bluegrass		Poa	a pratensis		1
northern bedstraw		Ga	lium boreale		2
pasture sagewort		Art	Irtemisia frigida		1
smooth aster		Syl	Symphyotrichum laeve		0
stinkweed		Th	hlaspi arvense		0
western wheat grass		Pas	scopyrum smithii		0
wild radish					1
wormseed mustard					0
Wildlife Observations					
Wildlife Common Na	ame		Wildlife Scientific Nam	ie	# Ubserved
		Co	omments		
Location: Middle of Sloped Gr.	assland. No	orth Side of S	Study Area		
Anthropogenic Native Shrubla	ind;				
Evidence of erosion on slope:	open soil				
Ground Cover: Exposed Soil 7	70%; Low V	egetation 20	0%; Litter 10%		
Trace plants recorded as 0 (76	ss I; Distrib ero)	oution Class	2		

Westhoff Engineering	Vegetation Community Mapping Da	ta Sheet	2D. Upland Shrub
Resources, Inc.		2017 PIOL	3B. Upland Shrub
Photos: 1 - 51.14	5488 - 114.267142		
1	Saskatoon Shrubland	51.145488	114.267142

Photos: 1 - 51.145488 - 114.267142 Photo Description *Plot 3B.JPG*



Engineering Resources, Inc.

Westhoff

2017 Plot 3C. Native Grassland

			1			
Date	Plo	ot #		Observer		
Jun 21, 2017	3		Wayne Bessie			
Habita	it		Project			
Native Grassland			Hawkwood WER116-77			
		Site	Description			
Aspect (Degrees)	Slope	e (%)	Slope Position	Antl	nropogenic	
SW	27		Mid slope	Natural		
Vegetation Description						
Strata						
B2						
Plants						
Plant Species Com	mon Name		Plant Species Sc	cientific Name	%	
buckbrush		Syl	mphoricarpos occidentalis	S	20	
prickly rose		Ro	sa acicularis		5	
saskatoon		Arr	nelanchier alnifolia		1	
Vegetation Description						
Strata						
С						
Plants						
Plant Species Com	mon Name		Plant Species Sc	cientific Name	%	
alpine sweet vetch			,		1	
Canada anemone		An	emone canadensis		0	
Canada goldenrod		So	lidago canadensis		2	
common yarrow		Aci	hillea millefolium		0	
creeping thistle		Cir	sium arvense		5	
cut-leaved anemone		An	emone multifida		0	
goat's-beard					0	
golden bean		The	ermopsis rhombifolia		0	
Kentucky bluegrass		Poa	a pratensis		40	
northern bedstraw		Ga	lium boreale	3		
northern bedstraw		Ga	lium boreale		0	
pasture sagewort		Art	emisia frigida		1	
prairie sagewort		Art	emisia ludoviciana		0	
prairie smoke					0	
puccoon					0	
rough fescue					2	
smooth aster		Sy	mphyotrichum laeve		1	
sticky purple geranium		Ge	Geranium viscosissimum		<u>1</u>	
western wheat grass		Pas	scopyrum smithii		0	
white camas		Zig	adenus elegans		0	
wormseed mustard					0	
Wildlife Observations					// Cl	
VVIIdlite Common Na	ame		wildlife Scientific Nai	me	# Ubserved	

Westhoff Engineering Resources, Inc.

2017 Plot 3C. Native Grassland

Location: West Sid	de of Sloped Grassland, North Side of Study Area				
Native Grassland;					
Evidence of erosic	on on slope: open soil, cobbles				
Ground Cover: Co	Ground Cover: Cobbles 2%, Exposed Soil 30%; Low Vegetation 60%; Litter 15%				
Weed Assessment: Cover Class 1; Distribution Class 2					
Trace plants recorded as 0 (zero)					
Photos: 1 - 51.146683 - 114.269509					
Photo #	Photo Description	Latitude	Longitude		
1	native grassland slope	51.146683	114.269509		

Photos: 1 - 51.146683 - 114.269509 Photo Description *Plot 3C.JPG*



Engineering Resources, Inc.

Westhoff

2017 Plot 4. Non-Native Grassland

	1		1				
Date	Plc	ot #	Observer				
Jun 16, 2017	4		Wayne Bessie				
Habita	Habitat			Project			
Non-native Grassland			Hawkwood WER116-77				
		Site	Description				
Aspect (Degrees)	Slope	e (%)	Slope Position	Ant	hropogenic		
SW	4		Low slope (toe)	Other			
Vegetation Description			•				
Strata							
B2							
Plants							
Plant Species Com	mon Name		Plant Species Se	cientific Name	%		
northern gooseberry		Rib	es oxyacanthoides		0		
Vegetation Description							
Strata							
С							
Plants							
Plant Species Com	mon Name		Plant Species S	cientific Name	%		
alfalfa		Me	dicago sativa		2		
Alsike clover					1		
black medick		Me	dicago lupulina		20		
bluebur			opula squarrosa		0		
common blue-eyed grass			yrinchium montanum		0		
common dandelion		Tai	raxacum officinale		20		
creeping thistle		Cir	sium arvense		2		
Kentucky bluegrass		Poa	a pratensis		15		
perennial sow-thistle		So	nchus arvensis		20		
slender wheat grass		Ely	mus trachycaulus ssp. ti	rachycaulus	1		
smooth brome		Bro	omus inermis		5		
stinkweed		Th	laspi arvense	0			
white clover		Tri	Trifolium repens				
wild vetch					0		
Wildlife Observations							
Wildlife Common Na	ame		Wildlife Scientific Na	me	# Observed		
		Сс	omments				
Location: Between southernm	nost reservoi	ir in main cr	eek ravine and Wetland	3			
Formerly cultivated land with	abundance	of weeds	$92 \cdot 1$ ittor 159				
Weed Assessment: Cover Cla	ss 0: Distrib	ution Class	0				
Incidental and Trace plants re	ecorded as 0	(zero)	~				
Photos: 1 - 51.144123 - 114.	270831	. ,					
Photo #	Pho	to Descrip	tion	Latitude	Longitude		
1 Weedy Gras	ssland			51.144123	114.270831		

Photos: 1 - 51.144123 - 114.270831 Photo Description *Plot 4.JPG*



Engineering Resources, Inc.

Westhoff

2017 Plot 5 Deciduous Woodland

Date	Plot #			Observer		
Jun 16, 2017	5	Dona	ld Hodges			
Habita	Habitat		Project			
Aspen Woodland		Hawk	wood WER116-77	y		
-						
	S	ite Descr	iption			
Aspect (Degrees)	Slope (%)		Slope Position	Ant	hropoger	nic
N		Mid s	lope	Natural		
Vegetation Description						
Strata						
A1						
Plants						1
Plant Species Comr	non Name		Plant Species Sc	ientific Name		%
aspen		Populus	tremuloides			40
Vegetation Description						
Strata						
B2						
Plants			<u> </u>			
Plant Species Comr	non Name	- ·	Plant Species Scientific Name			%
aspen		Populus	Populus tremuloides			0
Canada buffaloberry		Shepher	Snepherdia canadensis			5
northern gooseberry		Ribes ox	yacanthoides			2
prickly rose		Rosa acio	cularis			15
wild red raspberry		Rubus id	Rubus Idaeus			0
willow		Salix sp.				0
Vegetation Description						
Strata						
C						
Plants		1	<u></u>			
Plant Species Comr	non Name		Plant Species Sc	ientific Name		%
alpine sweet vetch		-				10
common dandelion		Taraxacu				5
cut-leaved anemone		Anemone	Anemone multifida			0
smooth brome		Bromus	romus inermis			5
star-flowered Solomon's-seal		Maianthe	laianthemum stellatum			5
wild strawberry		Fragaria	ragaria virginiana 2		2	
Wildlife Observations					" 01	
Wildlife Common Name		VVIIC	Wildlife Scientific Name # Ok		# 069	served
Mule Deer	Udocoll	eus nemic	onus		1	
		Commo	nto			
Location: Middle aspen grove	in lower crock ravir		nts			
Ground Cover: Low Vegetation	n 65%: Litter 35%					
Weed Assessment: Cover Clas	ss 1; Distribution Cl	ass 1				
Incidental plants recorded as	0 (zero)					
Mule deer just outside of aspe	n in low shrub					

Westhoff Engineering	Vegetation Community Mapping Da	ata Sheet	
Resources, Inc.		2017 Plot 5 Dec	ciduous Woodland
Photos: 1 - 51° 08	3' 26.719" - 114° 16' 17.55"		
1	Aspen Woodland	51° 08' 26.719"	114° 16' 17.55"

Photos: 1 - 51° 08' 26.719" - 114° 16' 17.55" Photo Description Plot 5.JPG



Engineering Resources, Inc.

Westhoff

2017 Plot 6. Low Shrub Native Grass

Date	Plot #	C	bserver	
Jun 16, 2017	6	Donald Hodges		
Habita	at		Project	
Low Shrub Native Grass		Hawkwood WER116-77		
	S	ite Description		
Aspect (Degrees)	Slope (%)	Slope Position	Anthropo	ogenic
S		Mid slope	Natural	
Vegetation Description	·			
Strata				
A1				
Plants		· · · · · · · · · · · · · · · · · · ·		
Plant Species Com	mon Name	Plant Species Scie	entific Name	%
aspen		Populus tremuloides		5
Vegetation Description				
Strata				
A2				
Plants				
Plant Species Com	mon Name	Plant Species Scie	entific Name	%
aspen		Populus tremuloides		2
willow		Salix sp.		2
Vegetation Description				
Strata				
B2				
Plants				
Plant Species Com	mon Name	Plant Species Scie	entific Name	%
buckbrush		Symphoricarpos occidentalis		2
Canada buffaloberry		Shepherdia canadensis		1
northern gooseberry		Ribes oxyacanthoides		1
prickly rose		Rosa acicularis		2
silverberry		Elaeagnus commutata		1
Vegetation Description				
Strata				
С				
Plants				
Plant Species Com	mon Name	Plant Species Scie	entific Name	%
alpine sweet vetch				2
common blue-eyed grass		Sisyrinchium montanum		5
common dandelion		Taraxacum officinale		2
common yarrow		Achillea millefolium		5
creeping thistle		Cirsium arvense		
cut-leaved anemone		Anemone multifida		5
Kentucky bluegrass		Poa pratensis		15
northern bedstraw		Galium boreale		10
prairie sagewort		Artemisia ludoviciana		2
prairie smoke				10

Westhoff Engineering Resources, Inc.

2017 Plot 6. Low Shrub Native Grass

Plants						
shepherd's-purse			Capsella bursa-pastoris			1
smooth brome			Bromus inermis			1
star-flowered Solo	omon's-seal		Maianthemum stellatum		2	
stinkweed			Thlaspi arvense			1
wild strawberry			Fragaria virginiana			5
wild vetch						1
Wildlife Observat	ions				_	
Wildlife (Common Name	Wildlife Scientific Name # Obs			served	
Clay-colored Spar	row	Spizella pallida 1				
Mule Deer		Odocoileus hemionus 1				
			Comments			
Location: Norther	n extent of smaller ravir	nes west	t of main ravine			
Ground Cover: Ba	are Soil 1%; Low Vegeta	tion 909	%; Litter 9%			
Weed Assessment: Cover Class 1; Distribution Class 2						
Photos: 1 - 51° 08	3' 25.944" - 114° 16' 25	.464"				
Photo #	Pho	oto Dese	cription	Latitude	Long	gitude
1	Low Shrub - Native Gra	ass Habitat 51° 08' 25.944" 114° 16' 25.46				25.464"

Photos: 1 - 51° 08' 25.944" - 114° 16' 25.464" Photo Description *Plot 6.JPG*



Westhoff
Engineering
Resources , Inc.

August 31, 2020

Appendix C Rare Plant Sampling Map



LEGEND

- Project Site
- Rare Plant Survey Points
- Rare Plant Survey Tracks
- - Top of Break

- Transitional

Watercourses

- Ephemeral
- Deciduous Woodland
- Cultivated Residence

Wetland

- Low Shrub/Disturbed Grassland
- Low Shrub/Native Grassland
- Non-native Grassland
- Tall Shrub

Dugout

- Imagery Source: Valtus Imagery

Client:	HIGHFIELD L	AND MANAG	MENT	
Project: BIC	BIOPHYSICAL IMPACT ASSESSMENT FOR THE ASCENSION LANDS			
Title: RARE PLANT SURVEY LOCATIONS				
Date: 10-17-2016	Project No.: WER116-77	Scale: 1:4,500	Арр С	
Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants				

Westhoff	Biophysical Impact Assessment for
Engineering	the Ascension Lands
Resources, Inc.	Final Report August 31, 2020

Appendix D Wetland Data

Alberta	Government
---------	------------

Function (ABWRET-A Raw Score)	1	3	2	4
Surface Water Storage (WS)	5.90	3.03	5.74	2.77
Stream Flow Support (SFS)	0.00	3.43	0.00	4.16
Streamwater Cooling (WC)	0.00	4.36	0.00	4.65
Sediment & Toxicant Retention & Stabilization (SR)	10.00	3.95	10.00	2.78
Phosphorus Retention (PR)	10.00	3.55	10.00	2.91
Nitrate Removal & Retention (NR)	10.00	4.38	10.00	3.94
Organic Nutrient Export (OE)	0.00	3.79	0.00	5.36
Fish Habitat (FH)	0.00	0.00	0.00	0.00
Aquatic Invertebrate Habitat (INV)	4.42	6.12	4.70	5.74
Amphibian Habitat (AM)	3.90	3.22	3.16	3.33
Waterbird Habitat (WB)	5.49	4.11	5.17	5.07
Songbird, Raptor, & Mammal Habitat (SBM)	5.08	4.17	3.62	4.21
Pollinator & Native Plant Habitat (PH)	4.20	3.81	3.11	3.92
Human Use & Recognition (HU)	3.18	2.65	2.74	2.74
Function (ABWRET-A Normalized Score)	1	3	2	4
Surface Water Storage (WS)	0.80	0.30	0.77	0.25
Stream Flow Support (SFS)	0.00	0.56	0.00	0.68
Streamwater Cooling (WC)	0.00	0.64	0.00	0.68
Sediment & Toxicant Retention & Stabilization (SR)	1.00	0.22	1.00	0.07
Phosphorus Retention (PR)	1.00	0.22	1.00	0.14
Nitrate Removal & Retention (NR)	1.00	0.13	1.00	0.06
Organic Nutrient Export (OE)	0.00	0.58	0.00	0.83
Fish Habitat (FH)	0.00	0.00	0.00	0.00
Aquatic Invertebrate Habitat (INV)	0.42	0.64	0.46	0.59
Amphibian Habitat (AM)	0.54	0.43	0.42	0.45
Waterbird Habitat (WB)	0.44	0.27	0.40	0.39
Songbird, Raptor, & Mammal Habitat (SBM)	0.65	0.48	0.38	0.49
Pollinator & Native Plant Habitat (PH)	0.43	0.36	0.24	0.38
Human Use & Recognition (HU)	0.42	0.32	0.33	0.34
Normalized Score (ABWRET_A) Based on Wetlands in RWVAU	1	3	2	4
Normalized Hydrological Health (HH)	0.80	0.56	0.77	0.68
Normalized Water Quality (WQ)	1.00	0.64	1.00	0.83
Normalized Ecological Health (EH)	0.65	0.64	0.46	0.59
Normalized Human Use (HU)	0.42	0.32	0.33	0.34
RWVAU #	13	13	13	13
Normalized Value Score (ABWRET_a)	0.78	0.58	0.70	0.66
Value Category (a, b, c, d)	с	d	d	d
Abundance Factor	1	1	1	1
Final Score(A, B, C, D)	В	С	С	С

Donald Hodges

From:	Sarina Sibbio <sarina.sibbio@gov.ab.ca></sarina.sibbio@gov.ab.ca>
Sent:	Thursday, May 4, 2017 10:54 AM
То:	Donald Hodges
Subject:	FW: Crown Claimed Wetlands in SW/SE-19-25-2 W5M

Correct Legal Description is Range 2 as stated in the Subject line and not Range 5 as stated in the body of your original submission.

Sarina

From: AEP Water-Boundaries
Sent: Thursday, May 04, 2017 10:48 AM
To: 'Donald Hodges'
Subject: RE: Crown Claimed Wetlands in SW/SE-19-25-2 W5M

Hi Donald!

I have completed my review of our documentation and historical air photo record along with satellite imagery from 1999 to 2015 inclusive.

According to my review, as well as the on-site photographs you have provided, confirms what we have viewed/determined. The <u>Crown will assert a claim</u> to the naturally occurring bed and shore of the <u>lower reaches</u> of the <u>"Unnamed Creek"</u> under Section 3 of the Public Lands Act. The <u>upper reaches</u> of the <u>"Unnamed Creek"</u>, does not meet the criteria of a water course in the Department Policy Directive. Wetland 2 and Wetland 3, shown on the attached Figure 1 sketch dated 10-14-2016 of "The Hawkwood Lands", also do not meet the criteria of a water body in the Department Policy Directive. As such, the Crown will not assert a claim to the <u>upper reaches</u> of the <u>"Unnamed Creek"</u> and to "Wetland 2 and Wetland 3" under Section 3 of the Public Lands Act.

A review of our records and historical air photo record indicates "Wetland 1" which is also shown on the Figure 1 sketch you attached in your original submission is a claimable water body. The Crown owns the permanent and naturally occurring bed and shore under Section 3 of the Public Lands Act.

Note: This assessment of water body ownership should not be taken to mean that authority has been granted under the provincial Water Act to alter, infill, or drain a water body. Please contact your local Environment office for additional information regarding approval requirements.

If you require any further explanation or need to discuss the above, I can be reached at 780-415-4625 or by Email at <u>Sarina.Sibbio@gov.ab.ca</u>.

R. Sarina Sibbio Senior Waterbody/Boundary Research Analyst Provincial Wetlands & Water Boundaries Unit Provincial Programs Branch Operations Division Alberta Environment and Parks From: Donald Hodges [mailto:DHodges@westhoff.ab.ca]
Sent: Monday, October 31, 2016 3:31 PM
To: Water Boundaries
Cc: Karen Oldershaw
Subject: Crown Claimed Wetlands in SW/SE-19-25-2 W5M

Good Afternoon

Please review to determine if any of the Project Site wetlands and/or drainages are Crown claimed.

The Project Site is located in SW/SE-19-25-5 W5M and consists of several wetlands, drainages and a creek.

Please find the attached pdf documents including a Project Site wetland figure and a wetland inventory data table.

Thank you and have a good day.

Don Hodges Environmental Specialist

Westhoff Engineering Resources, Inc.

Land & Water Resources Management Consultants

Suite 601, 1040 7th Avenue, SW Calgary, AB T2P 3G9

Phone: 403.264.9366, ext. 242 Fax: 403.264.8796 Email: <u>dhodges@westhoff.ab.ca</u>

This email is confidential and may also be privileged. If you are not the intended recipient, please notify us and delete this message from your system immediately. Any personal data in this email (including all attachments) must be handled in accordance with applicable data protection laws.

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error please notify the system manager. This message contains confidential information and is intended only for the individual named. If you are not the named addressee you should not disseminate, distribute or copy this e-mail.

WETLAND ASSESSMENT SURVEY DATA SHEET

Westhoff Engineering Resources, Inc.

Project	Da	ate	Wetland		Location		
WER116-77 Hawkwood	Jun 26, 201	17	1				
Adjacent Land	duse		Observer(s)		Wetland Class		
Road, Cropland	1	Wayne Bes	ssie Permanent S		Shallow Open Water		
Surface Water	% Tre	e Cover	%	Shrub Co	ver	% Shallow (Open Water
Y	0		5			50	
Wetland Vegetation Zo	one						
		Zone				Deepest Zone %	6 of Total Area
Open Water						50	
Plants				1			
ŀ	Plant Speci	es			Plant Scier	ntific Name	%
algae							20
pondweed							40
spiked water-milfoil				Myriophyllu	um sibiricum		25
water smartweed				Persicaria a	amphibia		<1
white water crowfoot							1
Wetland Vegetation Zo	one						· · · · · ·
		Zone				Deepest Zone 9	6 of Total Area
Shallow Marsh							
Plants					Dianat Calan		0/
t had any looved buttoreu	Plant Speci	es		Donungulur			%
celery-leaved buttercu	h			Ranunculu:			< 1
							40
common dandellon				Taraxacum	officinale		< 1
					/ense		5
				Poa palustr	TS		5
Iowi manna grass				Hordeum jubatum			5
foxtall barley				Hordeum J			
needle spike-rusn				Eleocharis			< 1
northern willowherb							2
perennial sow-thistie							10
silverweed							10
slough grass				Beckmanni	a syzigachne	!	30
vvetland vegetation Zo	one	7000				Deepest Zope 9	(of Total Araa
Shrubby Swamp		ZUNE				Deepest Zone /	
Diants							
	Plant Speci	<u>es</u>			Plant Scier	tific Name	%
beaked willow		00		Salix hebbiana			30
Canada anemone					anadensis		5
Canada goldenrod				Solidado ca	anadensis		5
common horsetail				Fauisetum	arvense		30
beart-leaved Alexande	ars		Zizia aptora			1	
northern bedstraw	15		Calium boroalo			5	
northern gooseherry					cantholdes		2
shrubby cinquefoil					fruticosa		5
star_flowered Solomon	1's_seal			Majanthom	um stellatum)	5
wire rush	13 3001			luncus balt	ticus	ı 	5
Wetland Vegetation 7	ne			Puncus Dall	licus		5
		Zone				Deenest 7one %	6 of Total Area
Wet Meadow		20110					

WETLAND ASSESSMENT SURVEY DATA SHEET

Westhoff Engineering Resources, Inc.

Plants						
Plant Species	Plant Scientific Name		%			
awned sedge	Carex atherodes		5			
celery-leaved buttercup	Ranunculus sceleratus		<1			
common great bulrush	Schoenoplectus tabernae	emontani	1			
fowl manna grass	Glyceria striata		40			
needle spike-rush	Eleocharis acicularis		2			
perennial sow-thistle	Sonchus arvensis		10			
perennial sow-thistle	Sonchus arvensis		2			
silverweed	Potentilla anserina		5			
small bottle sedge	Carex utriculata		1			
water smartweed	Persicaria amphibia		1			
wire rush	Juncus balticus		5			
Wetland Vegetation Zone						
Zone		Deepest Zone %	of Total Area			
Wetland-low-prairie						
Plants						
Plant Species	Plant Scien	tific Name	%			
creeping thistle	Cirsium arvense		1			
fowl bluegrass	Poa palustris		5			
perennial sow-thistle	Sonchus arvensis		10			
quackgrass	Elymus repens		<1			
silverweed	Potentilla anserina		2			
wire rush	Juncus balticus		35			
Wildlife Observations						
Wildlife Common Name	Widl	ife Scientific Name				
American Wigeon	Anas americana					
Black-billed Magpie	Pica hudsonia					
Canada Goose	Branta canadensis	Branta canadensis				
Gadwall	Anas strepera	Anas strepera				
Mallard	Anas platyrhynchos	Anas platyrhynchos				
Muskrat	Ondatra zibethicus					
Com	ments (disturbance etc)					
			- · · - · - · ·			

Wetland Low-Prairie - 1-25%; Wet Meadow 1-25%; Shallow Marsh 1-25%; Deep Marsh 0; Open Water 26-50% Cover Type 3

Subclass Slightly brackish - inferred from vegetation

Weed ratings: Canopy Cover - 1; Distribution - 2

Wetland 1 shows evidence of having a higher water level in the recent past. The older wet meadow is drying into a low prairie zone and the new wet meadow is inside or at the same distance from centre of the shallow marsh A small shrub swamp area occurs and is surrounded by riparian shrub and upland forest.

Photos: 1 - 51.14053 - 114.269051

110103.1 01.14000	114.207031		
Photo #	Photo Description	Latitude	Longitude
1	View of Wetland 1 from north edge	51.14053	114.269051

Photos: 1 - 51.14053 - 114.269051 Photo Description *Wetland 1, Facing South.JPG*



WETLAND ASSESSMENT SURVEY DATA SHEET

Engineering Resources, Inc.

Westhoff

Project	Da	ate	Wetland			Location		on
wer116-77 Hawkwood	Jun 26, 201	17	2					
Adjacent Land	duse	(Observer(s)			Wetl	Wetland Class	
Cropland and native gras	s/low shrub	Wayne Bess	sie		Temporary	Marsh		
Surface Water	% Tree	e Cover	%	Shrub Cov	/er	% S	hallow Op	en Water
N	0		0			0		
Wetland Vegetation Zo	one		•					
		Zone				Deepes	t Zone % d	of Total Area
Wetland-low-prairie								
Plants								
F	Plant Speci	es			Plant Scier	ntific Name		%
awned sedge				Carex ather	rodes			2
beaked willow				Salix bebbia	ana			2
Canada anemone				Anemone c	anadensis			2
creeping thistle				Cirsium arv	rense			5
silverweed				Potentilla a	nserina			5
small bottle sedge				Carex utrice	ulata	5		50
smooth brome				Bromus inermis			5	
western dock				Rumex occidentalis				1
Wetland Vegetation Zo	one			·				·
		Zone				Deepes	t Zone % d	of Total Area
Wet-meadow						50		
Plants				1				
F	Plant Speci	es			Plant Scier	ntific Name		%
awned sedge				Carex atherodes 75			75	
water smartweed				Persicaria amphibia 2				
Wildlife Observations								
Wildli	fe Commor	n Name		Widlife Scientific Name				
		(Comments	(disturban	ce etc)			
Low prairie zone: 26-5	50%; Wet M	eadow Zone	: >50%					
Cover Class 1								
Subclass Fresh - Inferr	Class 1. Dis	jetation	ttorn 2					
weed Ranking: Cover Class 1; Distribution Pattern 2								
Photos: 1 - 51° 08' 27	438" - 114°	16' 11 646		and along th				
Photo #		Photo De	escription		Lati	tude		naitude
1	View of Weth	and 2 from ri	parian edue o	n east side	51° 08' 27.4	438"	114° 16' 11	.646"
1.1								

Photos: 1 - 51° 08' 27.438" - 114° 16' 11.646" Photo Description *Wetland 2, facing west.JPG*



WETLAND ASSESSMENT SURVEY DATA SHEET

Westhoff Engineering Resources, Inc.

Project	Da	ate	Wetland			Location			
WER116-77	Jun 16, 20	17	3			Hawkwood			
Adjacent Lan	duse		Observer(s)			Wetland Class			
Cropland and Non-nat	ive Grass	Donald Hoc	lges; Wayne	Bessie	Temporary	Shrubby Sw	amp		
Surface Water	% Tre	e Cover	%	Shrub Cov	/er	% 5	Shallow Op	en Water	
N	0		40			0			
Wetland Vegetation Z	one								
		Zone				Deepes	st Zone %	of Total Area	
Wetland-low-prairie									
Plants				1				1	
	Plant Speci	es			Plant Scier	ntific Name	2	%	
common dandelion				Taraxacum	officinale			20	
common horsetail				Equisetum	arvense			5	
creeping thistle				Cirsium arv	rense			2	
Kentucky bluegrass				Poa pratens	SIS			15	
perennial sow-thistle				Sonchus ar	vensis			5	
smooth brome				Bromus ine	rmis			5	
willow				Salix sp.				1	
wire rush				Juncus balt	icus			10	
Wetland Vegetation Z	one	7000				Deenee	+ 7000 0/	of Total Area	
Mat maadaw zana		Zone				Deepes	at Zone %	or rotal Area	
Plants						80			
	Plant Sneci	es			Plant Scier	ntific Name	•	%	
		00						/0	
blueioint				Calamagros	stis canaden	sis		5	
common cattail				Typha latifolia				incidental	
common dandelion				Taraxacum officinale				5	
common horsetail				Equisetum	arvense		10		
creeping thistle				Cirsium arv	Zirsium arvense			5	
fowl bluegrass				Poa palustr	stris			10	
northern gooseberry				Ribes oxva	anthoides			incidental	
perennial sow-thistle				Sonchus ar	vensis			10	
silverweed				Potentilla a	nserina	serina			
willow				Salix sp.				60	
wire rush				Juncus balt	icus			20	
Wildlife Observations									
Wildl	ife Commo	n Name		Widlife Scientific Name					
				4					
			Comments	(disturban	ce etc)				
Low Prairie Zone: 1-2	5%; Wet Me	adow Zone:	> 50%						
Subclass: Fresh - inte	rpreted from	vegetation	presence						
Weed Scores: Cover C	Jass - 1, Dis	stribution Pa	ttern 1						
Photos: 1 - 51° 08' 37	.326" - 114°	Dhata D			1	tudo		poitude	
	M/III and Con		escription						
1	IVVIIIOW SWA	mp - wetlar	เนง		$151^{\circ}08^{\circ}3/.$	320	1114 16 1	1.220	



WETLAND ASSESSMENT SURVEY DATA SHEET

Westhoff Engineering Resources, Inc.

	1		1			1	
Project	Da	ate	Wetland		Location		
WER116-77	Jun 21, 201	7	4		Hawkwood		
Adjacent Land	duse	(Observer(s)		Wetland Class		
Cropland and Non-nati	ive Grass	Donald Hod	Donald Hodges; Wayne Bessie Temporary G		Graminoid Marsh		
Surface Water	% Tre	e Cover	%	Shrub Cov	ver	% Shallow Op	en Water
Υ	0		5			0	
Wetland Vegetation Zo	one					1	
		Zone				Deepest Zone %	of Total Area
Wetland-low-prairie							
Plants							
	Plant Speci	es		<u> </u>	Plant Scier	ntific Name	- %
buckbrush				Symphorica	arpos occidei	ntalis	5
Canada anemone				Anemone c	anadensis		5
common dandelion				Taraxacum	officinale		2
common yarrow				Achillea mil	llefolium		1
creeping thistle				Cirsium arv	vense		5
Kentucky bluegrass				Poa pratens	sis		15
perennial sow-thistle				Sonchus ar	vensis		5
prickly rose				Rosa acicul	aris		5
purple avens				Geum rival	e		1
smooth brome				Bromus ine	ermis		15
sticky purple geranium	1			Geranium v			incidental
wild strawberry				Fragaria virginiana			1
wild vetch							1
wire rush				Juncus balticus			
Wetland Vegetation Zo	one	7				Description of	
		Zone				Deepest Zone %	of Total Area
Wet-meadow						40	
	Plant Spoci	30			Plant Scior	atific Namo	0/
huckbrush		63		Symphorics	arnos occider	ntalis	incidental
Canada anemone					anadensis		5
				Taraxacum officinale			2
common horsetail				Equisetum arvense			10
creening thistle				Cirsium arv	vense		2
fowl bluegrass				Poa nalustr	is		10
aolden dock				Rumex fue	ninus		incidental
perennial sow-thistle				Sonchus ar	vensis		5
prickly rose				Rosa acicul	aris		incidental
Sartwell's sedge				Carex sarty	vellii		5
wild mint				Mentha arv	ensis		2
wire rush						15	
Wildlife Observations							
Wildlife Common Name			Widlife Scientific Name				
				1			
		(Comments	(disturban	ce etc)		
Low Prairie Zone: 26-5	50%; Wet M	eadow Zone	: 26-50%				
Cover Type 1	Cover Type 1						
Subclass Fresh - interp	preted from	vegetation	Harp 2				
weed Scores: Cover C	iass - 1; Dis	stribution Pa	iiern 2				

Westhoff Engineering	WETLAND ASSESSMENT SURVEY DATA SHEET						
Resources, Inc.			2017 Wetland 4				
Photos: 1 - 51° 08' 44.172" - 114° 16' 16.824"							
Photo #	Photo Description	Latitude	Longitude				
1	Wetland 4 - shallow creek ravine	51° 08' 44.172"	114° 16' 16.824"				

Photos: 1 - 51° 08' 44.172" - 114° 16' 16.824" Photo Description *Wetland 4.JPG*



Appendix 7

2017 June 26 Wetland 1; Site 1

Instructions: Complete	e this form for the plant	communi	ty at the b	oundary b	etween wet	land and r	on-wetland.
QWSP Investigator Company Name		Date		Project Name		Wetland #	
Wayne Bessie	Westhoff Engineering R	esources	Jun 26, 2017		WER116-77 Hawkwood 1		1
Legal land description of wetland							
SEC	TWP		RNG			MER	
19 25		02			05		
Plots		1			1		
Plot #	Stratum	Plot te	chnique	Plot loca	ation (Lat)	Plot loc	ation (Long)
1	Ground	1 x 1		51.139866		114.26961	2
Primary Indicator Observed	(Circle and describe below	v)				1	
V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots ection							
v2. Surface encrustations	s of algae are present?				No		
V3. The presence of a dor	minant groundcover of	peat moss	es (Sphag	num spp.)	No		
V4. Diminished rigor and	productivity of upland	species in	disturbed	areas	No		
V5. Evidence of morpholo (e.g. floating leaves, infla	ogical adaptations of pla ated stems, adventitious	ints to sat s roots)	urated cor	nditions	No		
Other Comments							
Wetland Species							
Common name of species	Scientific name of s	pecies	Facultativ	ve Wetland Wetland sp	or Obligate p	% Rela abunc	tive cover of ant species
common horsetail	Equisetum arven	se		No	No		<1
common skullcap				Yes			<1
creeping thistle	Cirsium arvense	9		No			5
fowl bluyegrass				Yes			10
perennial sow-thistle	Sonchus arvens	is		No			2
silverweed	Potentilla anserir	าล		No			1
wire rush	Juncus balticus		Yes				30
Jpland Species	1						
Common name of species	Scientific name of s	pecies	Facultativ	ve Wetland Wetland sp	or Obligate p	% Rela abunc	tive cover of ant species
beaked willow	Salix bebbiana			Yes			35
Canada anemone	Anemone canader	nsis		No			2
common dandelion	Taraxacum officin	ale		No			<1
common horsetail	Equisetum arven	se		No			10
creeping thistle	Cirsium arvense	e		No			2
fowl bluegrass	Poa palustris			Yes			10
marsh skullcap				Yes			<1
perennial sow-thistle	Sonchus arvens	is		No			1
shrubby cinquefoil	Dasiphora frutico	sa		No			5
Star-flowered Solomon's-seal	· ·			No			1
wild vetch				No		<1	
wire rush	Juncus balticus			Yes			10
vellow avens	Geum aleppicur	n		Yes			1

Appendix 7

Soils	
Soil Pit Depth (cm)	42
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties asso tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 of 5	No Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water stained leaves	No

Appendix 7 2017 June 26 Wetland 1; Sit						
Soil Horizon: B						
H	orizon	Depth (cm) Munsell Soil Colour Soil Value Soil Chr		Chroma		
В		28	2.5 Y	4	2	
Widlife Observations						
Wildlife Common Name			Wildlife Scientific Name			# Observed
Comments						
UTM Easting: 690998 UTM Northing: 5668924 Soil texture: Sandy Clay Site Moisture Regime: Hygric Mottles: 3-5% Weak mottles at 28cm Upland soils - No mottles, 10YR 3/2 silty-clay, hygric Wetland edge is at the area with low height/open willows (shrub swamp); the upland site is in riparian willows with upland soils						
Photos						
Photo #	Photo Description			Latitude	Longitude	
1	Wetland Habitat			51.139866	114.269612	
2	Wetland Soil Pit			51.139866	114.269612	

Photos: 1 - 51.139866 - 114.269612 Photo Description *Wetland1Site1 Habitat.JPG*



Photos: 2 - 51.139866 - 114.269612 Photo Description *Wetland1Soil Pit1Wetland.JPG*


2017 June 26 Wetland 1; Site 2

Instructi	ons: Complete	this form for the plant	communit	y at the b	oundary be	etween wet	land and n	on-wetland.		
QWSP I	QWSP Investigator Company Name Date			Projec	Project Name Wetland #					
Wayne Bessi	ie	Westhoff Engineering R	esources	Jun 26, 2	017	WER116-77 Hawkwood 1				
	Legal land description of wetland									
SEC		TWP		RNG			MER			
19	25		02			05				
Plots										
F	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat)	Plot loca	ation (Long)		
2		Ground	1 x 1		51.140125		114.269433	3		
Primary Indi	icator Observed	(Circle and describe belov	v)							
V1. Hydrop species in t 20 percent species in t	hytic species c he community or more areal o he plots ection	over more than 50 perc or plot (An abundant s cover in the community	cent of the pecies is a or plot). I	abundan plant spe _ist all ab	t plant ecies with undant	Yes				
V2. Surface	encrustations	of algae are present?				No				
V3. The pre	esence of a dom	ninant groundcover of p	peat mosse	es (Sphag	num spp.)	No				
V4. Diminis	hed rigor and	productivity of upland s	species in o	disturbed	areas	No				
V5. Evidenc (e.g. floatir	ce of morpholog ng leaves, infla	gical adaptations of pla ted stems, adventitious	nts to satu s roots)	urated con	nditions	No				
Other Comr	ments									
Wetland Spe	cies									
Common na	ame of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland spj	or Obligate	% Relat abunda	tive cover of ant species		
awne	ed sedge	Carex atherodes	5		Yes			10		
creepi	ng thistle	Cirsium arvense	9		No			5		
fowl b	oluegrass	Poa palustris			Yes			10		
Kentuck	y bluegrass	Poa pratensis			No			20		
perennia	I sow-thistle	Sonchus arvensi	S		No			5		
silve	erweed	Potentilla anserir	na		No			2		
wir	e rush	Juncus balticus			Yes			10		
Upland Spec	ies									
Common na	ame of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland spj	or Obligate o	% Relat abunda	tive cover of ant species		
commo	on yarrow	Achillea millefoliu	m		No			5		
creepi	ng thistle	Cirsium arvense	e e e e e e e e e e e e e e e e e e e		No			2		
Kentuck	y bluegrass	Poa pratensis			No			40		
northern	gooseberry	Ribes oxyacanthoi	des		No			1		
perennia	I sow-thistle	Sonchus arvensi	S		No			5		
prairie	sagewort	Artemisia ludovicia	ana		No			<1		

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 of 5	No Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water stained leaves	No

Appendix 7 2017 June 26 Wetland 1; Site 2								
Soil Horizor	n: B							
Н	orizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil	Chroma		
В		25	2.5 Y	3	1			
Widlife Obs	ervations							
	Wildlife Com	mon Name	Wilc	llife Scientific Name		# Observed		
			Comments					
UTM Easting UTM Northin Soil texture Site Moistur Mottles: we Upland soils	g: 691010 ng: 5668953 : Sandy Clay wit re Regime: Hygri ak mottles s - No mottles, 10	h coarse fragments and c c DYR 3/2, deep Ah horizon	obbles , silty-clay loam, subb	nygric				
Photos								
Photo #		Photo Description	1	Latitude	Lor	ngitude		
1	Wetland Habitat			51.140125	114.269433	3		
2	Wetland Soil Pit			51.140125	114.269433	3		



Photos: 2 - 51.140125 - 114.269433 Photo Description *Wetland1Soil Pit2Wetland.JPG*



2017 June 26 Wetland 1; Site 3

Instruct	ions: Complete	this form for the plant	communi	ty at the b	oundary b	etween wet	land and r	ion-wetland.
QWSP	Investigator	Company Nai	ne		Date	Projec [®]		Wetland #
Wayne Bess	sie	Westhoff Engineering R	esources	Jun 26, 2	017	WER116-77 Hawkwood 1		1
		Legal la	nd descri	otion of w	etland			
SEC		TWP		RNG			MER	
19	25		02			05		
Plots								
	Plot #	Stratum	Plot te	chnique	Plot loca	ation (Lat)	Plot loc	ation (Long)
3		Ground	1 x 1	•	51.14053		114.26905	1
Primary Ind	dicator Observed	(Circle and describe below	v)					
V1. Hydroj species in 20 percent species in	ohytic species c the community t or more areal the plots ection	over more than 50 perc or plot (An abundant s cover in the community	cent of the pecies is a or plot).	e abundan a plant spe List all ab	t plant ecies with undant	Yes		
V2. Surfac	e encrustations	of algae are present?				No		
V3. The pr	esence of a don	ninant groundcover of p	peat moss	es (Sphag	num spp.)	No		
V4. Dimini	shed rigor and	productivity of upland s	species in	disturbed	areas	No		
V5. Eviden (e.g. floati	ice of morpholo ing leaves, infla	gical adaptations of pla ted stems, adventitious	nts to sat s roots)	urated co	nditions	No		
Wetland Sp	ecies							
Common r	name of species	Scientific name of s	pecies	Facultativ	ve Wetland Wetland sp	or Obligate p	% Rela abund	tive cover of ant species
beak	ked willow	Salix bebbiana			Yes			5
Canad	a goldenrod	Solidago canaden	sis		No			1
comn	non yarrow	Achillea millefoliu	Im		No			1
creep	oing thisIte				No			2
fowl m	nanna grass	Glyceria striata			Yes			5
Kentuc	ky bluegrass	Poa pratensis			No			5
perenni	al sow-thistle	Sonchus arvens	S		No			5
silv	verweed	Potentilla anserir	าล		No			2
W	ire rush	Juncus balticus			Yes			30
Jpland Spe	cies							
				Facultativ	ve Wetland	or Obligate	% Rela	tive cover of
Common r	name of species	Scientific name of s	pecies		Wetland sp	p	abund	ant species
bu	ckbrush	Symphoricarpos occid	entalis		No			2
Canad	la anemone	Anemone canader	nsis		No			2
Canad	a goldenrod	Solidago canaden	sis		No			5
comn	non yarrow	Achillea millefoliu	Im		No			<1
creep	ping thistle	Cirsium arvense	9		No			5
Kentuc	ky bluegrass	Poa pratensis			No			35
long-leav	ved chickweed	Stellaria longifol	ia		No			<1
perenni	al sow-thistle	Sonchus arvens	S		No			5
silv	verweed	Potentilla anserir	าล		No			1
sti	nkweed	Thlaspi arvense)		No			<1
wild	strawberry	Fragaria virginiar	na		No			1

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Low slope (toe)
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 01 5	No Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water-stained leaves	No

	Appendix 7 2017 June 26 Wetland 1; Site 3								
Soil Horizon	: В								
H	orizon	Depth (cm)	Munsell Soil Colour	Aunsell Soil Colour Soil Value Soil Chroma					
В		30	2.5 Y	4	1				
Widlife Obse	ervations								
	Wildlife Com	mon Name	Wild	life Scientific Name		# Observed			
			Comments						
UTM Easting	j: 691035								
UTM Northir	ng: 5668999								
Soil texture	Silty clay loam								
Site Moistur	e Regime: Hygrid	C							
Mottles: sm	all, 1% at 35 cm								
Upland soils	- No mottles, 10	JYR 3/3loam, subhygric							
A distinct up	bland edge with a	a slope of 2m over 20m (10%). Wetland Pit is a	at the toe					
Photos				_					
Photo #		Photo Description	n	Latitude	Lor	ngitude			
1	Wetland Habitat			51.14053	114.26905	1			
2	Wetland Soil Pit			51.14053	114.26905	1			

Photos: 1 - 51.14053 - 114.269051 Photo Description *Wetland1Site3Habitat.JPG*



Photos: 2 - 51.14053 - 114.269051 Photo Description *Wetland1Soil Pit3Wetland.JPG*



2017 June 26 Wetland 1; Site 4

Instruct	ions: Complete	this form for the plant	communit	y at the b	oundary be	etween wet	land and n	on-wetland.		
QWSP	Investigator	Company Nar	ne		Date	Projec	t Name	Wetland #		
Wayne Bess	sie	Westhoff Engineering R	esources	Jun 26, 2	017	WER116-77	Hawkwood	1		
Legal land description of wetland										
SEC		TWP		RNG			MER			
19	25		02			05				
Plots										
	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat)	Plot loca	ation (Long)		
4		Ground	1 x 1		51.140136		114.26831	9		
Primary Inc	licator Observed	(Circle and describe belov	v)							
V1. Hydrop species in 20 percent species in	bhytic species c the community or more areal o the plots ection	over more than 50 perc or plot (An abundant s cover in the community	cent of the pecies is a or plot). L	abundan plant spe _ist all ab	t plant ecies with undant	Yes				
V2. Surfac	e encrustations	of algae are present?				No				
V3. The pr	esence of a don	ninant groundcover of p	peat mosse	es (Sphag	num spp.)	No				
V4. Dimini	shed rigor and	productivity of upland s	species in a	disturbed	areas	No				
V5. Eviden (e.g. floati	ce of morpholog ng leaves, infla	gical adaptations of pla ted stems, adventitious	nts to satu s roots)	urated cor	nditions	No				
Other Com	ments									
Wetland Sp	ecies									
Common n	ame of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland spj	or Obligate	% Related abundation	tive cover of ant species		
perennia	al sow-thisIte				No			5		
sedg	le species				Yes			5		
silv	verweed	Potentilla anserir	na		No			5		
smoo	oth brome	Bromus inermis	;		No			1		
wi	re rush	Juncus balticus			Yes			40		
Upland Spe	cies									
Common n	ame of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland spj	or Obligate o	% Relat abunda	tive cover of ant species		
bu	ckbrush	Symphoricarpos occid	entalis		No			3		
Kentucl	ky bluegrass	Poa pratensis			No			20		
northe	rn bedstraw	Galium boreale			No			1		
perennia	al sow-thistle	Sonchus arvensi	S		No			5		
prair	rie smoke				No			2		
prio	ckly rose	Rosa acicularis			No			2		
smoo	oth brome	Bromus inermis	5		No			5		
wild s	strawberry	Fragaria virginiar	na		No			1		

Soils	
Soil Pit Depth (cm)	38
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	Yes
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties asso tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 of 5	No Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water stained leaves	No

			Appendix 7	2017	June 26 We	tland 1; Site 4		
Soil Horizor	n: B							
Н	orizon	Depth (cm)	Depth (cm) Munsell Soil Colour Soil Value Soil Chroma					
В		20	2.5 Y	7	1			
Widlife Obs	ervations			1				
	Wildlife Com	mon Name	Wild	llife Scientific Name		# Observed		
			Comments					
UTM Easting UTM Northin Soil texture Site Moistur Mottles: ext Upland soils This site is a The upland	g: 691088 ng: 5668957 : heavy clay re Regime: Hygri ensively mottled s - No mottles, 7. a remnant wet m soil is highly oxid	c - distinct against light 5 YR 4/3 sandy-clay, r eadow area which is d Jized reddish in B horiz	coloured clay nesic; oxidized rying. There is new wet con	meadow further inwards	s now.			
Photos								
Photo #		Photo Descript	ion	Latitude	Lor	ngitude		
1	Wetland Habitat			51.140136	51.140136			
2	Wetland Soil Pit			51.140136	51.140136			



Photos: 2 - 51.140136 - 51.140136 Photo Description *Wetland1Soil Pit4Wetland.JPG*



2017 June 26 Wetland 1; Site 5

Instruct	ions: Complete	this form for the plant	communit	y at the b	oundary b	etween wet	land and n	on-wetland.	
QWSP	Investigator	Company Nar	ne	C	ate	Project Name		Wetland #	
Wayne Bess	sie	Westhoff Engineering R	esources	Jun 26, 20	017	WER116-77	' Hawkwood	1	
Legal land description of wetland									
SEC		TWP		RNG			MER		
19	25		02			05			
Plots			1			-			
	Plot #	Stratum	Plot tec	hnique	Plot loca	ition (Lat)	Plot loc	ation (Long)	
5		Ground	1 x 1		51.139873		114.26752	5	
Primary Inc	licator Observed	(Circle and describe below	v)						
V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots ection									
V2. Surfac	e encrustations	of algae are present?				No			
V3. The pr	esence of a don	ninant groundcover of p	peat mosse	es (Sphag	num spp.)	No			
V4. Dimini	shed rigor and	productivity of upland s	species in (disturbed	areas	No			
V5. Eviden (e.g. floati	ice of morpholog ng leaves, infla	gical adaptations of pla ted stems, adventitious	nts to satu s roots)	urated cor	nditions	No			
Other Com	iments								
Wetland Sp	ecies								
Common r	name of species	Scientific name of s	pecies	Facultativ	ve Wetland Wetland sp	or Obligate p	% Rela abund	tive cover of ant species	
awn	ed sedge	Carex atherodes	S		Yes			35	
comr	non cattail	Typha latifolia			Yes			2	
creep	oing thistle	Cirsium arvense	e		No			2	
perenni	al sow-thistle	Sonchus arvensi	S		No			2	
silv	verweed	Potentilla anserir	na		No			5	
smoo	oth brome	Bromus inermis	5		No			10	
Upland Spe	cies								
Common r	name of species	Scientific name of s	pecies	Facultativ	e Wetland Wetland sp	or Obligate p	% Rela abund	tive cover of ant species	
creep	oing thistle	Cirsium arvense	e		No			5	
smoo	oth brome	Bromus inermis	5		No			40	

Soils	
Soil Pit Depth (cm)	45
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 01 5	No Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water-stained leaves	No

	Appendix 7 2017 June 26 Wetland 1; Site 5								
Soil Horizon	: В								
H	orizon	zon Depth (cm) Munsell Soil Colour Soil Value Soil Chroma							
В		30	2.5 Y	7	1				
Widlife Obse	ervations								
	Wildlife Com	mon Name	Wild	life Scientific Name		# Observed			
			Comments						
UTM Easting UTM Northin Soil texture Site Moistur Mottles: 5% Upland soils Wetland soi	i: 691144 ng: 5668930 Clay e Regime: Hygrid at 30 cm - No mottles, 2. pit is exuding w	c 5 Y 4/1 clay at depth, dr ater at base, but it is not	y/blocky well drained s filling up.	soil above; mesic					
Photos									
Photo #		Photo Description	۱	Latitude	Lor	ngitude			
1	Wetland Habitat			51.139873	114.267525	5			
2	Wetland Soil Pit			51.139873	114.267525	5			

Photos: 1 - 51.139873 - 114.267525 Photo Description *Wetland1Site5Habitat.JPG*



Photos: 2 - 51.139873 - 114.267525 Photo Description *Wetland1Soil Pit5Wetland.JPG*



2017 June 26 Wetland 2; Site 1

Instruct	ions: Complete	this form for the plant	communit	y at the b	oundary be	etween wet	land and n	on-wetland.	
QWSP	Investigator	Company Na	me		Date	Project Name		Wetland #	
Wayne Bess	sie	Westhoff Engineering R	esources	Jun 26, 2	017	WER116-77	' Hawkwood	2	
		Legal la	nd descrip	tion of w	etland				
SEC		TWP		RNG		MER			
19	25		02			05			
Plots									
	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat) Plot location (Long			
1		Ground	1 x 1		51.140905		114.26997	7	
Primary Inc	licator Observed	(Circle and describe below	v)						
species in 20 percent species in	the community or more areal the plots ection	or plot (An abundant s cover in the community	pecies is a or plot). I	List all ab	ecies with undant	Yes			
V2. Surfac	e encrustations	of algae are present?				No			
V3. The pr	esence of a don	ninant groundcover of	peat mosse	es (Sphag	num spp.)	No			
V4. Dimini	shed rigor and	productivity of upland s	species in o	disturbed	areas	No			
V5. Eviden (e.g. floati	ce of morpholo ng leaves, infla	gical adaptations of pla ted stems, adventitious	ints to satu s roots)	urated co	nditions	No			
Other Com	iments								
Wetland Sp	ecies								
Common n	ame of species	Scientific name of s	pecies	Facultati	ve Wetland o Wetland sp	or Obligate p	% Relat abunda	ive cover of ant species	
awn	ed sedge	Carex atherode	s		Yes			25	
creep	oing thistle	Cirsium arvense	Э		No			3	
perennia	al sow-thistle	Sonchus arvens	is		No			5	
silv	verweed	Potentilla anserir	าล		No			1	
small k	oottle sedge	Carex utriculata	a		Yes			10	
water	smartweed	Persicaria amphil	bia		Yes			2	
wormse	eed mustard				No			<1	
Upland Spe	cies								
Common n	ame of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland sp	or Obligate p	% Relat abunda	ive cover of ant species	
creep	oing thistle	Cirsium arvense	e		No			5	
Kentucl	ky bluegrass	Poa pratensis			No			15	
Sedg	ge species				Yes			15	
smoo	oth brome	Bromus inermis	6		No			5	
star-flowere	ed Solomon's-seal	Maianthemum stella	atum		No			1	
wes	tern dock	Rumex occidenta	lis	No 1					

Soils	
Soil Pit Depth (cm)	35
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties asso tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 of 5	Generated by SNAP! Desktop 5.3.10.3 No
Oxidized rhizospheres	No
Water stained leaves	No

			Appendix 7	2017	June 26 We	tland 2; Site 1	
Soil Horizor	n: B						
Н	orizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil	Chroma	
В		25	2.5 Y	2.5 1			
Widlife Obs	ervations				•		
Wildlife Common Name Wi				llife Scientific Name		# Observed	
						•	
			Comments				
UTM Easting	g: 690968						
UTM Northir	ng: 5669038						
Soil texture	: Clay loam						
Site Moistur	e Regime: Subh	ygric					
Mottles: pre	esent						
Wetland soi	I - blocky modera	ately drained					
Upland soils	s - No mottles, 2.	.5Y 3/1 clay loam; mod	erately well drained				
Photos							
Photo #	o # Photo Description			Latitude Longitu		ngitude	
1	Wetland Habitat			51.140905	114.26997	7	
2	Wetland Soil Pit			51.140905	114.26997	7	

Photos: 1 - 51.140905 - 114.269977 Photo Description *Wetland2Site1Habitat.JPG*



Photos: 2 - 51.140905 - 114.269977 Photo Description *Wetland2Soil Pit1Wetland.JPG*



2017 June 26 Wetland 3; Site 1

Instruct	ions: Complete	this form for the plant	communit	y at the b	oundary be	etween wet	land and n	on-wetland.
QWSP	Investigator	Company Name		Date		Project Name		Wetland #
Wayne Bess	sie	Westhoff Engineering R	esources	Jun 26, 2017		WER116-77 Hawkwood		3
		Legal la	nd descrip	tion of we	etland			,
SEC		TWP		RNG			MER	
19	25		02			05		
Plots								
	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat)	Plot loca	ation (Long)
1		Shrub	10 x 10		51.143307		114.27000	2
Primary Inc	licator Observed	(Circle and describe below	v)				1	
V1. Hydrop species in 20 percent species in	ohytic species co the community t or more areal o the plots ection	over more than 50 perc or plot (An abundant s cover in the community	cent of the pecies is a / or plot).	abundan i plant spe List all ab	t plant ecies with undant	Yes		
V2. Surface encrustations of algae are present? No								
V3. The pr	esence of a dom	ninant groundcover of p	peat mosse	es (Sphag	num spp.)	No		
V4. Dimini	shed rigor and p	productivity of upland s	species in	disturbed	areas	No		
V5. Eviden (e.g. floati	ice of morpholog ng leaves, inflat	gical adaptations of pla ted stems, adventitious	ints to satu s roots)	urated cor	nditions	No		
Other Com	iments							
Wetland Sp	ecies							
				Facultati	(a) Matland (n Obligata	0/ Dalai	tive cover of
Common n	ame of species	Scientific name of s	pecies	Facultatin	Wetland sp	o obligate	abund	ant species
i	aspen	Populus tremuloio	les		No			1
balas	sm poplar				Yes			2
beak	ked willow	Salix bebbiana			Yes			40
Canad	a goldenrod	Solidago canaden	sis		No			10
comme	on horsetail	Equisetum arven	se		No			5
Kentucl	ky bluegrass	Poa pratensis			No			10
northern	n green orchid				Yes			<1
perennia	al sow-thistle	Sonchus arvensi	is		No			3
wi	ire rush	Juncus balticus			Yes			10
Upland Spe	cies						•	
Common n	name of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland sp	pr Obligate	% Related abundation	tive cover of ant species
i	aspen	Populus tremuloio	les		No			1
beak	ked willow	Salix bebbiana			Yes			15
Canad	a goldenrod	Solidago canaden	sis		No			5
commo	on dandelion	Taraxacum officin	ale		No			10
creep	oing thistle	Cirsium arvense	9		No			2
Kentucl	ky bluegrass	Poa pratensis			No			15
perennia	al sow-thistle	Sonchus arvensi	is		No			10
wi	ire rush	Juncus balticus			Yes			5

Appendix 7	2017 June 26 Wetland 3; Site 1
Soils	
Soil Pit Depth (cm)	40
Aspect	SW
Slope Position	Mid slope
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	Yes
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	Yes
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	No
Free water in soil pit	No
Saturated soil Page 2 of 5	No Generated by SNAPI Desktop 5.3.10.
Oxidized rhizospheres	No
Water-stained leaves	No

ſ

Appendix 7 2017 June 26 Wetland 3; Site 1								
Soil Horizon	: В							
H	orizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil	Chroma		
В		22	5 Y	4 1				
Widlife Obse	ervations							
Wildlife Common Name Wildlife Scientific Name # Observ						# Observed		
			Comments					
UTM Easting UTM Northir Soil texture Site Moistur Mottles: Pro Upland soils The wetland corresponds This wetland Numerous of surrounded	UTM Easting: 690957 UTM Northing: 5669305 Soil texture: Sandy clay Site Moisture Regime: Hygric Mottles: Prominent at 22cm Upland soils - No mottles, very oxidized B horizon (reddish) 10YR 5/3 loam, subhygric The wetland edge where mottled soils occur is inside the shrub border where shrub cover is about 40% or higher. This corresponds roughly to the wire rush dominant area. This wetland is sloped (2-4%) and a discharge wetland with seepage waters in the spring. Numerous old ruts in the peripheral areas have resulted in wetter "channels" with wire rush and other wetland species							
Photos								
Photo #		Photo Description	า	Latitude	Lor	ngitude		
1	Wetland Habitat			51.143307	114.270002	2		
2	Wetland Soil Pit	/etland Soil Pit 51.143307 114.270002						

Photos: 1 - 51.143307 - 114.270002 Photo Description *Wetland3Site1Habitat.JPG*



Photos: 2 - 51.143307 - 114.270002 Photo Description *Wetland3Soil Pit1Wetland.JPG*



2017 June 26 Wetland 3; Site 2

Instruct	ions: Complete	this form for the plant	communit	y at the b	oundary b	etween wet	land and n	on-wetland.	
OWSP	Investigator	Company Name		Date		Project Name		Wetland #	
Wayne Bessie		Westhoff Engineering R	esources	Jun 26, 2	017	WER116-77	WER116-77 Hawkwood 3		
					- +				
		Legaria	na aescrip	otion of we	etiand				
SEC		TWP		RNG		MER			
19	25		02			05			
Plots					1		1		
	Plot #	Stratum	Plot tec	hnique	Plot loca	ation (Lat) Plot location (Long)			
2		Ground	1 x 1		51.144165		114.269152	2	
Primary Ind	licator Observed	(Circle and describe belov	v)			1			
V1. Hydrop species in 20 percent species in	bhytic species c the community or more areal the plots ection	over more than 50 perc or plot (An abundant s cover in the community	cent of the pecies is a / or plot). I	abundan plant spe List all ab	t plant ecies with undant	Yes			
V2. Surface	e encrustations	of algae are present?				No			
V3. The pro	esence of a don	ninant groundcover of p	peat mosse	es (Sphag	num spp.)	No			
V4. Diminis	shed rigor and	productivity of upland s	species in (disturbed	areas	No			
V5. Eviden (e.g. floati	ce of morpholo ng leaves, infla	gical adaptations of pla ted stems, adventitious	nts to satu s roots)	urated coi	nditions	No			
Other Com	ments								
Wetland Spe	ecies					1			
Common n	ame of species	Scientific name of s	pecies	Facultativ	/e Wetland Wetland sp	or Obligate p	% Relat abunda	ive cover of ant species	
beak	ed willow	Salix bebbiana			Yes	•		5	
comn	non cattail	Typha latifolia			Yes			5	
commo	n dandelion	Taraxacum officin	ale		No			15	
creep	oing thistle	Cirsium arvense	e		No			5	
perennia	al sow-thistle	Sonchus arvensi	S		No			10	
wi	re rush	Juncus balticus			Yes			20	
Upland Spec	cies								
Common n	ame of species	Scientific name of s	pecies	Facultative Wetland or Obligate % Relative co Wetland spp abundant spe		ive cover of ant species			
commo	on dandelion	Taraxacum officin	ale		No			5	
creep	oing thistle	Cirsium arvense	è		No			5	
Kentuck	ky bluegrass	Poa pratensis			No			5	
qua	ackgrass	Elymus repens			No			10	
smoo	oth brome	Bromus inermis	5	No 40					

Appendix 7 2017 June 26 Wetland 3; Site 2 Soils Soil Pit Depth (cm) 40 Aspect SW Slope Position Mid slope S1. Organic soils (except Folists) No S2. Presence of peat accumulation determined by Von Post test No S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) No present S4. Sulfidic material (odor of "rotten eggs") present No S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present No immediately below the surface layer (A- or Ae- horizon) and within 30 cm S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following No present: a. Thin surface layer (at least 0.5 cm) of peat or muck; or No b. Presence of iron (high chroma mottles, oxidized rhizospheres) No within 30 cm of surface; or c. Iron and manganese concretions within the surface layer No (A-horizon); or d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed No color is chroma 2 or less S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the Yes following present within 30 cm of the surface: a. Iron and manganese concretions or nodules; or No b. Distinct or prominent oxidized rhizospheres along several living No roots; or c. Low chroma mottles Yes S8. Sandy soils with one of the following present No a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf No litter is present; or b. Surface layer of peat or muck of any thickness where a leaf litter No is absent: or c. A surface layer (A-horizon) having a low chroma matrix (chroma No 1 or less and value of 3 or less) greater than 10 cm thick; or d. Vertical organic streaking or blotchiness with 30 cm of the No surface; or e. Easily recognized high chroma mottles occupy at least 2 percent No of the low chroma subsoil matrix within 30 cm of the surface; or f. Organic concretions with 30 cm of the surface; or No g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil No surface S9. Remains of aquatic invertebrates are present within 30 cm of No the soil surface in pothole-like depressions S10. Other regionally applicable, field-verificable soil properties associated with prolonged seasonal high water tables Surface water present No Free water in soil pit No Generated by SNAP! Desktop 5.3.10 Page 2 of 5 Saturated soil No Oxidized rhizospheres No

Nο

Water-stained leaves

			Appendix 7	2017 .	June 26 We	tland 3; Site 2		
Soil Horizor	: В							
H	orizon	Depth (cm)	Munsell Soil Colour	ur Soil Value Soil Chroma				
В		25	2.5 Y	3	1			
Widlife Obs	ervations							
Wildlife Common NameWildlife Scientific Name# Obs					# Observed			
			Comments					
UTM Easting UTM Northin Soil texture Site Moistur Mottles: pro Upland soils This is the s	g: 691013 ng: 5669403 : Sandy clay loar e Regime: Hygri minent - mottles preser ource end of the	n c nt, 10YR 4/3 Sandy clay l seepage water and is the	oam, mesic well drain e upper slope end of t	ed he wetland.				
Photos								
Photo #		Photo Description	ı	Latitude	Lor	ngitude		
1	Wetland Habitat			51.144165	114.269152	2		
2	Wetland Soil Pit	/etland Soil Pit 51.144165 114.269152						



Photos: 2 - 51.144165 - 114.269152 Photo Description *Wetland3Soil Pit2Wetland.JPG*



2017 June 26 Wetland 3; Site 3

Instructio	ons: Complete	this form for the plant	communit	y at the b	oundary be	etween wet	land and n	on-wetland.	
QWSP I	nvestigator	Company Nar	me		Date	Project Name		Wetland #	
Wayne Bessie	e	Westhoff Engineering R	esources	Jun 26, 20	017	WER116-7	/ER116-77 Hawkwood 3		
		Legal la	nd descrip	tion of we	etland			1	
SEC		TWP		RNG			MFR		
19 2	25		02	- THIO		05	IVIEI		
Plots									
P	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat)	Plot location (Long		
3		Shrub	10 x 10	•	51.14401		114.27007	9	
Primary India	cator Observed	(Circle and describe below	v)				1		
species in th 20 percent of species in th	he community or more areal he plots ectior	or plot (An abundant s cover in the community	pecies is a / or plot). I	i plant spe List all ab	ecies with undant	Yes			
V2. Surface	encrustations	of algae are present?				No			
V3. The pres	sence of a don	ninant groundcover of p	peat mosse	es (Sphag	num spp.)	No			
V4. Diminisl	hed rigor and	productivity of upland s	species in	disturbed	areas	No			
V5. Evidenc	e of morpholo	gical adaptations of pla	ints to satu	urated cor	nditions	No			
Other Comn	nents								
wettand Spec	cies								
Common na	ime of species	Scientific name of s	pecies	Facultativ	e Wetland o Wetland sp	or Obligate o	% Related abundation	tive cover of ant species	
balsar	m poplar	Populus balsamife	era		Yes			2	
beake	ed willow	Salix bebbiana			Yes			25	
common	n dandelion	Taraxacum officin	ale		No			10	
creepir	ng thistle	Cirsium arvense	9		No			3	
fowl b	luegrass	Poa palustris			Yes			5	
silve	erweed	Potentilla anserir	าล		No			1	
wire	e rush	Juncus balticus	;		Yes			20	
Upland Speci	es						1		
Common na	ime of species	Scientific name of s	necies	Facultativ	e Wetland o	or Obligate	% Relat	tive cover of	
balsar	m poplar	Populus balsamife	era		Yes	•	abaria	2	
beake	ed willow	Salix bebbiana			Yes			5	
common	andelion	Taraxacum officin	ale					10	
creepir	na thistle	Cirsium arvense	9		No			5	
Kentucky	y bluegrass	Poa pratensis	-		No			5	
perennial	sow-thistle	Sonchus arvensi	is		No			10	
smoot	h brome	Bromus inermis	5		No			20	
Appendix 7 2017 June 26 Wetland 3; Site 3 Soils Soil Pit Depth (cm) 40 Aspect SW Slope Position Mid slope S1. Organic soils (except Folists) No S2. Presence of peat accumulation determined by Von Post test No S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) No present S4. Sulfidic material (odor of "rotten eggs") present No S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present No immediately below the surface layer (A- or Ae- horizon) and within 30 cm S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following No present: a. Thin surface layer (at least 0.5 cm) of peat or muck; or No b. Presence of iron (high chroma mottles, oxidized rhizospheres) No within 30 cm of surface; or c. Iron and manganese concretions within the surface layer No (A-horizon); or d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed No color is chroma 2 or less S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the Yes following present within 30 cm of the surface: a. Iron and manganese concretions or nodules; or No b. Distinct or prominent oxidized rhizospheres along several living No roots; or c. Low chroma mottles Yes S8. Sandy soils with one of the following present No a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf No litter is present; or b. Surface layer of peat or muck of any thickness where a leaf litter No is absent: or c. A surface layer (A-horizon) having a low chroma matrix (chroma No 1 or less and value of 3 or less) greater than 10 cm thick; or d. Vertical organic streaking or blotchiness with 30 cm of the No surface; or e. Easily recognized high chroma mottles occupy at least 2 percent No of the low chroma subsoil matrix within 30 cm of the surface; or f. Organic concretions with 30 cm of the surface; or No g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil No surface S9. Remains of aquatic invertebrates are present within 30 cm of No the soil surface in pothole-like depressions S10. Other regionally applicable, field-verificable soil properties associated with prolonged seasonal high water tables Surface water present No Free water in soil pit No Generated by SNAP! Desktop 5.3.10 Page 2 of 5 Saturated soil No Oxidized rhizospheres No

Nο

Water-stained leaves

Appendix 7 2017 June 26 Wetland 3; Site 3						
Soil Horizor	: В					
H	orizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil	Chroma
В		25	10 YR	3	2	
Widlife Obs	ervations					
	Wildlife Com	mon Name	Wild	llife Scientific Name		# Observed
			Comments			
UTM Easting: 690949 UTM Northing: 5669383 Soil texture: Heavy clay Site Moisture Regime: Hygric Mottles: prominent at 25 cm Upland soils - 5% mottles in upper 30 cm, none in clay below, 2.5 Y 5/2, heavy clay, subhygric						
Photos						
Photo #		Photo Description	n	Latitude	Lor	ngitude
1	Wetland Habitat	t		51.14401 114.270079)
2	Wetland Soil Pit			51.14401	114.270079)

Photos: 1 - 51.14401 - 114.270079 Photo Description *Wetland3Site3Habitat.JPG*



Photos: 2 - 51.14401 - 114.270079 Photo Description *Wetland3Soil Pit3Wetland.JPG*



2017 June 21 Wetland 4 Pits 1&2

Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.								
QWS	P Investigator	Company Name		Date		Project Name Wetlan		Wetland #
Donald Ho	dges; Wayne Bessi	ie Westhoff Engineering Reso	Resources Inc. Jun		017	Hawkwood	WER116-77	4
		Legal la	nd descrip	otion of w	etland			
SEC		TWP		RNG			MFR	
19	25		02	- NNO		05	MER	
Plots								
	Plot #	Stratum	Plot teo	t technique Plot location (Lat) Plot location (Lo			ation (Long)	
1		Ground	1 x 1		51° 08′ 42.	786″	114° 16′17	.928″
Primary I r	ndicator Observed	(Circle and describe below	v)					
V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots ection								
V2. Surfa	ce encrustations	of algae are present?				No		
V3. The p	presence of a dom	ninant groundcover of p	peat moss	es (Sphag	Inum spp.)	No		
V4. Dimir	nished rigor and p	productivity of upland s	species in	disturbed	areas	No		
V5. Evide (e.g. floa	nce of morpholog ting leaves, inflat	gical adaptations of pla ted stems, adventitious	nts to sat s roots)	urated co	nditions	No		
Other Comments				Flat area of creek ravine with seeping water and saturated soils.				
Wetland S	pecies					I		
Common	name of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland sp	or Obligate	% Relat	tive cover of
comr	non horsetail	Equisetum arven	se		No			5
cree	eping thistle	Cirsium arvense	9		No			5
fow	/l bluegrass	Poa palustris			Yes			10
gc	olden dock	Rumex fueginus	6		Yes			2
Sart	well's sedge	Carex sartwelli			Yes			30
Upland Sp	ecies							
				Facultativ	ve Wetland (or Obligate	% Relat	tive cover of
Common	name of species	Scientific name of s	pecies		Wetland sp	p	abunda	ant species
b	uckbrush	Symphoricarpos occid	entalis		No			5
Cana	ida anemone	Anemone canader	nsis		No			5
cree	eping thistle	Cirsium arvense	Э		No			5
Kentu	cky bluegrass	Poa pratensis			No			10
pr	rickly rose	Rosa acicularis			No			5
smo	ooth brome	Bromus inermis	5		No			20
Plots			1		1		Т	
	Plot #	Stratum	Plot teo	chnique	Plot loca	tion (Lat)	Plot loca	ation (Long)
2		Ground	1 x 1	51° 08′ 42.		690″	114° 16′ 18	3.473″

Appendix 7 2017 June 21 Wetland 4 Pits 1				
Primary Indicator Observed	(Circle and describe below)			
species in the community 20 percent or more areal species in the plots ection	Yes			
V2. Surface encrustations	of algae are present?		No	
V3. The presence of a don	ninant groundcover of peat mos	ses (Sphagnum spp.)	No	
V4. Diminished rigor and	productivity of upland species in	n disturbed areas	No	
V5. Evidence of morpholog (e.g. floating leaves, infla	gical adaptations of plants to sa ted stems, adventitious roots)	turated conditions	No	
Other Comments				
Wetland Species				
Common name of species	Scientific name of species	Facultative Wetland Wetland sp	or Obligate	% Relative cover of abundant species
Canada Anemone	· · ·	No		5
common horsetail	Equisetum arvense	No		10
common yarrow	Achillea millefolium	No		1
creeping thistle	Cirsium arvense	No		5
fowl bluegrass	Poa palustris	Yes		10
marsh hedge nettle		No		5
Sartwell's sedge	Carex sartwellii	Yes		30
Upland Species				
Common name of species	Scientific name of species	Facultative Wetland Wetland sp	or Obligate p	% Relative cover of abundant species
buckbrush	Symphoricarpos occidentalis	No		5
Canada anemone	Anemone canadensis	No		10
creeping thistle	Cirsium arvense	No		5
Kentucky bluegrass	Poa pratensis	No		15
prickly rose	Rosa acicularis	No		15
smooth brome	Bromus inermis	No		15
wild vetch No				1

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	No
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	Yes
Free water in soil pit	Yes
Saturated soil Page 3 of 11	Yes
Oxidized rhizospheres	No
Water-stained leaves	No

		Appendix 7	2017 Ju	ine 21 Wetland 4 Pits 1&2
Soil Horizon: Soil Pit 1				
Horizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil Chroma
Soil Pit 1	40			

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	No
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties assitables	ociated with prolonged seasonal high water
Surface water present	Yes
Free water in soil pit	Yes
Saturated soil Page 5 of T1	Yes Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water stained leaves	No

Appendix 7 2017 June 21 Wetland 4 Pits 1&2							
Soil Horizor	Soil Horizon: Soil Pit 2						
Н	HorizonDepth (cm)Munsell Soil ColourSoil ValueSoil Chroma			Chroma			
Soil Pit 2		40					
Widlife Obs	ervations						
	Wildlife Com	mon Name	Wild	life Scientific Name		# Observed	
			Comments				
Soil deep bl	ack colour and sa	aturated					
Photos							
Photo #		Photo Descripti	on	Latitude Lor		ngitude	
1	Wetland Habitat	, between soil pits 1 an	d 2	51° 08' 42.786"	114° 16'17.	.928″	
2	Soil Pit #1 Upland			51° 08' 42.666" 114°		114° 16'17.970″	
3	Soil Pit #1 Wetland			51° 08' 42.786" 114° 16		.928″	
4	4 Soil Pit #2 Upland			51° 08′ 42.924″ 114° 16′ ⁻		8.738″	
5	Soil Pit #2 Wetla	and		51° 08' 42.690"	114° 16′ 18	3.473″	

Comments:

Photo Description Wetland 4 Habitat - Pits 1 and 2

Photos: 1 - 51° 08' 42.786" - 114° 16'17.928" Photo Description *SP1&2 Habitat.JPG*



Photos: 2 - 51° 08' 42.666" - 114° 16'17.970" Photo Description SP1Upland.JPG



Photos: 3 - 51° 08′ 42.786″ - 114° 16′17.928″ Photo Description SP1Wetland.JPG



Photos: 4 - 51° 08' 42.924" - 114° 16' 18.738" Photo Description *SP2Upland.JPG*



Photos: 5 - 51° 08' 42.690" - 114° 16' 18.473" Photo Description $\ensuremath{\textit{SP2Wetland.JPG}}$



2017 June 21 Wetland 4 Pits 3&4

Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.								
QWSP Investigator		Company Name		Date		Project Name V		Wetland #
Donald Hod	ges; Wayne Bessi	e Westhoff Engineering Reso	ources Inc.	Jun 21, 2017		Hawkwood WER116-77 4		4
	<u> </u>	Legal la	nd descrip	tion of we	etland			I
SEC		TWP		RNG			MER	
19	25		02			05		
Plots			I			1		
	Plot #	Stratum	Plot tec	hnique	nique Plot location (Lat) Plot location (Lor			ation (Long)
3		Ground	1 x 1	•	51° 08′ 43.	770″	114° 16′ 18	3.305″
Primary Ind	licator Observed (Circle and describe belov	v)		1		1	
V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots ection								
V2. Surface	e encrustations	of algae are present?				No		
V3. The pro	esence of a dom	ninant groundcover of p	peat mosse	es (Sphag	Inum spp.)	No		
V4. Dimini:	shed rigor and p	productivity of upland s	species in (disturbed	areas	No		
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)								
Other Comments					Flat area of water and s	creek ravine aturated soil	with seeping s.	
Wetland Spe	ecies					1		
				E = = + = + !:				
Common n	ame of species	Scientific name of s	pecies	Facultation	Wetland sp	b obligate	abunda	ant species
commo	n dandelion	Taraxacum officing	ale		No	-		2
commo	on horsetail	Equisetum arvens	se		No			20
fowl	bluegrass	Poa palustris			Yes			10
perennia	al sow-thistle	Sonchus arvensi	S		No			2
Sartw	ell's sedge	Carex sartwellii	-		Yes			10
wi	ld mint	Mentha arvensis	5		Yes			2
wi	re rush	Juncus balticus			Yes			10
Upland Spec	cies						1	-
Common n	Facultative Wetland species Facultative Wetland s Common name of species Scientific name of species Wetland s		ve Wetland Wetland sp	or Obligate p	% Relat abunda	ive cover of ant species		
bu	ckbrush	Symphoricarpos occid	entalis		No			5
Canad	a anemone	Anemone canaden	nsis		No			5
commo	on horsetail	Equisetum arvens	se		No			2
creep	oing thistle	Cirsium arvense	9		No			2
Kentucl	ky bluegrass	Poa pratensis			No			15
perennia	al sow-thistle	Sonchus arvensi	S		No			2
smoo	oth brome	Bromus inermis	5		No			15
Plots								
	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat)	Plot loca	ation (Long)
4		Ground	1 x 1	1 51° 08′ 43.9		920″	114° 16′ 17	.868″

Appendix 7 2017 June 21 Wetland 4 Pits 3&4				
Primary Indicator Observed	(Circle and describe below)			
species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots ection				
V2. Surface encrustations	of algae are present?		No	
V3. The presence of a don	ninant groundcover of peat moss	ses (Sphagnum spp.)	No	
V4. Diminished rigor and	productivity of upland species in	disturbed areas	No	
V5. Evidence of morpholog (e.g. floating leaves, infla	gical adaptations of plants to sat ted stems, adventitious roots)	urated conditions	No	
Other Comments				
Wetland Species				
Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp		% Relative cover of abundant species
Canada anemone	Anemone canadensis	No	-	2
common dandelion	Taraxacum officinale	No		2
common horsetail	Equisetum arvense	No		10
creeping thistle	Cirsium arvense	No		1
fowl bluegrass	Poa palustris	Yes		10
perennial sow-thistle	Sonchus arvensis	No		1
silverweed	Potentilla anserina	No		2
wire rush	Juncus balticus	Yes		10
Upland Species				
Common name of species	Scientific name of species	Facultative Wetland Wetland sp	or Obligate p	% Relative cover of abundant species
Canada anemone	Anemone canadensis	No		5
common horsetail	Equisetum arvense	No		5
creeping thistle	Cirsium arvense	No		2
Kentucky bluegrass	Poa pratensis	No		10
northern gooseberry	Ribes oxyacanthoides	No		2
prickly rose	Rosa acicularis	No		10
smooth brome	Bromus inermis	No		10
wild vetch				1

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	No
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties assitables	ociated with prolonged seasonal high water
Surface water present	Yes
Free water in soil pit	Yes
Saturated soil Page 3 of T1	Yes Generated by SNAP! Desktop 5.3.10.3
Oxidized rhizospheres	No
Water-stained leaves	No

		Appendix 7	2017 Ju	une 21 Wetland 4 Pits 3&4
Soil Horizon: Soil Pit 3				
Horizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil Chroma
Soil Pit 3	40			

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	No
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	Yes
Free water in soil pit	Yes
Saturated soil Page 5 of T1	Yes
Oxidized rhizospheres	No
Water-stained leaves	No

Appendix 7 2017 June 21 Wetland 4 Pits 3&4								
Soil Horizor	Soil Horizon: Soil Pit 4							
Н	Horizon Depth (cm) Munsell Soil Colour Soil Value Soil					Chroma		
Soil Pit 4	t 4 40							
Widlife Obs	ervations							
Wildlife Common Name Wild				life Scientific Name		# Observed		
			Comments					
Soil deep bl	ack colour and sa	aturated						
Photos					_			
Photo #	Photo Description			Latitude	Longitude			
1	Wetland Habitat, between soil pits 3 and 4			51° 08' 43.770"	114° 16' 18.305"			
2	Soil Pit #3 Upland			51° 08' 43.847"	114° 16′ 18.168″			
3	Soil Pit #3 Wetland			51° 08′ 43.770″	114° 16′ 18.305″			
4	Soil Pit #4 Upland			51° 08′ 44.940″	114° 16′ 16.938″			
5	Soil Pit #4 Wetla	and		51° 08′ 43.920″	114° 16' 17	'.868″		

Photos: 1 - 51° 08′ 43.770″ - 114° 16′ 18.305″ Photo Description *SP3&4 Habitat.JPG*



Photos: 2 - 51° 08′ 43.847″ - 114° 16′ 18.168″ Photo Description SP3Upland.JPG



Photos: 3 - 51° 08' 43.770" - 114° 16' 18.305" Photo Description *SP3Wetland.JPG*



Photos: 4 - 51° 08' 44.940" - 114° 16' 16.938" Photo Description *SP4Upland.JPG*



Photos: 5 - 51° 08' 43.920" - 114° 16' 17.868" Photo Description *SP4Wetland.JPG*



2017 June 21 Wetland 4 Pits 5&6

Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.								
QWSP Investigator		Company Nar	ame		Date		Project Name	
Donald Hodges; Wayne Bessie		eWesthoff Engineering Resources Inc.		Jun 21, 2017		Hawkwood	Hawkwood WFR116-77	
Legal land description of wetland								
SEC		TWP		RNG MER				
19	25		02		05			
Plots								
	Plot #	Stratum Plot technique Plot location (Lat) Plot				Plot loca	ation (Long)	
5		Ground	1 x 1	I	51° 08′ 44.	772" 114° 16' 17.004"		
Primary Ind	licator Observed (Circle and describe below	v)		1		1	
V1. Hydrop species in 20 percent species in	V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots ection							
V2. Surface	e encrustations	of algae are present?				No		
V3. The pro	esence of a dom	inant groundcover of p	eat mosse	es (Sphag	num spp.)	No		
V4. Dimini:	shed rigor and p	productivity of upland s	species in	disturbed	areas	No		
V5. Eviden (e.g. floati	V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)							
Other Comments Flat area of creek ravine with seeping water and saturated soils.						e with seeping s.		
Wetland Spe	ecies							
Common name of species Scientific name of spe			pecies	Facultativ	ve Wetland Wetland sp	or Obligate p	% Relat abunda	ive cover of ant species
Canad	a anemone	Anemone canaden	isis		No			5
commo	on horsetail	Equisetum arvens	se		No			10
creep	ing thistle	Cirsium arvense	9		No			2
fowl	bluegrass	Poa palustris			Yes			10
perennia	al sow-thistle	Sonchus arvensi	S	No				5
pric	kly rose	Rosa acicularis			No			1
wi	re rush	Juncus balticus		Yes 10				10
Upland Spec	cies							
Common n	ame of species	Scientific name of species			Facultative Wetland or Obligate Wetland spp		% Relative cover of abundant species	
bu	ckbrush	Symphoricarpos occid	entalis	No		10		
Canad	a anemone	Anemone canadensis		No			5	
commo	on horsetail	Equisetum arvense		No			5	
creep	ing thistle	Cirsium arvense		No			2	
Kentuck	ky bluegrass	Poa pratensis		No		10		
perennial sow-thistle Sonchus arvensis		s	No		5			
pric	kly rose	Rosa acicularis		No		10		
smoo	oth brome	Bromus inermis	is		No		2	
Plots								
	Plot #	Stratum	Plot tec	hnique	Plot loca	ition (Lat)	Plot loca	ation (Long)
6		Ground	1 x 1		51° 08′ 44.982		114° 16′ 17.262″	

	Apper	ndix 7	2017 Ju	ne 21 Wetland 4 Pits 5&6	
Primary Indicator Observed	(Circle and describe below)				
species in the community 20 percent or more areal species in the plots ection	Yes				
V2. Surface encrustations	No				
V3. The presence of a don	No				
V4. Diminished rigor and	productivity of upland species ir	n disturbed areas	No		
V5. Evidence of morpholo (e.g. floating leaves, infla	gical adaptations of plants to sa ted stems, adventitious roots)	turated conditions	No		
Other Comments					
Wetland Species			1		
Common name of species	Scientific name of species	Facultative Wetland Wetland sp	Facultative Wetland or Obligate		
Canada anemone	Anemone canadensis	No		2	
common dandelion	Taraxacum officinale	No		5	
common horsetail	Equisetum arvense	No		10	
fowl bluegrass	Poa palustris	Yes		10	
perennial sow-thistle	Sonchus arvensis	No		5	
wire rush	Juncus balticus	Yes		10	
Upland Species					
Common name of species	mon name of species Scientific name of species Wetland s		or Obligate	% Relative cover of abundant species	
buckbrush	Symphoricarpos occidentalis	No		5	
common horsetail	nmon horsetail Equisetum arvense No			5	
creeping thistle	creeping thistle Cirsium arvense			2	
Kentucky bluegrass	Poa pratensis	No		10	
northern gooseberry	Ribes oxyacanthoides	No		1	
perennial sow-thistle Sonchus arvensis		No		5	
prairie smoke		No		2	
prickly rose	Rosa acicularis	No		5	
smooth brome	Bromus inermis	No		10	
timothy	Phleum pratense	No		2	
wire rush Juncus balticus Yes				2	

Soils					
Soil Pit Depth (cm)	40				
Aspect					
Slope Position	Level depression				
S1. Organic soils (except Folists)	No				
S2. Presence of peat accumulation determined by Von Post test	No				
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No				
S4. Sulfidic material (odor of "rotten eggs") present	No				
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No				
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No				
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No				
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No				
c. Iron and manganese concretions within the surface layer (A-horizon); or	No				
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No				
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No				
a. Iron and manganese concretions or nodules; or	No				
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No				
c. Low chroma mottles	No				
S8. Sandy soils with one of the following present	No				
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No				
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No				
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No				
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No				
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No				
f. Organic concretions with 30 cm of the surface; or	No				
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No				
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No				
S10. Other regionally applicable, field-verificable soil properties associated with prolonged seasonal high water tables					
Surface water present	Yes				
Free water in soil pit	Yes				
Saturated soil Page 3 of 11	Yes				
Oxidized rhizospheres	No				
Water-stained leaves	No				

Appendix 7 2017 June 21 Wetlan				
Soil Horizon: Soil Pit 5				
Horizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil Chroma
Soil Pit 5	40			

Soils					
Soil Pit Depth (cm)	40				
Aspect					
Slope Position	Level depression				
S1. Organic soils (except Folists)	No				
S2. Presence of peat accumulation determined by Von Post test	No				
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No				
S4. Sulfidic material (odor of "rotten eggs") present	No				
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No				
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No				
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No				
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No				
c. Iron and manganese concretions within the surface layer (A-horizon); or	No				
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No				
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No				
a. Iron and manganese concretions or nodules; or	No				
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No				
c. Low chroma mottles	No				
S8. Sandy soils with one of the following present	No				
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No				
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No				
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No				
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No				
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No				
f. Organic concretions with 30 cm of the surface; or	No				
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No				
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No				
S10. Other regionally applicable, field-verificable soil properties associated with prolonged seasonal high water tables					
Surface water present	Yes				
Free water in soil pit	Yes				
Saturated soil Page 5 of T1	Yes				
Oxidized rhizospheres	No				
Water-stained leaves	No				

Appendix 7 2017 June 21 Wetland 4 Pits 5&6								
Soil Horizor	Soil Horizon: Soil Pit 6							
Н	orizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil Chroma			
Soil Pit 6	il Pit 6 40							
Widlife Obs	ervations							
Wildlife Common Name V			Wild	life Scientific Name		# Observed		
			Comments					
Soil deep bl	ack colour and sa	aturated						
Photos								
Photo #	Photo Description			Latitude	Longitude			
1	Wetland Habitat, between soil pits 5 and 6		6	51° 08' 44.772"	114° 16' 17.004"			
2	Soil Pit #5 Upland			51° 08' 44.940"	114° 16′ 16.938″			
3	Soil Pit #5 Wetland			51° 08' 44.772"	114° 16′ 17.004″			
4	Soil Pit #6 Upland			51° 08′ 44.718″	114° 16' 17.424"			
5	Soil Pit #6 Wetla	and		51° 08' 44.982"	114° 16′ 17	.262″		

Photos: 1 - 51° 08′ 44.772″ - 114° 16′ 17.004″ Photo Description *SP5&6 Habitat.JPG*



Photos: 2 - 51° 08' 44.940" - 114° 16' 16.938" Photo Description SP5Upland.JPG



Photos: 3 - 51° 08' 44.772" - 114° 16' 17.004" Photo Description *SP5Wetland.JPG*



Photos: 4 - 51° 08' 44.718" - 114° 16' 17.424" Photo Description *SP6Upland.JPG*


Photos: 5 - 51° 08' 44.982" - 114° 16' 17.262" Photo Description SP6Wetland.JPG



Appendix 7

2017 June 16 Wetland 4

Instruct	ions: Complete t	this form for the plant	communit	y at the b	oundary be	etween wet	land and n	on-wetland.
QWSP	Investigator	Company Nar	ne		Date	Project Name Wet		Wetland #
Donald Hode	ges; Wayne Bessie	e Westhoff Engineering Reso	ources Inc.	Jun 16, 2017 Hawkwood			WER116-77	4
		Legal la	nd descrip	tion of we	etland			
SEC		TWP		RNG			MER	
19	25		02			05		
Plots			I			1		
	Plot #	Stratum	Plot tec	hnique	Plot loca	tion (Lat)	Plot loca	ation (Long)
1		Ground	1 x 1		51.144606)	114.271572	2°
Primary Ind	icator Observed (Circle and describe belov	v)		1			
V1. Hydrop species in 20 percent species in	phytic species co the community o or more areal c the plots ection	over more than 50 perc or plot (An abundant s over in the community	cent of the pecies is a or plot). I	abundan plant spe List all ab	t plant ecies with undant	Yes		
V2. Surface	e encrustations	of algae are present?				No		
V3. The pre	esence of a dom	inant groundcover of p	beat mosse	es (Sphag	num spp.)	No		
V4. Diminis	V4. Diminished rigor and productivity of upland species in disturbed areas No							
V5. Eviden (e.g. floati	ce of morpholog ng leaves, inflat	ical adaptations of pla ed stems, adventitious	nts to satu s roots)	urated coi	nditions	No		
Other Com	ments			Flat area of creek ravine with seeping water and saturated soils.			e with seeping ls.	
Wetland Spe	ecies							
Common n	ame of species	Scientific name of s	pecies	Facultativ	ve Wetland o Wetland sp	or Obligate p	% Relat abunda	ive cover of ant species
Canad	a anemone	Anemone canader	nsis	No				5
creep	ing thistle	Cirsium arvense	9	No				1
fowl	bluegrass	Poa palustris		Yes				20
grace	eful sedge	Carex praegracil	is	Yes				1
perennia	al sow-thistle	Sonchus arvensi	S		No			2
stir	nkweed	Thlaspi arvense	•		No			1
wi	re rush	Juncus balticus			Yes			10
Upland Spec	cies							
Common name of species Scientific name of species					ve Wetland o Wetland sp	pr Obligate	% Relat abunda	ive cover of ant species
bud	ckbrush	Symphoricarpos occid	entalis		No			5
Canad	a anemone	Anemone canader	isis		No			5
common b	lue-eyed grass	Sisyrinchium monta	num		No		2	
Kentuck	ky bluegrass	Poa pratensis			No		20	
milk ve	etch species				No		2	
pric	kly rose	Rosa acicularis		No			2	

Appendix 7

Soils	
Soil Pit Depth (cm)	40
Aspect	
Slope Position	Level depression
S1. Organic soils (except Folists)	No
S2. Presence of peat accumulation determined by Von Post test	No
S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present	No
S4. Sulfidic material (odor of "rotten eggs") present	No
S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm	No
S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:	No
a. Thin surface layer (at least 0.5 cm) of peat or muck; or	No
b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or	No
c. Iron and manganese concretions within the surface layer (A-horizon); or	No
d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A- horizon) and the crushed color is chroma 2 or less	No
S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:	No
a. Iron and manganese concretions or nodules; or	No
b. Distinct or prominent oxidized rhizospheres along several living roots; or	No
c. Low chroma mottles	No
S8. Sandy soils with one of the following present	No
a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or	No
b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or	No
c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or	No
d. Vertical organic streaking or blotchiness with 30 cm of the surface; or	No
e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or	No
f. Organic concretions with 30 cm of the surface; or	No
g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface	No
S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	No
S10. Other regionally applicable, field-verificable soil properties ass tables	ociated with prolonged seasonal high water
Surface water present	Yes
Free water in soil pit	Yes
Saturated soil Page 2 of 4	Yes
Oxidized rhizospheres	No
Water-stained leaves	No

			Appendix 7		2017 June	e 16 Wetland 4	
Soil Horizor	1:						
Н	orizon	Depth (cm)	Munsell Soil Colour	Soil Value	Soil Chroma		
Widlife Obs	ervations						
	Wildlife Com	mon Name	Wildl	Wildlife Scientific Name			
			Comments				
Soil deep bl	ack colour and sa	aturated					
Photos							
Photo #		Photo Description	า	Latitude Lon		ngitude	
1	View of southerr reservoir.	n portion of Wetland 4, n	51.144606°	06° 114.271572°			

Photos: 1 - 51.144606° - 114.271572° Photo Description *Wetland 4APP7.1.JPG*



Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Wetland ID	Photo Date (M/D/Y)	Photo ID (Roll AS#, Photo #)	Season	AWCS Wetland Class	Precipitation Year (mm)	Precipitation Month (mm)	Precipitation Day (mm)	Surface or Open Water or Wetland Vegetation
	6/9/1950	AS 167, Photo 66	SUM	Marsh – graminoid - Permanent	No Data	No Data	No Data	Surface Water
	8/2/1966	AS 953, Photo 96	SUM		447.22 – Avg	Total precipitation for the month is 85.53	No daily precipitation, previous 10 days 33.76	Surface Water
	6/12/1974	AS 1316, Photo 166	SUM		365.73 – Dry	Total precipitation for the month is 17.04	No daily precipitation, previous 10 days 8.96	Surface Water
	10/11/1977	AS 2980, Photo 162	F		419.46 – Avg	Total precipitation for the month is 2.91	No daily precipitation, previous 10 days 11.45	Vegetation
	10/3/1981	AS 2397, Photo 153	F		549.96 – Wet	Total precipitation for the month is 33.9	No daily precipitation, previous 10 days 6.19	Surface Water
1	5/8/1988	AS 3694, Photo 185	S		404.74 – Avg	Total precipitation for the month is 17.78	No daily precipitation, previous 10 days 2.54	Surface Water
	8/19/1994	AS 4543, Photo 165	S		459.79 – Avg	Total precipitation for the month is 113.57	No daily precipitation, previous 10 days 51.35	Surface Water
	7/21/1997	AS 4837, Photo 32	S		378.32 – Dry	Total precipitation for the month is 19.2	No daily precipitation, previous 10 days 5.66	Surface Water
	5/12/2002	AS 5208B, Photo 36	S		374.22 – Dry	Total precipitation for the month is 43.94	No daily precipitation, previous 10 days 24.47	Surface Water
	5/12/2005	Google Earth	S		654.35 – Wet	Total precipitation for the month is 25.25	No daily precipitation, previous 10 days 9.11	Surface Water
	9/13/2008	Google Earth	SUM		767.41 – Wet	Total precipitation for the month is 45.41	Daily precipitation is 0.16, previous 10 days 28.58	Surface Water

Biophysical Impact Assessment for the Ascension Lands
Final Report
August 31, 2020

Wetland ID	Photo Date (M/D/Y)	Photo ID (Roll AS#, Photo #)	Season	AWCS Wetland Class	Precipitation Year (mm)	Precipitation Month (mm)	Precipitation Day (mm)	Surface or Open Water or Wetland Vegetation	
	0/7/2012	Google Farth	SLINA		421.90 - Avg	Total precipitation for	No daily precipitation,	Surface Water	
	5/7/2012	Google Laith	30101		421.09 – Avg	the month is 8.9	previous 10 days 0.88		
	7/20/2014	Coogle Farth	SLINA		400.99 Aug	Total precipitation for	No daily precipitation,	Surface Water	
	//28/2014	Google Earth	20101		400.88 – Avg	the month is 15.18	previous 10 days 10.51		
	9/22/2015	Google Farth	SLINA		405.92 Avg	Total precipitation for	No daily precipitation,	Surface Water	
	8/22/2013	Google Laith	30101		403.82 - Avg	the month is 109.1	previous 10 days 58.65	Surface Water	
	4/17/2016	Google Earth	S		No Data	No Data	No Data	Surface Water	

Biophysical Impact Assessment for the Ascension Lands Final Report August 31, 2020

Surface or Open AWCS Photo ID Wetland Photo Date Precipitation **Precipitation Month** Water or (Roll AS#, Season Wetland Precipitation Day (mm) (M/D/Y)ID Wetland Year (mm) (mm) Photo #) Class Vegetation Marsh – AS 167, 6/9/1950 SUM graminoid -No Data No Data No Data Vegetation Photo 66 Seasonal AS 953, Total precipitation for No daily precipitation, 8/2/1966 SUM 447.22 – Avg Vegetation Photo 96 the month is 85.53 previous 10 days 33.76 AS 1316, Total precipitation for No daily precipitation, 6/12/1974 SUM 365.73 - Dry Surface Water Photo 166 the month is 17.04 previous 10 days 8.96 Total precipitation for AS 2980, No daily precipitation, F 10/11/1977 419.46 – Avg Vegetation Photo 162 the month is 2.91 previous 10 days 11.45 AS 2397, Total precipitation for No daily precipitation, 10/3/1981 F 549.96 – Wet Vegetation Photo 153 the month is 33.9 previous 10 days 6.19 2 AS 3694, Total precipitation for No daily precipitation, S 404.74 – Avg 5/8/1988 Vegetation Photo 185 the month is 17.78 previous 10 days 2.54 AS 4543, Total precipitation for No daily precipitation, S 8/19/1994 459.79 – Avg Vegetation Photo 165 the month is 113.57 previous 10 days 51.35 AS 4837. Total precipitation for No daily precipitation, 7/21/1997 S 378.32 - Dry Vegetation Photo 32 the month is 19.2 previous 10 days 5.66 Total precipitation for No daily precipitation, AS 5208B, 5/12/2002 S 374.22 – Drv Vegetation Photo 36 the month is 43.94 previous 10 days 24.47 Total precipitation for No daily precipitation, S 5/12/2005 Google Earth 654.35 – Wet Vegetation the month is 25.25 previous 10 days 9.11 Total precipitation for Daily precipitation is 0.16, 9/13/2008 Google Earth SUM 767.41 – Wet Vegetation the month is 45.41 previous 10 days 28.58

Westhoff

Engineering

Resources,

Inc.

Westhoff	Biophysical Impact Assessment for the
Engineering	Ascension Lands
Resources,	Final Report
Inc.	August 31, 2020

Wetland ID	Photo Date (M/D/Y)	Photo ID (Roll AS#, Photo #)	Season	AWCS Wetland Class	Precipitation Year (mm)	Precipitation Month (mm)	Precipitation Day (mm)	Surface or Open Water or Wetland Vegetation	
	9/7/2012	Google Farth	SLIM		421.80 - Avg	Total precipitation for	No daily precipitation,	Vegetation	
	9/7/2012	Google Laith	30101		421.09 - Avg	the month is 8.9	previous 10 days 0.88		
	7/28/2014	Google Farth	SLINA		400.99 Ava	Total precipitation for	No daily precipitation,	Vagatation	
	//28/2014	Google Laith	30101		400.88 – Avg	the month is 15.18	previous 10 days 10.51	vegetation	
	9/22/2015	Google Farth	SLINA		405.92 Avg	Total precipitation for	No daily precipitation,	Vagatation	
	8/22/2013	Google Laith	30101		403.82 - Avg	the month is 109.1	previous 10 days 58.65	vegetation	
	4/17/2016	Google Earth	S		No Data	No Data	No Data	Vegetation	

Biophysical Impact Assessment for the Engineering **Ascension Lands Final Report** August 31, 2020

Wetland ID	Photo Date (M/D/Y)	Photo ID (Roll AS#, Photo #)	Season	AWCS Wetland Class	Precipitation Year (mm)	Precipitation Month (mm)	Precipitation Day (mm)	Surface or Open Water or Wetland Vegetation
	6/9/1950	AS 167, Photo 66	SUM	Marsh – graminoid - Seasonal	No Data	No Data	No Data	Vegetation
	8/2/1966	AS 953, Photo 96	SUM		447.22 – Avg	Total precipitation for the month is 85.53	No daily precipitation, previous 10 days 33.76	Vegetation
	6/12/1974	AS 1316, Photo 166	SUM		365.73 – Dry	Total precipitation for the month is 17.04	No daily precipitation, previous 10 days 8.96	Vegetation
	10/11/1977	AS 2980, Photo 162	F		419.46 – Avg	Total precipitation for the month is 2.91	No daily precipitation, previous 10 days 11.45	Vegetation
	10/3/1981	AS 2397, Photo 153	F		549.96 – Wet	Total precipitation for the month is 33.9	No daily precipitation, previous 10 days 6.19	Vegetation
3	5/8/1988	AS 3694, Photo 185	S		404.74 – Avg	Total precipitation for the month is 17.78	No daily precipitation, previous 10 days 2.54	Vegetation
	8/19/1994	AS 4543, Photo 165	S		459.79 – Avg	Total precipitation for the month is 113.57	No daily precipitation, previous 10 days 51.35	Vegetation
	7/21/1997	AS 4837, Photo 32	S		378.32 – Dry	Total precipitation for the month is 19.2	No daily precipitation, previous 10 days 5.66	Vegetation
	5/12/2002	AS 5208B, Photo 36	S		374.22 – Dry	Total precipitation for the month is 43.94	No daily precipitation, previous 10 days 24.47	Vegetation
	5/12/2005	Google Earth	S		654.35 – Wet	Total precipitation for the month is 25.25	No daily precipitation, previous 10 days 9.11	Vegetation
	9/13/2008	Google Earth	SUM		767.41 – Wet	Total precipitation for the month is 45.41	Daily precipitation is 0.16, previous 10 days 28.58	Vegetation

Westhoff

Resources,

Inc.

Westhoff	Biophysical Impact Assessment for the
Engineering	Ascension Lands
Resources,	Final Report
Inc.	August 31, 2020

Wetland ID	Photo Date (M/D/Y)	Photo ID (Roll AS#, Photo #)	Season	AWCS Wetland Class	Precipitation Year (mm)	Precipitation Month (mm)	Precipitation Day (mm)	Surface or Open Water or Wetland Vegetation	
	9/7/2012	Google Farth	SLIM		421.80 - Avg	Total precipitation for	No daily precipitation,	Vegetation	
	5/7/2012	Google Laith	30101		421.09 - Avg	the month is 8.9	previous 10 days 0.88	vegetation	
	7/28/2014	Google Farth	SLIM		400 88 - Ava	Total precipitation for	No daily precipitation,	Vegetation	
	772872014	Google Laith	30101		400.88 – Avg	the month is 15.18	previous 10 days 10.51	vegetation	
	8/22/2015	Google Farth	SLIM		405.82 - Avg	Total precipitation for	No daily precipitation,	Vegetation	
	0/22/2015	Google Earth	50101		403.82 - Avg	the month is 109.1	previous 10 days 58.65	vegetation	
	4/17/2016	Google Earth	S		No Data	No Data	No Data	Vegetation	

Biophysical Impact Assessment for the Ascension Lands Final Report August 31, 2020

Surface or Open AWCS Photo ID Wetland Photo Date Precipitation **Precipitation Month** Water or (Roll AS#, Season Wetland Precipitation Day (mm) (M/D/Y)ID Wetland Year (mm) (mm) Photo #) Class Vegetation Marsh – AS 167, 6/9/1950 SUM graminoid -No Data No Data No Data Vegetation Photo 66 Seasonal AS 953, Total precipitation for No daily precipitation, 8/2/1966 SUM 447.22 – Avg Vegetation Photo 96 the month is 85.53 previous 10 days 33.76 AS 1316, Total precipitation for No daily precipitation, 6/12/1974 SUM 365.73 - Dry Vegetation Photo 166 the month is 17.04 previous 10 days 8.96 Total precipitation for AS 2980, No daily precipitation, F 10/11/1977 419.46 – Avg Vegetation Photo 162 the month is 2.91 previous 10 days 11.45 AS 2397, Total precipitation for No daily precipitation, 10/3/1981 F 549.96 – Wet Vegetation Photo 153 the month is 33.9 previous 10 days 6.19 4 AS 3694, Total precipitation for No daily precipitation, S 404.74 – Avg 5/8/1988 Vegetation Photo 185 the month is 17.78 previous 10 days 2.54 AS 4543, Total precipitation for No daily precipitation, Vegetation and S 8/19/1994 459.79 – Avg Photo 165 the month is 113.57 previous 10 days 51.35 Surface Water AS 4837. Total precipitation for No daily precipitation, 7/21/1997 S 378.32 - Dry Vegetation Photo 32 the month is 19.2 previous 10 days 5.66 Total precipitation for No daily precipitation, AS 5208B, 5/12/2002 S 374.22 – Drv Vegetation Photo 36 the month is 43.94 previous 10 days 24.47 Total precipitation for No daily precipitation, S 5/12/2005 Google Earth 654.35 – Wet Vegetation the month is 25.25 previous 10 days 9.11 Total precipitation for Daily precipitation is 0.16, 9/13/2008 Google Earth SUM 767.41 – Wet Vegetation the month is 45.41 previous 10 days 28.58

Westhoff

Engineering

Resources,

Inc.

Westhoff	Biophysical Impact Assessment for the
Engineering	Ascension Lands
Resources,	Final Report
Inc.	August 31, 2020

Wetland ID	Photo Date (M/D/Y)	Photo ID (Roll AS#, Photo #)	Season	AWCS Wetland Class	Precipitation Year (mm)	Precipitation Month (mm)	Precipitation Day (mm)	Surface or Open Water or Wetland Vegetation	
	9/7/2012	Google Earth	SUM		421.89 – Avg	Total precipitation for	No daily precipitation,	Vegetation	
						the month is 8.9	previous 10 days 0.88		
	7/28/2014	Google Farth	SLIM		400.99 Ava	Total precipitation for	No daily precipitation,	Vagatation	
	772872014	Google Laith	30101	40	400.00 - Avg	the month is 15.18	previous 10 days 10.51	vegetation	
8,	8/22/2015	Google Earth	h SUM		405.82 - Avg	Total precipitation for	No daily precipitation,	Vagatation	
						the month is 109.1	previous 10 days 58.65	vegetation	
	4/17/2016	Google Earth	S		No Data	No Data	No Data	Vegetation	

Westhoff
Engineering
Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands Final Report

August 31, 2020

Appendix E Potential Wildlife Species

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page 54

Species		Provincial Listing		Federal Listing				
Common Name	Scientific Name	General Status	Wildlife Act	COSEWIC	SARA Schedule 1			
Amphibians and Reptiles								
boreal chorus frog	Pseudacris maculata	S						
Canadian toad	Bufo hemiophrys	MBAR						
northern leopard frog	Rana pipiens	AR	EN	SC	SC			
red-sided garter snake	Thamnophis sirtalis	SEN						
tiger salamander	Ambystoma tigrinum	S						
wandering garter snake	Thamnophis elegans	SEN						
western toad	Bufo boreas	SEN						
wood frog	Rana sylvatica	S						
	Mammals		-					
American badger	Taxidea taxus	SEN			EN			
big brown bat	Eptesicus fuscus	S						
black bear	Ursus americanus	S						
bushy-tailed woodrat	Neotoma cinerea	S						
common porcupine	Erethizon dorsatum	S						
coyote	Canis latrans	S						
deer mouse	Peromyscus maniculatus	S						
dusky shrew	Sorex monticolus	S						
ermine	Mustela erminea	S						
grey squirrel	Sciurus carolinensis	EX						
grizzly bear	Ursus arctos	AR		SC				
hoary bat	Lasiurus cinereus	SEN						
house mouse	Mus musculus	EX						
least chipmunk	Tamias minimus	S						
least weasel	Mustela nivalis	S						
little brown bat	Myotis lucifugus	S						
long-eared bat	Myotis evotis	S						
long-tailed vole	Microtus longicaudus	S						
long-tailed weasel	Mustela frenata	MBAR						
masked shrew	Sorex cinereus	S						
meadow vole	Microtis pennsylvanicus	S						
mink	Neovision vison	S						
moose	Alces alces	S						
mule deer	Odocoileus hemionus	S						
muskrat	Ondatra zibethicus	S						
northern flying squirrel	Glaucomys sabrinus	S						

© Westhoff Engineering Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page 55

Species			Provincial Listing		Federal Listing	
Common Name	Scientific Name	General Status	Wildlife Act	COSEWIC	SARA Schedule 1	
northern long-eared bat	Myotis septentrionalis	MBAR				
northern pocket gopher	Thomomys talpoides	S				
porcupine	Erethizon dorsatum					
pygmy shrew	Sorex hoyi	S				
red bat	Lasiurus borealis	SEN				
red fox	Vulpes vulpes	S				
red squirrel	Tamiasciurus hudsonicus	S				
Richardson's ground squirrel	Spermophilus richardsonii	S				
sagebrush vole	Lemmiscus curtatus	S				
silver-haired bat	Lasionycteris noctivagans	SEN				
snowshoe hare	Lepus americanus	S				
southern red-backed vole	Clethrionomys gapperi	S				
striped skunk	Mephitis mephitis	S				
thirteen-lined ground squirrel	Spermophilus tridecemlineatus	UN				
water shrew	Sorex palustris	S				
western heather vole	Phenacomys intermedius	S				
western jumping mouse	Zapus princeps	S				
white-tailed deer	Odocoileus virginianus	S				
white-tailed jack rabbit	Lepus townsendii	S				
	Birds					
American coot	Fulica americana	S				
American crow	Corvus brachyrhynchos	S				
American dipper	Cinclus mexicanus	S				
American goldfinch	Carduelis tristis	S				
American green-winged teal	Anas crecca	SEN				
American kestrel	Falco sparverius	SEN				
American redstart	Setophaga ruticilla	S				
American robin	Turdus migratorius	S				
American wigeon	Anas Americana	S				
bald eagle	Haliaeetus leucocephalus	SEN				
Baltimore oriole	lcterus galbula	SEN				
bank swallow	Riparia riparia	S				
barn swallow	Hirundo rustica	SEN				
Barrow's goldeneye	Bucephala islandica	S				
belted kingfisher	Ceryle alcyon	S				

© Westhoff Engineering Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page 56

Species			Provincial Listing		Federal Listing	
Common Name	Scientific Name	General Status	Wildlife Act	COSEWIC	SARA Schedule 1	
black-billed cuckoo	Coccyzus erythropthalmus	UN				
black-billed magpie	Pica hudsonia	S				
black-capped chickadee	Poecile atricapilla	S				
blackpoll warbler	Dendroica striata	S				
blue jay	Cyanocitta cristata	S				
blue-winged teal	Anas discors	S				
bohemian waxwing	Bombycilla garrulus	S				
Bonaparte's gull	Larus philadelphia	S				
Brewer's blackbird	Euphagus cyanocephalus	S				
broad-winged hawk	Buteo platypterus	SEN				
brown creeper	Certhia Americana	SEN				
brown thrasher	Toxostoma rufum	S				
brown-headed cowbird	Molothrus ater	S				
bufflehead	Bucephala albeola	S				
California gull	Larus californicus	S				
Calliope hummingbird	Stellula calliope	S				
Canada goose	Branta canadensis	S				
Canada warbler	Wilsonia Canadensis	SEN		TH	TH	
cedar waxwing	Bombycilla cedrorum	S				
chipping sparrow	Spizella passerina	S				
clay-colored sparrow	Spizella pallida	S				
cliff swallow	Petrochelidon pyrrhonota	S				
common goldeneye	Bucephala clangula	S				
common grackle	Quiscalus quiscula	S				
common merganser	Mergus merganser	S				
common nighthawk	Chordeiles minor	SEN		TH	ТН	
common raven	Corvus corax	S				
common redpoll	Carduelis flammea	S				
common snipe	Gallinago delicata	S				
common tern	Sterna hirundo	S				
Connecticut warbler	Oporornis agilis	S				
Cooper's hawk	Accipiter cooperii	S				
dark-eyed junco	Junco hyemalis	S				
downy woodpecker	Picoides pubescens	S				
eastern kingbird	Tyrannus tyrannus	S				
eastern phoebe	Sayornis phoebe	SEN				

[©] Westhoff Engineering Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page 57

Species			Provincial Listing		Federal Listing	
Common Name	Scientific Name	General Status	Wildlife Act	COSEWIC	SARA Schedule 1	
European starling	Sturnus vulgaris	EX				
evening grosbeak	Coccothraustes vespertinus	S				
Franklin's gull	Larus pipixcan	S				
gadwall	Anas strepera	S				
gray catbird	Dumetella carolinensis	S				
gray partridge	Perdix perdix	EX				
gray-crowned rosy-finch	Leucosticte tephrocotis	S				
great blue heron	Ardea herodias	SEN			SC	
great gray owl	Strix nebulosa	SEN				
great horned owl	Bubo virginianus	S				
greater scaup	Aythya marila	S				
greater yellowlegs	Tringa melanoleuca	S				
hairy woodpecker	Picoides villosus	S				
harlequin duck	Histrionicus histrionicus	SEN		SC	SC	
herring gull	Larus argentatus	S				
hoary redpoll	Acanthis hornemanni	S				
hooded merganser	Lophodytes cucullatus	S				
horned grebe	Podiceps auritus	SEN		SC		
house finch	Carpodacus mexicanus	S				
house sparrow	Passer domesticus	EX				
house wren	Troglodytes aedon	S				
killdeer	Charadrius vociferus	S				
lazuli bunting	Passerina amoena	S				
least flycatcher	Empidonax minimus	SEN				
lesser scaup	Aythya affinis	SEN				
lesser yellowlegs	Tringa flavipes	S				
Lincoln's sparrow	Melospiza lincolnii	S				
long-eared owl	Asio otus	S				
Macgillivray's warbler	Oporornis tolmiei	S				
magnolia warbler	Dendroica magnolia	S				
mallard	Anas platyrhynchos	S				
merlin	Falco columbarius	S				
mountain bluebird	Sialia currucoides	S				
mourning dove	Zenaida macroura	S				
Nashville warbler	Vermivora ruficapilla	S				
northern flicker	Colaptes auratus	S				

© Westhoff Engineering Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page 58

Species			Provincial Listing		Federal Listing	
Common Name	Scientific Name	General Status	Wildlife Act	COSEWIC	SARA Schedule 1	
northern goshawk	Accipiter gentilis	SEN			TH	
northern mockingbird	Mimus polyglottos	S				
northern pintail	Anas acuta	SEN				
northern rough-winged swallow	Stelgidopteryx serripennis	S				
northern shoveler	Anas clypeata	S				
northern shoveler	Anas clypeata	S				
northern shrike	Lanius excubitor	S				
northern waterthrush	Seiurus noveboracensis	S				
orange-crowned warbler	Vermivora celata	S				
pacific-slope flycatcher	Empidonas difficilis	UN				
peregrine falcon	Falco peregrinus	AR	EN	SC	ТН	
Philadelphia vireo	Vireo philadelphicus	S				
pileated woodpecker	Dryocopus pileatus	SEN				
pine grosbeak	Pinicola enucleator	S				
pine siskin	Carduelis pinus	S				
purple finch	Carpodacus purpureus	S				
purple martin	Progne subis	SEN				
red-breasted nuthatch	Sitta canadensis	S				
red-eyed vireo	Vireo olivaceus	S				
redhead	Aythya Americana	S				
red-necked grebe	Podiceps grisegena	S				
red-tailed hawk	Buteo jamaicensis	S				
red-winged blackbird	Agelaius phoeniceus	S				
ring-billed gull	Larus delawarensis	S				
ring-necked pheasant	Phasianus colchicus	EX				
rock pigeon	Columba livia	EX				
rose-breasted grosbeak	Pheucticus ludovicianus	S				
rough-legged hawk	Buteo lagopus	S				
ruby-crowned kinglet	Regulus calendula	S				
ruby-throated hummingbird	Archilochus colubris	S				
ruddy duck	Oxyura jamaicensis	S				
ruffed grouse	Bonasa umbellus	S				
rusty blackbird	Euphagus carolinus	SEN		SC	SC	
Savannah sparrow	Passerculus sandwichensis	S				
sharp-shinned hawk	Accipiter striatus	S				

[©] Westhoff Engineering Resources, Inc.

Biophysical Impact Assessment for the Ascension Lands

Final Report August 31, 2020

Page 59

Species			Provincial Listing		Federal Listing	
Common Name	Scientific Name	General Status	Wildlife Act	COSEWIC	SARA Schedule 1	
sharp-tailed grouse	Tympanuchus phasianellus	SEN				
snow goose	Chen caerulescens	S				
solitary sandpiper	Tringa solitaria	S				
song sparrow	Melospiza melodia	S				
sora	Porzana carolina	SEN				
spotted sandpiper	Actitis macularia	S				
spotted towhee	Pipilo maculatus	S				
Swainson's hawk	Buteo swainsoni	SEN				
Swainson's thrush	Catharus ustulatus	S				
Tennessee warbler	Vermivora peregrina	S				
Townsend's solitaire	Myadestes townsendi	S				
Townsend's warbler	Dendroica townsendi	S				
tree swallow	Tachycineta bicolor	S				
trumpeter swan	Cygnus buccinators	AR	EN			
tundra swan	Cygnus columbianus	S				
turkey vulture	Cathartes aura	S				
veery	Catharus fuscescens	S				
vesper sparrow	Pooecetes gramineus	S				
violet-green swallow	Tachycineta thalassina	S				
warbling vireo	Vireo gilvus	S				
western meadowlark	Sturnella neglecta	S				
western wood-pewee	Contopus sordidulus	SEN				
white-breasted nuthatch	Sitta carolinensis	S				
White-crowned sparrow	Zonotrichia leucophrys	S				
white-throated sparrow	Zonotrichia albicollis	S				
willow flycatcher	Empidonax traillii	S				
Wilson's warbler	Wilsonia pusilla	S				
winter wren	Troglodytes troglodytes	S				
wood duck	Aix sponsa	S				
yellow warbler	Dendroica petechia	S				
yellow-bellied sapsucker	Sphyrapicus varius	S				
yellow-headed blackbird	Xanthocephalus xanthocephalus	S				
yellow-rumped warbler	Dendroica coronata	S				