

# FINAL REPORT

Hydrogeology of Agricultural  
Development Areas,  
Newfoundland & Labrador

NEWFOUNDLAND AND LABRADOR  
DEPARTMENT OF ENVIRONMENT  
AND CONSERVATION – WATER  
RESOURCES MANAGEMENT  
DIVISION

REPORT NO. 1034406



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REPORT TO

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Environment and Conservation - Water  
Resources Management Division  
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ON

**Hydrogeology of Agricultural Development  
Areas, Newfoundland & Labrador**

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## 1.0 INTRODUCTION

Jacques Whitford Limited (Jacques Whitford) was retained by the Newfoundland and Labrador Department of Environment and Conservation (NLDEC) - Water Resources Management Division to carry out a detailed hydrogeological assessment of Agricultural Designated Areas (ADAs) in the province of Newfoundland and Labrador. This study was carried out as part of the Canada-Newfoundland and Labrador National Water Supply Expansion Program to increase knowledge of the hydrogeology of the province's ADAs, and to determine the suitability and availability of groundwater supply for agricultural needs in these areas.

The report is presented in twenty (20) sections. Section 1 provides an overview of the study area, describes the objectives and scope of the project, and summarizes the methodology used for the hydrogeological assessment. Results of the hydrogeological assessment are presented by ADA in Sections 2 through 18; and includes a description of the physical setting, bedrock and surficial geology, hydrostratigraphy, groundwater flow regime, surface and groundwater quality, and groundwater resource estimates for each ADA. Section 19 discusses the limitations of the assessment. References consulted to carry out the hydrogeological assessment are provided in Section 20. Supporting information is provided in appendices by ADA.

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### 1.1 Study Area

A total of 21 Agricultural Designated Areas (ADAs) are currently defined within Newfoundland and Labrador, and were evaluated as part of the current study, including the following:

#### **Newfoundland**

1. St. John's ADA;
2. Avalon South ADA;
3. Markland ADA;
4. Lamaline ADA;
5. Winterland ADA;
6. Bay d'Espoir ADA;
7. Lethbridge ADA;
8. Mugravetown ADA;
9. Winter Brook ADA;
10. Terra Nova ADA;
11. Gander ADA;
12. Wooddale ADA;
13. Botwood ADA;
14. Lewisporte ADA;
15. Comfort Cove ADA;
16. Springdale ADA;
17. Humber Valley ADA;



18. Port au Port ADA;
19. Robinson's-St.Fintans ADA;
20. Codroy ADA; and,

## **Labrador**

21. Goose Bay ADA.

The locations of the ADAs are shown on Drawing No. 1034406-1-1 in Appendix 1, and detailed descriptions of their location and extent are provided in subsequent sections of the report.

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## 1.2 Objectives & Scope

The objectives of the study were to carry out detailed hydrogeological assessment of the twenty-one (21) ADAs currently defined in the province to increase knowledge of the hydrogeology, and to determine the suitability and availability of groundwater supply for agricultural needs in these areas. The end goal of the study was to provide a comprehensive assessment of groundwater resource potential in the ADAs that will benefit the agricultural community by providing data on water supply sustainability and quality, and will assist in the decision-making process on issues such as viable water sources (groundwater versus surface water), water supply suitability for various agricultural water needs and uses (i.e., irrigation, livestock, etc), water chemistry and sustainability.

The hydrogeological assessment carried out as part of the current study relied solely on existing reports and other available sources of information, including various federal and provincial government databases, and did not include any hydrogeologic field investigations to collect new data in support of the project.

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## 1.3 Methodology

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### 1.3.1 Information Sources

Various sources of information were consulted to carry out the hydrogeological assessment of the ADAs, and included:

- Department of Environment and Conservation Water Resources Management Division Drilled Water Well Database for wells drilled between 1950 and March, 2008;
- Agriculture and Agri-Foods Canada National Soils Database;
- Environment Canada National Climate Archive and Information Database;
- Newfoundland and Labrador Ambient Water Quality Database available through the Canada and Newfoundland/Labrador Aqua Link;
- Newfoundland and Labrador Department of Environment and Conservation - Water Resources Management Division Drinking Water Quality Database (unpublished);
- Newfoundland and Labrador Department of Environment and Conservation – Parks and Natural Areas Division Ecoregion Brochures;



- Newfoundland and Labrador Department of Natural Resources - Agrifoods Division Land use Database (unpublished); and,
- Various federal and provincial bedrock and surficial geology maps and reports, as indicated in the List of References provided at the end of the report.

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### 1.3.2 Hydrogeological Assessment

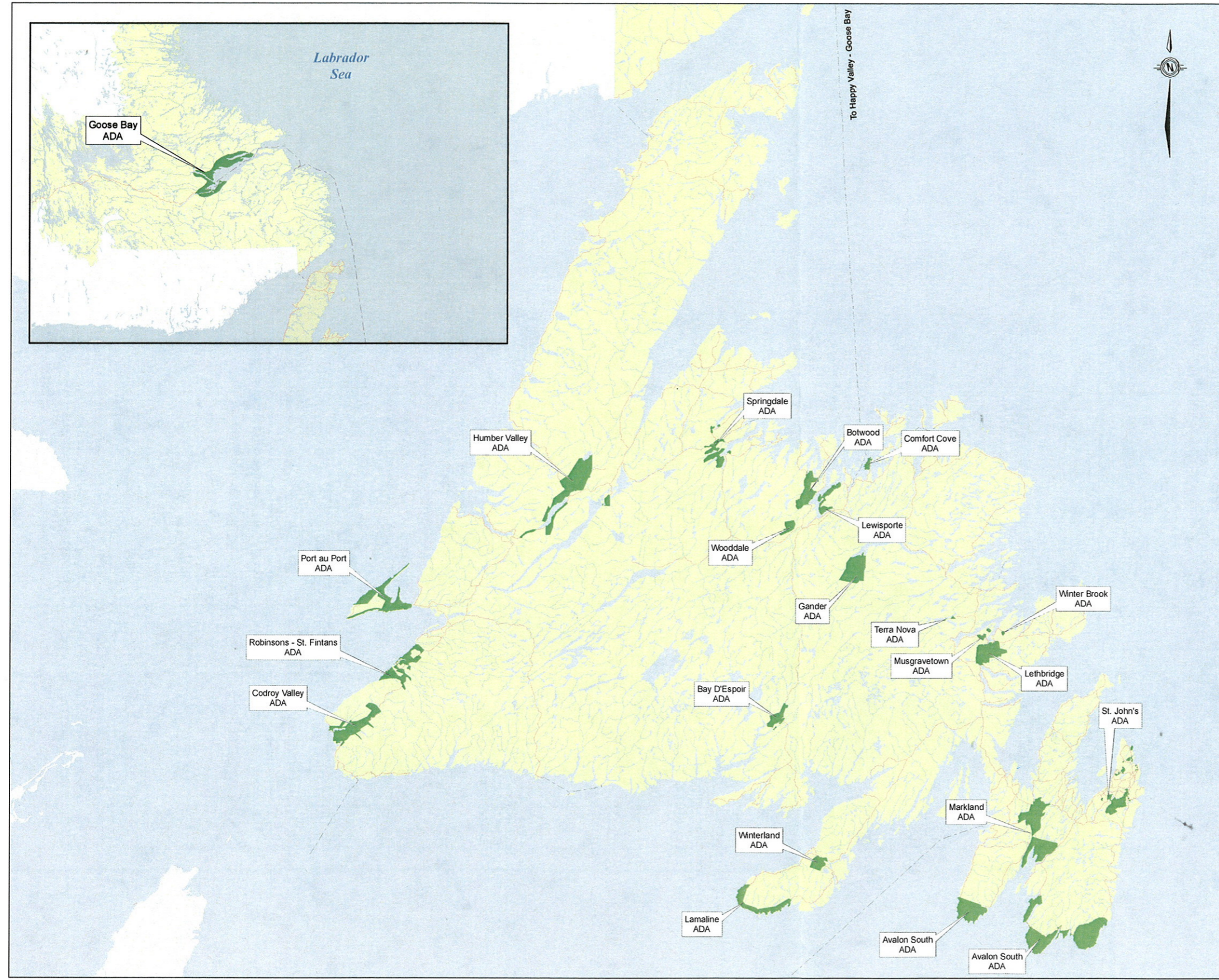
The desktop study-based work items carried out as part of the hydrogeological assessment included:





- Acquire and compile all available hydrogeology-related data, reports, and maps for each ADA;
- Overlay ADA boundary plans provided by the NL Department of Natural Resources Agrifoods Division on various 1:50,000-scale topographic maps and aerial and satellite photographs to evaluate the physical setting, including physiography, topography, and drainage, of each ADA.
- Consultation with Environment Canada's historical meteorological records to characterize climatic conditions in each ADA.
- Consultation with Newfoundland and Labrador Department of Environment and Conservation – Parks and Natural Areas Division Ecoregion Brochures in relation to climate and vegetation in each ADA.
- Consultation with NL Department of Natural Resources Agrifoods Division databases in relation to agricultural land use in each ADA.
- Overlay ADA boundary plans on geology maps to determine surficial and bedrock geology, and the presence of any major faults or other structural features in each ADA. Supported by consultation with various federal and provincial bedrock and surficial geology reports, as indicated in the List of References provided at the end of the report.
- Consultation with Newfoundland and Labrador Department of Environment and Conservation - Water Resources Management Division Drilled Water Well Database to acquire water well records for use in evaluating the groundwater potential of various geological units in each ADA.
- Carry out statistical analysis to determine minimum, maximum and mean potential well yields within hydrostratigraphic units in each ADA.
- Assess the groundwater flow system in each ADA based on various hydrogeology-related data, reports, and maps.
- Compile surface water quality data from various sources for each ADA, and compare to applicable federal and provincial guidelines and criteria.
- Compile groundwater quality data from the Newfoundland and Labrador Department of Environment and Conservation - Water Resources Management Division Drinking Water Quality database, and compare to applicable federal and provincial guidelines and criteria.

- Production of maps for each ADA showing spatial distribution of various geological and hydrogeological data.
- Determination of groundwater recharge and availability in each ADA.
- Preparation of a detailed report that presents all of the findings and results of the hydrogeological assessment.

# APPENDIX 1

## Regional Drawings



-  Major Road
-  Ferry Route
-  Hydrology
-  Agricultural Development Area



PROJECT TITLE

**HYDROGEOLOGY OF AGRICULTURAL DEVELOPMENT AREAS, NEWFOUNDLAND AND LABRADOR**

DRAWING TITLE

**REGIONAL MAP SHOWING LOCATION OF ADAs**

**Jacques Whitford**

	SCALE	1:2,500,000	DATE	01/02/2008
	DRAWN BY:	JLB	CHECKED BY:	
	EDITED BY:	JLB	REV. No.	0
	DRAWING No.	1034406-1-1		
	MAP FILE	1034406-01.MXD		